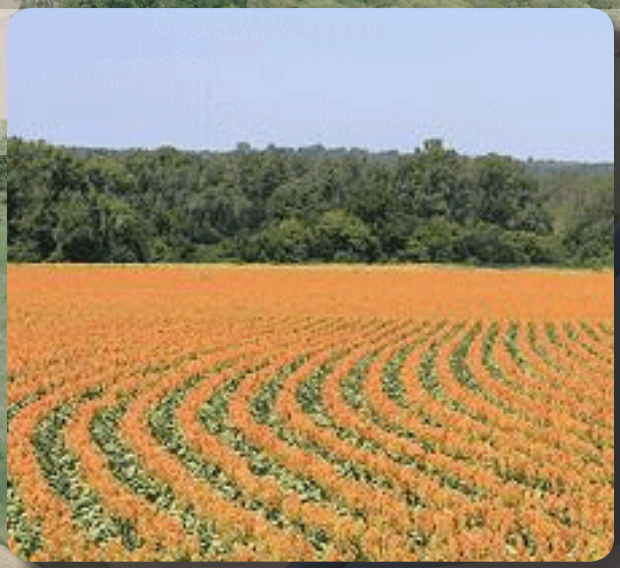
United States Department of State
Office of Environmental Quality and Transboundary Issues
Bureau of Oceans and International Environmental and Scientific Affairs

Draft Supplemental Environmental Impact Statement

Keystone XL Mainline Alternative Route

September
2018



COVER SHEET

United States Department of State

Title: Supplemental Environmental Impact Statement for Keystone XL Mainline Alternative Route

Location: Nebraska

Contact: For further information about this Supplemental Environmental Impact Statement, or for general information on the Department of State's process for implementing the National Environmental Policy Act, contact:

Marko Velikonja, Keystone XL MAR Program Manager
Office of Environmental Quality and Transboundary Issues
Bureau of Oceans and International Environmental and Scientific Affairs
United States Department of State
2201 C Street, NW, Suite 2726
Washington, DC 20520

Abstract:

The U.S. Department of State (the Department) has prepared this Draft Supplemental Environmental Impact Statement (SEIS) for the Mainline Alternative Route (MAR) of the Keystone XL Pipeline in Nebraska. Consistent with the National Environmental Policy Act (NEPA) of 1969 (as implemented by the regulations of the Council on Environmental Quality [CEQ], found at 40 Code of Federal Regulations (CFR) 1500–1508), this SEIS will support the Bureau of Land Management's (BLM) review of a right-of-way (ROW) application pursuant to the Mineral Leasing Act of 1920.

The MAR was included by TransCanada Keystone Pipeline, L.P. (Keystone) as an alternative to its Preferred Route in their February 16, 2017 application to the Nebraska Public Service Commission (Nebraska PSC) seeking approval for the Keystone XL Project. Keystone's Preferred Route was considered in the Department's 2014 Final Supplemental Environmental Impact Statement for the Keystone XL Project (2014 Keystone XL Final SEIS). After reviewing Keystone's application, the Nebraska PSC approved the MAR on November 20, 2017. This Draft SEIS supplements the 2014 Keystone XL Final SEIS, considers the direct, indirect and cumulative impacts related to the MAR and identifies any potential mitigation measures to minimize adverse effects. This Draft SEIS also considers new information related to the Keystone XL Project, including studies conducted of the proposed Keystone XL pipeline's crossing of the Missouri River.

Under the Proposed Action, Keystone would construct the portion of the Keystone XL Project in Nebraska along the MAR. This would include approximately 162 miles of construction, connection, operation and maintenance along the MAR of the proposed new 36-inch diameter pipeline and related ancillary facilities within Nebraska that were not analyzed within the 2014 Keystone XL Final SEIS.

Public Participation: The Department encourages public participation in the environmental review process. A notice was published in the *Federal Register* (FR) on May 25, 2018, informing agencies and the public of its intent to prepare an environmental review and inviting input on the scope of the review. The scoping period closed on June 25, 2018, and 56 comment submissions were received, of which 10 were campaigns that provided a total of 212,604 signatures.

Prior to this Draft SEIS, the Department prepared a Draft Environmental Assessment (EA) regarding the MAR and published a Notice of Availability of the Draft EA in the FR (83 FR 36659) on July 30, 2018. The public comment period extended from July 30 to August 29, 2018. The Department will consider comments received during both the Draft EA and the Draft SEIS public comment periods in the Final SEIS document.

The Department published a Notice of Availability in the *Federal Register* to announce the availability of this Draft SEIS, initiating a 45-day public comment period. The Department also published a notification advertisement in local newspapers; sent notification letters and e-mails; placed an electronic version of the document on the Department's website (https://keystonepipeline-xl.state.gov/); and placed hard copies of the Draft SEIS at the following libraries:

Clarkson Memorial Library
318 Pine Street
Clarkson, NE 68629

Crete Public Library
305 East 13th Street
Crete, NE 68333

Fairbury Public Library
601 7th Street
Fairbury, NE 68352

Norfolk Public Library
308 West Prospect Avenue
Norfolk, NE 68701

Stanton Public Library
1009 Jackpine Street
Stanton, NE 68779

Columbus Public Library
2504 14th Street
Columbus, NE 68601

David City Public Library
399 N 5th Street
David City, NE 68632

Neligh Public Library
710 M Street
Neligh, NE 68756

Seward Memorial Library
233 South 5th Street
Seward, NE 68434

SUMMARY

DRAFT
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Acronyms

Acronym	Definition
BLM	Bureau of Land Management
CEQ	Council on Environmental Quality
CFR	*Code of Federal Regulations*
CMRP	Construction Mitigation and Reclamation Plan
Department	U.S. Department of State
EA	Environmental Assessment
EIA	Energy Information Administration
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FR	*Federal Register*
KXL	Keystone XL
MAR	Mainline Alternative Route
MBTA	Migratory Bird Treaty Act
MP	milepost
NDEQ	Nebraska Department of Natural Resources and Environmental Quality
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NID	National Interest Determination
NOA	Notice of Availability
NOI	Notice of Intent
NPPD	Nebraska Public Power District
NPS	National Park Service
NRHP	National Register of Historic Places
PHMSA	Pipeline and Hazardous Materials Safety Administration
PSC	Public Service Commission
ROI	region of influence
ROW	right-of-way
SCADA	Supervisory Control and Data Acquisition
SEIS	Supplemental Environmental Impact Statement
SHPO	State Historic Preservation Office
SPCC	Spill Prevention Control and Countermeasure
TWA	Temporary Workspace Area
U.S.	United States

Acronym	Definition
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
WCSB	Western Canadian Sedimentary Basin

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SUMMARY

S.1 INTRODUCTION

The U.S. Department of State (the Department) has prepared this Draft Supplemental Environmental Impact Statement (SEIS) for the Mainline Alternative Route (MAR) of the Keystone XL Pipeline in Nebraska. Consistent with the National Environmental Policy Act (NEPA) of 1969 (as implemented by the regulations of the Council on Environmental Quality [CEQ], found at 40 *Code of Federal Regulations* [CFR] 1500–1508), this SEIS will support the Bureau of Land Management's (BLM) review of a right-of-way (ROW) application pursuant to the Mineral Leasing Act of 1920.

S.1.1 Background

Figure S-1 (page S-2) shows the location of the MAR which starts at a point 110 miles south of the Nebraska-South Dakota border (near proposed milepost [MP] 711) located just north of the Elkhorn River in Antelope County. From this starting point, the proposed MAR heads in a southeasterly direction across Madison and Stanton counties for approximately 43 miles. At proposed MP 754, the MAR then intercepts the existing ROW for the Keystone Mainline pipeline and heads towards the south paralleling the existing Keystone Mainline for approximately 50 miles, crossing Shell Creek and the Platte River in Colfax County. The MAR then shifts away from its co-location with the existing Keystone Mainline pipeline at proposed MP 804 for approximately 29 miles by routing west around the Seward County wellhead protection area. The MAR then rejoins the existing Keystone Mainline pipeline route at proposed MP 833 and continues south for an additional 40 miles through Saline County, terminating in Jefferson County where it rejoins the Keystone XL Preferred Route at MP 873. The total length of the proposed Keystone XL pipeline through Nebraska would be approximately 281 miles, of which the MAR would be approximately 162 miles long. Table S-1 summarizes key differences between the Keystone XL Preferred Route and the MAR in Nebraska.

Table S-1. Summary of Key Changes of the Proposed Keystone XL Pipeline in Nebraska

Project Component	Previous Nebraska Totals 2014 Keystone XL Final SEIS	Current Nebraska Totals (considering the MAR)	Net Difference of MAR
Pipeline Length (miles)	274	281	+7
Co-location of ROW (miles)[a]	2.0	106.8	+104.8
Required Pump Stations	5	6	+1

[a.] Co-location includes pipeline, utility and road ROW.
MAR = Mainline Alternative Route; ROW = right-of-way; SEIS = Supplemental Environmental Impact Statement

S.1.2 Scope of the SEIS

This SEIS supplements the Department's 2014 Final Supplemental Environmental Impact Statement for the Keystone XL Project (2014 Keystone XL Final SEIS) and will be used to consider the direct, indirect and cumulative impacts related to the MAR, determine if there are potentially significant impacts from the proposed MAR and to identify any potential mitigation measures to minimize adverse effects. This SEIS also considers new information related to the Keystone XL Project, including studies conducted of the proposed Keystone XL pipeline's crossing of the Missouri River.

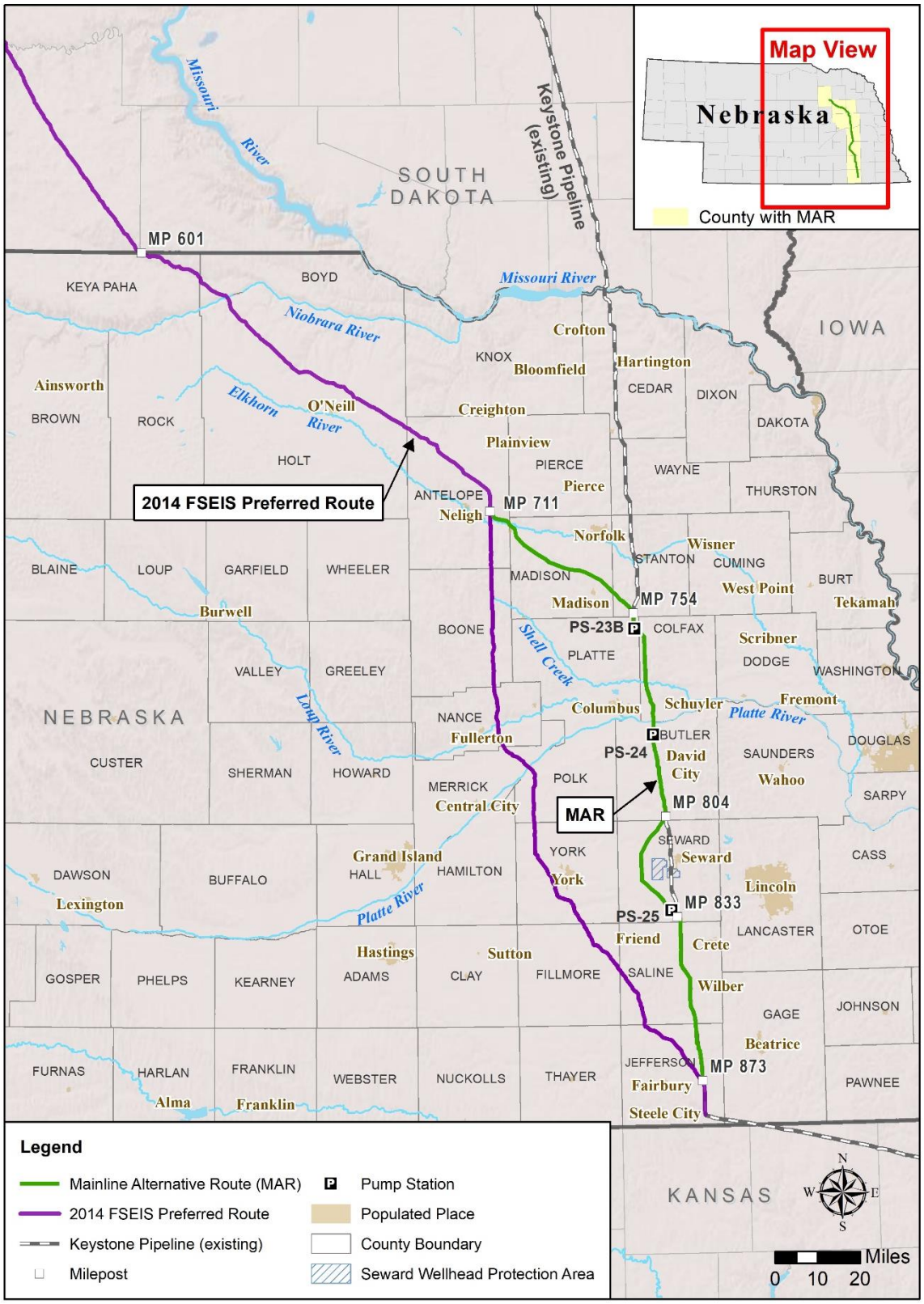

Figure S-1. Proposed MAR in Comparison with 2014 Keystone XL Final SEIS Preferred Route

S.1.3 Purpose and Need

S.1.3.1 Keystone

The primary purpose of the proposed Keystone XL pipeline is to provide the infrastructure to transport up to 830,000 barrels per day (bpd) of crude oil from the Western Canadian Sedimentary Basin (WCSB) in Canada and the Bakken Shale Formation in the United States to existing pipeline facilities near Steele City, Nebraska for onward delivery to Cushing, Oklahoma and the U.S. Gulf Coast area.

As explained in detail in Section 1.4 of the 2014 Keystone XL Final SEIS, there is existing demand by Gulf Coast area refiners for secure sources of crude oil. Refiners in the Gulf Coast area are configured to efficiently process heavy oil but process crude oil with a wide range of qualities, from light sweet (low sulfur content) to heavy sour (higher sulfur content). Those refiners generally have access to a wide variety of crude oils through an extensive pipeline network for delivering domestic crude oils as well as waterborne imports from countries around the world. Currently, refiners in the Gulf Coast area obtain heavy crude oil primarily via waterborne foreign imports, but the reliability of those supplies is uncertain because of declining production and political uncertainty associated with the major traditional suppliers, notably Mexico (approximately 50 percent decline in 20 years) and Venezuela (greater than 50 percent decline in 20 years) (U.S. Department of State 2014).

Since the 2014 Keystone XL Final SEIS was published, imports from Mexico and Venezuela, which historically were the largest sources of heavy crudes for Gulf Coast refineries, have further declined nearly 13 and 40 percent, respectively, according to the most recent data from the Energy Information Administration (EIA). Over the past year, crude oil supply disruptions internationally have continued to impact oil markets and availability of crude oil for U.S. refineries. While total unplanned disruptions have fallen to their lowest levels since 2012, the trends in decline of production from traditional suppliers are likely to continue in the short term and has accelerated since 2017. The potential shortfalls in production from Venezuela, Mexico and other traditional suppliers, coupled with their inability to raise output in the short term, increase U.S. energy security concerns. Impacts from anticipated decreases in production and exports from other major oil exporters, including Iran, also extend uncertainty and volatility.

The WCSB is projected to have significant increases in production, with much of this increase to come from the oil sands. EIA predicts a growth trend of increased production in the short term, with over 550,000 bpd in crude production growth in Canada through 2019 over 2017 production levels. The long-term additional crude oil production in the WCSB is projected to come to the market as heavy crude oil, in the form of diluted bitumen (dilbit). The exact mix volume and final destination of crude oil types that would be transported by the Keystone XL pipeline would be determined by market forces (U.S. Department of State 2014). During consideration of the January 2017 re-submitted application for its Presidential Permit, Keystone affirmed that it maintains shipping contracts that will be substantially similar to those represented in its 2012 application for a Presidential Permit to transport approximately 555,000 bpd of WCSB crude oil to existing Gulf Coast area delivery points and 155,000 bpd of WCSB crude oil to Cushing, Oklahoma.

S.1.3.2 Department

This SEIS is being prepared to evaluate the potential environmental impacts of the MAR in support of the BLM's review of Keystone's updated application for a ROW.

S.1.3.3 Bureau of Land Management

The proposed Keystone XL pipeline would cross lands managed by the BLM in Montana. The BLM's purpose and need is to respond to the Keystone application under Section 28 of the Mineral Leasing Act, as amended, for a ROW grant and Temporary Use Permit (TUP) to construct, operate, maintain and decommission a crude oil pipeline and related facilities on federal lands in compliance with the Mineral Leasing Act, BLM ROW regulations and other applicable federal laws. The BLM will decide whether to approve, approve with modification or deny issuance of a ROW grant and TUP to Keystone for the proposed Keystone XL pipeline, and if approved, under what terms and conditions. The BLM will use this SEIS, as well as the 2011 Keystone XL Final EIS, the 2014 Keystone XL Final SEIS, and other information and factors, to support its review of the Keystone XL pipeline.

S.1.4 Agency, Tribal and Public Involvement

S.1.4.1 Scoping

The Department published a Notice of Intent (NOI) in the *Federal Register* (FR) on May 25, 2018 to solicit public comments of the proposed MAR and related facilities. The NOI announced a public scoping period (83 FR 24383) and solicited public comments via http://www.regulations.gov. The public scoping period extended from May 25 to June 25, 2018, during which the Department received comments from stakeholders, including Indian tribes, non-governmental organizations and members of the public. The Department received 56 comment submissions, of which 10 were campaigns that provided a total of 212,604 signatures. The public scoping comments addressed a broad range of concerns, including the scope of the analysis, the role of the Department and BLM in the NEPA process, the need for the project based on market conditions, potential cumulative and connected actions, pipeline safety and the potential for spills, spill incident records and corporate history, and the adequacy of regulatory oversight for pipelines and pipeline safety. Commenters also raised concerns about potential impacts on environmental and human resources, specifically including soil erosion, soil productivity, water resources (e.g., the Ogallala aquifer), biological resources (e.g., whooping cranes), Indian treaties, cultural and tribal resources, socioeconomic conditions, environmental justice, damage to property and landowner access. Commenters additionally expressed concerns about the potential for cumulative impacts associated with the project that may adversely affect U.S. energy use and dependence on nonrenewable resources, and the contribution to greenhouse gases and global climate change. Many comments also requested a full SEIS be performed because the project could cause significant impacts and stated that this NEPA review should encompass the whole Keystone XL pipeline. Finally, numerous stakeholders submitted comments simply expressing opposition for the project. The Department considered these scoping comments in the preparation of this SEIS.

Scoping comments related to the 2014 Keystone XL Final SEIS and existing Presidential Permit were considered out of scope of the MAR analysis (see Section S.1.2). This included requests for environmental review of the entire Keystone XL pipeline previously addressed as part of the 2014 Keystone XL Final SEIS analysis. Scoping comments also requested that other permitting agencies such as the BLM or U.S. Army Corps of Engineers (USACE) act as the lead agency and prepare a SEIS. Scoping comments also raised concerns for construction worker camps. The MAR does not involve the establishment of additional camps beyond those analyzed in the 2014 Keystone XL Final SEIS.

Scoping comments requested the environmental review include new information since the 2014 Keystone XL Final SEIS. The Department reviewed the latest available data in the preparation of this SEIS including relevant studies, surveys and reports for biological resources and protected species (see Section 3.7) and cultural resources (see Section 3.9). Accidental release occurrences and studies since the 2014 Keystone XL Final SEIS, including recent major spills of crude oil pipelines, the site-specific risk

assessment conducted for the Missouri River crossing (see Section 5.2), and the USACE Missouri River scour analysis (see Section 5.4.3.2), were also considered.

S.1.4.2 Draft EA and Draft SEIS Comment Period

Prior to this Draft SEIS, the Department prepared a Draft Environmental Assessment (EA) regarding the MAR and published a NOA which announced the availability of the Draft EA in the FR (83 FR 36659) on July 30, 2018. The public comment period extended from July 30 to August 29, 2018. The Department will consider comments received on the Draft EA and the Draft SEIS public comment periods in the Final SEIS document.

The Department distributed the Draft SEIS to other federal, state and local government agencies that may have expertise relevant to this environmental review (see Appendix A, Indian Tribe, Agency and Elected Officials Coordination). The Department also published the Draft SEIS on its website, announced publication of this document in the FR and local newspapers (e.g., the *Omaha World-Herald* and the *Lincoln Journal Star*), and invited public comments by mail or through http://www.regulations.gov.

S.1.4.3 Agency Coordination

The Department invited the following agencies to participate as cooperating agencies for preparation of this SEIS:

Federal Agencies

- U.S. Bureau of Reclamation
- U.S. National Park Service (NPS)
- Pipeline and Hazardous Materials Safety Administration (PHMSA)
- U.S. Army Corps of Engineers (USACE)
- U.S. Bureau of Land Management (BLM)
- U.S. Department of Agriculture (USDA), Farm Service Agency
- USDA, Natural Resources Conservation Service
- USDA, Rural Utilities Service
- U.S. Department of the Interior
- U.S. Environmental Protection Agency (USEPA)
- U.S. Fish and Wildlife Service (USFWS)
- Western Area Power Administration

State Agencies

- Nebraska Department of Environmental Quality (NDEQ)

The following agencies accepted to participate as cooperating agencies: BLM, NDEQ, NPS, PHMSA, USACE, USDA Rural Utilities Service, USFWS, and Western Area Power Administration. The USEPA agreed to participate in this Draft SEIS as a coordinating agency. The Department coordinated with the USEPA during the development of the Draft EA and further coordinated telephonically and through email correspondence for this SEIS.

During development of this SEIS, the Department also consulted with the USFWS regarding the potential for adverse effects to protected resources (see Appendix A of the SEIS). In addition, the Department coordinated with the Nebraska State Historical Society / State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation.

S.1.4.4 Indian Tribe Coordination

The Department invited the following Indian tribes involved in the Keystone XL Pipeline Programmatic Agreement to participate in the NEPA process for the MAR (refer to Appendix A of the SEIS for a sample letter):

Indian Tribes

- Absentee-Shawnee Tribe of Indians of Oklahoma
- Alabama-Coushatta Tribe of Texas
- Apache Tribe of Oklahoma
- Assiniboine & Sioux Tribes of the Fort Peck Indian Reservation
- Blackfeet Tribe of the Blackfeet Indian Reservation of Montana
- Cherokee Nation
- Cheyenne and Arapaho Tribes
- Cheyenne River Sioux Tribe of the Cheyenne River Reservation
- Chippewa Cree Indians of the Rocky Boy's Reservation
- Confederated Tribes of the Goshute Reservation
- Crow Creek Sioux Tribe of the Crow Creek Reservation
- Crow Tribe of Montana
- Delaware Tribe of Indians
- Duckwater Shoshone Tribe of the Duckwater Reservation
- Eastern Band of Cherokee Indians
- Shoshone Tribe of the Wind River Reservation
- Ely Shoshone Tribe of Nevada
- Forest County Potawatomi Community
- Fort Belknap Indian Community
- Hannahville Indian Community
- Ho-Chunk Nation of Wisconsin
- Kaw Nation, Oklahoma
- Kialegee Tribal Town
- Kickapoo Traditional Tribe of Texas
- Kickapoo Tribe in Kansas
- Kiowa Tribe
- Lower Brule Sioux Tribe of the Lower Brule Reservation
- Lower Sioux Indian Community in the State of Minnesota
- Match-e-be-nash-she-wish Band of Pottawatomi Indians of Michigan
- Nez Perce Tribe
- Northern Arapaho Tribe of the Wind River Reservation
- Northern Cheyenne Tribe
- Nottawaseppi Huron Band of the Potawatomi
- Oglala Sioux Tribe of the Pine Ridge Reservation
- Omaha Tribe of Nebraska
- Otoe-Missouria Tribe of Indians
- Pawnee Nation of Oklahoma
- Poarch Band of Creeks
- Pokagon Band of Potawatomi Indians
- Ponca Tribe of Indians of Oklahoma
- Ponca Tribe of Nebraska
- Prairie Band of Potawatomi Nation
- Red Lake Band of Chippewa Indians
- Rosebud Sioux Tribe of the Rosebud Indian Reservation
- Sac and Fox Nation of Missouri in Kansas and Nebraska
- Sac and Fox Nation
- Sac and Fox Tribe of the Mississippi in Iowa
- Santee Sioux Nation

- Shakopee Mdewakanton Sioux Community of Minnesota
- Shoshone-Bannock Tribes of the Fort Hall Reservation
- Sisseton-Wahpeton Oyate of the Lake Traverse Reservation
- Skull Valley Band of Goshute Indians of Utah
- Southern Ute Indian Tribe
- Spirit Lake Tribe
- Standing Rock Sioux Tribe of North & South Dakota
- The Modoc Tribe of Oklahoma
- The Osage Nation
- Thlopthlocco Tribal Town
- Three Affiliated Tribes of the Fort Berthold Reservation
- Tonkawa Tribe of Indians of Oklahoma
- Turtle Mountain Band of Chippewa Indians of North Dakota
- Upper Sioux Community
- Ute Indian Tribe of the Uintah & Ouray Reservation
- Ute Mountain Ute Tribe
- Wichita and Affiliated Tribes
- Yankton Sioux Tribe of South Dakota
- Ysleta del Sur Pueblo

Two Indian tribes responded to the Department: the Otoe-Missouria Tribe of Indians and the Ysleta del Sur Pueblo. The Otoe-Missouria Tribe of Indians provided a preferred contact to engage in coordination. The Ysleta del Sur Pueblo stated that they do not have comments and do not request consultation on the project since it is outside of their area of interest.

S.2 DESCRIPTION OF ALTERNATIVES

The Department considered and evaluated the direct, indirect, and cumulative effects of three route alternatives in the 2014 Keystone XL Final SEIS, including the Preferred Route. This SEIS supplements the 2014 Keystone XL Final SEIS to include the MAR. The MAR was developed as part of the planning process and in support of Keystone's application to the Nebraska PSC for approval of a pipeline route. Keystone employed a multidisciplinary approach to identify potential pipeline corridor routes through Nebraska. This process produced the Preferred Route that was previously analyzed by the Department in the 2014 Keystone XL Final SEIS and two alternatives, including the MAR. In developing the range of reasonable alternatives for this SEIS, the Department considered the Nebraska PSC's review and approval of the MAR, and the following criteria that were used in its development:

- Site new pipeline and supporting facilities to minimize impacts to environmentally sensitive areas (e.g., surface waters, wetlands, protected species and their habitat, and heritage resources).
- Site new pipeline to maximize the use of existing ROW, access roadways and pipeline infrastructure to the greatest extent possible to minimize impacts to landowners and land uses.
- Minimize the route length and the construction of permanent aboveground facilities.
- Avoid wellhead protection areas.
- Cross the Niobrara River at a location not designated as scenic or recreational under the National Wild and Scenic River Act of 1968.

Based on the siting criteria and the approval of the MAR by the Nebraska PSC, this SEIS considers two alternatives for detailed analysis: the Proposed Action (Section 2.1) and the No Action Alternative (Section 2.2). Section 2.3, Alternatives Dismissed from Further Consideration, describes the alternatives

considered but eliminated from detailed analysis during the screening process and explains the basis for elimination. The BLM will consider the analysis described within this SEIS, among other factors, when determining whether to approve, approve with modification or deny issuance of a ROW grant to Keystone for the Keystone XL Project, and if so, under what terms and conditions.

S.2.1 Proposed Action

Under the Proposed Action, Keystone would construct and operate the portion of the Keystone XL Project in Nebraska along the MAR. This would include approximately 162 miles of construction, connection, operation and maintenance along the MAR of the proposed new 36-inch diameter pipeline and related ancillary facilities within Nebraska that were not analyzed within the 2014 Keystone XL Final SEIS. See Figure 1-1 and Section 2.4 for a detailed description of the MAR.

S.2.2 No Action Alternative

Consistent with CEQ regulations for implementing NEPA, the Department is including the No Action Alternative for consideration within this SEIS. The No Action Alternative serves as a baseline for comparing effects of the Proposed Action. Under the No Action Alternative, the Nebraska portion of the Keystone XL Project would not be constructed or operated along the MAR.

S.2.3 Alternatives Dismissed From Further Consideration

The Department conducted a robust analysis of alternatives in both the 2014 Keystone XL Final SEIS and in the earlier 2011 Keystone XL Final EIS. This included consideration of transportation of crude oil by rail, trucking or use of existing pipelines, as well as use of alternative energy sources and energy conservation. Ultimately the Department dismissed each of these alternatives from detailed analysis as they failed to meet the purpose and need.

The environmental review process also involved shifting a portion of the proposed pipeline route in Nebraska (the proposed Steele City Segment analyzed in the 2011 Keystone XL Final EIS) further to the east to avoid the sensitive Sand Hills Region in Nebraska. This revised route is presented and analyzed as the Preferred Route in the 2014 Keystone XL Final SEIS. The Department dismissed the following alternatives to the proposed MAR based on the siting criteria and the Nebraska PSC's lack of approval:

- The Keystone XL Preferred Route Alternative (analyzed in the 2014 Keystone XL Final SEIS) – this alternative does not maximize the use of existing ROW compared to the proposed MAR; and
- The Steele City Segment Alternative (presented as the Sandhills Alternative Route in the Nebraska Public Service Commission application) – this alternative does not minimize impacts to environmentally sensitive areas (e.g., Sand Hills Region).

S.3 ENVIRONMENTAL EFFECTS

S.3.1 Summary of Environmental Effects of the Proposed Action Alternative from Normal Operations

The Department analyzed the potential effects of the Proposed Action and the No Action Alternative. As summarized in Table S-2, the analysis indicated that implementing the MAR would have no significant direct, indirect or cumulative effects on the quality of the natural or human environments. These conclusions are based on the best management practices and impact avoidance measures contained within the Construction Mitigation and Reclamation Plan (CMRP) and outlined in Tables S-3 and S-4. The following descriptors qualitatively characterize impacts on the respective resources:

- Beneficial - Impacts would improve or enhance the resource.
- Negligible - No apparent or measurable impacts are expected, and may also be described as "none," if appropriate.
- Minor - The action would have a barely noticeable or measurable adverse impact on the resource.
- Moderate - The action would have a noticeable or measurable adverse impact on the resource. This category could include potentially significant impacts that could be reduced by the implementation of mitigation measures.
- Significant - The action would have obvious and extensive adverse impacts that could result in potentially significant impacts on a resource, despite mitigation measures.

Table S-2. Comparison Summary of Impact Ratings during Normal Operations

Resource[a]	No Action Alternative	Proposed Action Construction	Proposed Action Operations & Maintenance	Cumulative Effects
Land Use, Recreation and Visual Resources	None	Minor to Moderate	Negligible to Minor	Negligible
Geology and Soils	None	Negligible (geology) Minor (soils)	Negligible (geology) Minor (soils)	Minor
Air Quality and Greenhouse Gases	None	Minor	Minor	Minor
Noise and Vibration	None	Minor to Moderate	Negligible to Minor	Minor to Moderate
Water Resources	None	None (wild and scenic rivers) Negligible (groundwater and floodplains) Minor (surface water and wetlands)	None (floodplains and wild and scenic rivers) Negligible (groundwater) Minor (surface water and wetlands)	Minor to Moderate
Biological Resources	None	Minor to Moderate	None to Minor	Minor to Moderate
Socioeconomics and Environmental Justice	None	None to Minor Beneficial (Economic Base)	Negligible to Minor Beneficial (Economic Base and Tax Revenue)	Negligible to Minor Beneficial
Cultural Resources	None	Minor to Moderate	Negligible to Minor	Minor
Reliability[b]	None	–	–	–

a. Refer to Section 4.1, Introduction, for a discussion of impact ratings.

b. The impact intensity of an accidental release on a given resource is dependent on numerous factors including type of product released, size of the release, proximity of the resource to the point of release, weather conditions, response time and method of cleanup. Therefore, the analysis does not assign a specific impact rating. See Chapter 5, Environmental Consequences from Accidental Releases, for a more detailed description of impacts and the likelihood of an accidental release.

Table S-3. Summary of Resource Protection Measures for the Proposed Action

Resource	Project Phase	Description
Land Use, Recreation and Visual Resources	Construction	• Segregating the upper 12 inches of agricultural topsoil during construction and replacing it during site restoration. • Avoiding functional loss (stopping or obstructing) of active irrigation ditches during construction or providing alternate sources of water. • Avoiding or minimizing potential damage to drain tile systems and repairing damaged drain tiles using original or new material. • Restoring disturbed areas as per the Con/Rec units and landowner agreements. • Minimizing construction noise in the immediate vicinity of herds of livestock. • Installing temporary fences with gates around construction areas to prevent injury to livestock or workers. • Leaving hard plugs (short lengths of unexcavated trench) or installing soft plugs (areas where the trench is excavated and replaced with minimally compacted material) to allow livestock and wildlife to cross the trench safely where required by landowner. • Maintaining all existing improvements such as fences, gates, irrigation ditches, cattle guards and reservoirs to the degree practicable where required by the landowner agreement. • Routing the proposed pipeline along existing ROWs in forest lands, when practicable. • Felling trees toward the pipeline centerline to minimize additional tree disturbance. • Providing construction shielding for certain land improvements (e.g., fences and sheds) and to preserve landscaping and mature trees. • Restoring all fences, landscaping improvements, shrubs, lawn areas and other structures to landowner-agreed requirements following construction.
Geology and Soils	Construction	• Construction of the pipeline to withstand probable seismic events within the seismic risk zones and in accordance with U.S. Department of Transportation regulations (49 CFR 195, Transportation of Hazardous Liquids by Pipeline) and all other applicable federal and state regulations. • Design and construction of the pipeline in accordance with 49 CFR 192 and 193, which require pipeline facilities to be designed and constructed in a manner to provide adequate protection from washouts, floods, unstable soils, landslides or other hazards that could cause the proposed pipeline facilities to move or sustain abnormal loads. Keystone also proposes to use specialized pipeline installation techniques, such as padding and the use of rock-free backfill, which are designed to effectively insulate the proposed pipeline from minor earth movements. • Installation of sediment barriers (e.g., silt fencing, straw or hay bales and sand bags), trench plugs, temporary slope breakers, drainage channels or ditches and use of mulching in areas of high erosion potential as outlined in the CMRP. • Restoration and revegetation of areas disturbed by construction along the pipeline ROW consistent with the CMRP and specific landowner requirements. • Implementation of compaction control measures, including ripping (loosening of compacted soils with a dozer equipped with a ripper blade or deep plow) to relieve compaction, particularly in areas where topsoil has been removed.

Table S-3. Summary of Resource Protection Measures for the Proposed Action

Resource	Project Phase	Description
Geology and Soils (continued)	Construction	• Monitoring the ROW following construction for erosion, settling and landslide activity, and, in areas of prime farmland, monitoring for any degradation in soil productivity. • Removal and segregation of the top 8 to 12 inches of topsoil in non-forested agricultural areas located within prime farmland during excavation to a windrow along the edge of the ROW, with care taken to minimize the potential for mixing topsoil and subsoil. • Compensation of landowners in the event that agricultural productivity is impaired by vehicular compaction for demonstrated losses associated with decreased productivity.
	Operations	• Implementation of erosion and sediment control and reclamation (including revegetation) procedures similar to those described for construction activities and also as described in the CMRP for operations wherever soil is exposed and steep slopes are present or erosion potential is high.
Air Quality and Greenhouse Gases	Construction	• Employing water trucks, sprinklers or calcium chloride (limited to roads) to control dust levels during construction activities. • Controlling speed of all contractor vehicles in work areas and on roads. • Controlling emissions from construction equipment combustion, open burning and temporary fuel transfer systems and associated tanks to the extent required by state and local agencies through the permit process. • Prevention of wind-blown particles from sand blasting operations from reaching any residence or public building by placement of curtains of suitable material, as necessary. • Compliance with all applicable state regulations and local ordinances with respect to truck transportation and fugitive dust emissions.
Noise and Vibration	Construction	• Coordinating pipeline work schedules in areas near residences and businesses where construction activities or noise levels may be considered disruptive to minimize disruption. • Minimizing noise during non-daylight hours and within 1 mile of residences or other noise sensitive areas such as hospitals, motels, campgrounds or state and federal parks. • Providing advance notice to landowners within 500 feet of the ROW prior to construction, limiting the hours during which construction activities with high decibel noise levels are conducted, and ensuring construction proceeds quickly through such areas. • Minimizing noise in the immediate vicinity of herds of livestock or poultry operations, which are particularly sensitive to noise through use of noise control measures identified above. • Establishing a toll-free telephone line for landowners to report any construction noise-related issues and follow-up on appropriate mitigation measures, as necessary.
	Operations	• Implementing a three-step noise control plan for pump station operations in a progressive order when noise reductions are required: (1) install pipe lagging for all pipe suction pipes and discharge pipes; (2) install acoustic blankets for all pumps; and (3) upgrade enclosure for all motors, which would provide 3 decibels noise attenuation for each motor compared with a standard motor enclosure.

Table S-3. Summary of Resource Protection Measures for the Proposed Action

Resource	Project Phase	Description
Water Resources	Construction	• Implementing the Project's SPCC Plan to avoid or minimize the potential impact of harmful spills and leaks during construction. • Compliance with requirements of all permits issued for the waterbody and wetland crossings by federal, state or local agencies. • Installation of sediment barriers immediately after initial disturbance of the waterbody, wetland or adjacent upland per the CMRP. • Selection of most appropriate method at each crossing based on site-specific conditions (i.e., environmental sensitivity of the waterbody, depth, rate of flow, subsurface soil conditions and the expected time and duration of construction) at the time of crossing. • Use of non-toxic drilling fluids and additives during HDD activities. • Development of a contingency to address a frac-out during a HDD. The plan shall include instructions for monitoring during the directional drill and mitigation in the event that there is a release of drilling fluids. Additionally, the waterbody shall be monitored downstream for any signs of drilling fluid. • Re-establishment of the streambank contour and stabilization of streambanks and installation of temporary sediment barriers following the measures provided in the CMRP and applicable permits. • Reduction of construction ROW crossing widths to 85 feet or less in standard wetlands unless non-cohesive soil conditions require utilization of a greater width and unless the USACE or other regulatory authority authorizes a greater width. • Limiting the duration of construction-related disturbance within wetlands in accordance with USACE Nationwide Permit requirements. • Performing all equipment maintenance and repairs upland locations at least 100 feet from waterbodies and wetlands. • As much as is feasible, replace topsoil and restore original contours with no crown over the trench. Remove excess spoil and stabilize wetland edges and adjacent upland areas by establishing permanent erosion control measures and revegetation, as applicable, during final clean up.
Biological Resources		• Limiting construction traffic to construction of the ROW, existing roads, newly constructed roads and approved private roads. • Clearly staking construction ROW boundaries, including pre-approved TWAs, to prevent disturbance to unauthorized areas. • Implementing reclamation and revegetation measures as described in the proposed CMRP, Con/Rec units and Biological Opinion. • Using certified seed mixes to limit the introduction of noxious weeds within 12 months of seed germination testing, and adjusting seeding rates based on test results per the Con/Rec units. • Seeding at a rate appropriate for the region and for the stability of the reclaimed surface based on pure live seed. • Develop and adhere to a weed control plan for Nebraska in consultation with County Weed Boards. • Using pre-construction treatment such as mowing prior to seed development or herbicide application (in consultation with county or state regulatory agencies, and landowners) for areas of noxious weed infestations prior to clearing grading, trenching or other soil disturbing work to weed infestation locations identified on construction drawings. • Stripping and storing topsoil contaminated with weed populations separately from clean topsoil and subsoil.

Table S-3. Summary of Resource Protection Measures for the Proposed Action

Resource	Project Phase	Description
Biological Resources (continued)		• Using mulch and straw or hay bales that are free of noxious weeds for temporary erosion and sediment control. • Cleaning all construction equipment, including timber mats, with air or high-pressure washing equipment prior to moving equipment to the next job site; cleaning the tracks, tires and blades of equipment by hand or compressed air to remove excess soil prior to movement of equipment out of weed infested areas; or use cleaning stations to remove vegetative materials with high pressure washing equipment. • Implementing weed control measures as required by any applicable plan and in conjunction with the landowner. • Reseeding disturbed native range with native seed mixes after topsoil replacement consistent with applicable Con/Rec and landowner requirements. • Develop and implement a conservation plan, in consultation with the USFWS, consistent with the MBTA and the Bald and Golden Eagle Protection Act and consistent with provisions of Executive Order 13186 by providing avoidance and mitigation measures for migratory birds and bald and golden eagles and their habitats where the pipeline would be constructed, operated and maintained; • Develop construction timing restrictions and buffer zones through consultation with regulatory agencies; and • If construction would occur during the raptor nesting season during January to August, complete pre-construction surveys to locate active nest sites to allow for appropriate construction scheduling and buffer restrictions. • Installation of sediment barriers immediately after initial disturbance of waterbodies or adjacent uplands. • Maintaining the ROW width and limiting the extent of riparian vegetation loss. • Minimization of grading and grubbing along streambanks. • Minimizing in-stream use of equipment, locating workspaces at least 10 feet from waterbodies to the extent practicable. • Using dry-ditch techniques at crossings where the timing of construction does not adequately protect environmentally sensitive waterbodies, as determined by the appropriate regulatory authority.
Socioeconomics and Environmental Justice	Construction	• Identifying and documenting routes that would be used for moving materials and equipment, which would minimize potential impacts. • Crossing paved roads by boring beneath the roads, allowing traffic activity to continue. • *During the construction phase, maintaining roads used for construction in a condition that is safe for both members of the public and the workforce.* • *After construction is complete, restoring the roads used to their preconstruction conditions or better.* • Submitting a road use plan prior to mobilization and coordinating with the appropriate state and county representatives to develop a mutually acceptable plan.

Table S-3. Summary of Resource Protection Measures for the Proposed Action

Resource	Project Phase	Description
Cultural Resources	Construction and Operations	• Implementation of the existing Programmatic Agreement for the Keystone XL Pipeline along the MAR to avoid, if possible, or mitigate adverse effects on eligible historic properties. If impacts to NRHP-eligible properties could not be avoided, mitigation plans would be reviewed by the Department and the consulting parties following the protocols outlined in the Programmatic Agreement. • Following the terms of the Unanticipated Discoveries Plan should any unanticipated discoveries of cultural resources be made during construction or operation of the pipeline.

CMRP = Construction Mitigation and Reclamation Plan; HDD = horizontal directional drill; MAR = Mainline Alternative Route; MBTA = Migratory Bird Treaty Act; SPCC = Spill Prevention, Control and Countermeasures; ROW = right-of-way; TWA = temporary workspace area; USFWS = United States Fish and Wildlife Service

Table S-4. Specific Measures for Species Protected under the ESA

Species	Project Phase	Conservation Measures
Interior least tern (*Sterna antillarum)*	Construction	• Avoiding direct impacts to habitat and individuals through crossing the Platte River (preferred range of species) using the HDD method with a pipeline burial depth of 25 feet or greater below the river bed. • Conducting pre-construction surveys within 0.25 mile of suitable breeding habitat at the Platte River during the nesting season (from May 1 through September 1) to ensure that there are no nesting terns. Conducting daily surveys for nesting terns during the nesting season when construction activities occur within 0.25 mile of potential nesting habitat. If interior least tern nests are found at the crossings, Keystone would: (1) adhere to a 0.25-mile buffer of no pipeline construction activity and (2) continue to monitor nests if any are within 0.25 mile of the construction footprint until young have fledged. • Making minor adjustments to the pipeline corridor, if practicable, to avoid impacts to nesting interior least terns in coordination with USFWS. This may involve shifting the pipeline corridor away from nests to avoid disturbances to interior least tern nests or other modifications depending on the circumstances. • Down shielding of lights should HDD work occur at night if the HDD site lacks vegetative screening and an active interior tern nest is located within 0.25 mile from the HDD site. • Completion of interior least tern nest surveys by the NPPD for electrical line installation similar to pipeline construction. • Power provider to use BFDs, according to APLIC and NPPD standards, on the overhead shield wire at river crossings in areas of known habitat. • Implementation of measures identified in a required HDD contingency plan, including monitoring of the directional drill bore, monitoring downstream for evidence of drilling fluids and mitigation measures to address a frac-out should one occur. • Avoidance of temporary water reductions based on Keystone's plan to withdraw the volume needed at a rate less than 10 percent of the baseline daily flow and to return water back to its source within a 30-day period.
	Operations	• Power provider to use BFDs, according to APLIC and NPPD standards, on the overhead shield wire at river crossings in areas of known habitat.

Table S-4. Specific Measures for Species Protected under the ESA

Species	Project Phase	Conservation Measures
Piping plover (*Charadrius melodus)*	Construction	• Conservation measures would be similar to those described as the least tern as these species share similar habitats. • Conducting pre-construction surveys within 0.25 mile of suitable nesting habitat at the Platte River to ensure that there are no nesting pairs within 0.25 mile of the construction area if construction were to occur during the piping plover nesting season (April 15 to September 1). Conducting daily surveys for nesting piping plovers when construction activities occur within 0.25 mile of potential nesting habitat during the nesting season. If a piping plover nest(s) is found at the crossings, Keystone would: (1) adhere to 0.25-mile buffer of no construction activity and (2) continue to monitor the nest(s) if it is within 0.25 mile of the construction footprint until the young have fledged.
	Operations	• Power provider to use BFDs, according to APLIC and NPPD standards, on the overhead shield wire at river crossings in areas of known habitat.
Rufa red knot (*Calidris canutus rufa)*	Construction and Operations	As the rufa red knot is rarely observed in Nebraska, it is unlikely the Project would adversely this species. General conservation measures used for listed species would be applicable to the rufa red knot.
Whooping crane (*Grus americana)*	Construction	• Using the HDD method with a pipeline burial depth of 25 feet or greater below the river bed at major river crossings (Platte and Elkhorn rivers) to prevent potential roosting and feeding habitat loss or alteration. • Revegetation (particularly within riparian zones and in wetland habitats) in accordance with the CMRP, Con/Rec units, and Nationwide Permit 12 requirements would reduce habitat impacts. • During spring and fall whooping crane migration periods, environmental monitors would complete a brief survey of any wetland or riverine habitat areas potentially used by whooping cranes in the morning before starting equipment and following the Whooping Crane Survey Protocol previously developed by the USFWS and NGPC. If whooping cranes were sighted within 0.5 mile of active construction during the morning survey or at any time of the day, the environmental monitor would immediately contact the USFWS and NGPC for further instruction and require that all human activity and equipment start-up be delayed or immediately cease. Work could proceed if whooping crane(s) leave the area. The environmental monitor would record the sighting, bird departure time and work start time on the survey form. The USFWS would notify the environmental compliance manager of whooping crane migration locations during the spring and fall migrations through information gathered from the whooping crane tracking program. • Down-shielding of lights should HDD occur at night during the spring and fall whooping crane migrations in areas that provide suitable habitat. • Prohibiting the use of helicopters within 0.5 mile of any whooping crane(s) observed during the daily preconstruction surveys. • Avoidance of temporary water reductions based on Keystone's plan to withdraw the volume needed at a rate less than 10 percent of the baseline daily flow and to return water back to its source within a 30-day period. • The NPPD would complete a field review with USFWS and NGPC to determine if any areas are present with a higher probability of whooping crane use (i.e., wetlands or large ponded areas [stock ponds], meadows and obvious flight corridors to and from such areas to feeding habitats). Power provider to use spiral BFDs, consistent with APLIC standards, in appropriate areas as identified in the field review. • The NPPD would complete daily presence/absence whooping crane surveys according to the Project's protocol described above if construction occurs during the spring and fall migration periods in areas where such surveys are agreed to be appropriate and necessary to avoid disturbance. Should a whooping crane be sighted within 0.5 mile of a work area, all work would cease until the whooping

Table S-4. Specific Measures for Species Protected under the ESA

Species	Project Phase	Conservation Measures
		crane leaves that immediate area. USFWS and NGPC would be contacted immediately and notified of the presence of whooping crane.
Whooping crane (*Grus americana)* *(continued)*	Operations	• Power provider to use spiral BFDs, consistent with APLIC standards, in appropriate areas as identified in pre-construction field reviews.
Pallid sturgeon (*Scaphirhy-nchus albus)*	Construction	• Using the HDD method through crossing the Platte River with a pipeline burial depth of 25 feet or greater below the river bed to avoid direct impacts to habitat. • During construction of the HDD and hydrostatic testing, Keystone would ensure that the intake end of any pump for water withdrawal would be screened to prevent entrainment of larval fish or debris and the intake screens will be periodically checked for fish entrainment when pumping from the Platte River. Mesh size of the screen would be 0.125 inch and have an intake velocity of less than 0.5 foot per second to avoid larval entrainment and juvenile fish impingement and entrapment. Should a sturgeon become entrained, impinged or entrapped, all pumping operations would immediately cease and Keystone would contact USFWS to determine if additional protection measures would be required. • Maintaining at least a 100-foot setback from the water's edge for the HDD drill pads at the HDD crossings of the Platte River to reduce indirect impacts. • Implementation of measures identified in a required HDD contingency plan, including monitoring of the directional drill bore, monitoring downstream for evidence of drilling fluids and mitigation measures to address a frac-out should one occur. • Avoiding broadcast applications of pesticides or herbicides near aquatic habitat. • Ensuring that upstream and downstream fish passage is maintained in any areas where stream habitat disturbance occurs. • Avoidance of temporary water reductions based on Keystone's plan to withdraw the volume needed at a rate less than 10 percent of the baseline daily flow and to return water back to its source within a 30-day period for the Platte River.
	Operations	• Avoiding broadcast applications of pesticides or herbicides near aquatic habitat.
Topeka shiner (*Notropis topeka)*	Construction	• Using the HDD method through crossing Union Creek to avoid direct impacts. • Using an isolation flow dry crossing method for smaller tributaries if the species or suitable habitat is found. • Maintaining at least a 100-foot setback from the water's edge for the HDD drill pads at the HDD crossings of streams containing suitable habitat to reduce indirect impacts. • Implementation of measures identified in a required HDD contingency plan, including monitoring of the directional drill bore, monitoring downstream for evidence of drilling fluids and mitigation measures to address a frac-out should one occur. • Avoiding broadcast applications of pesticides or herbicides near aquatic habitat. • Ensuring that upstream and downstream fish passage is maintained in any areas where stream habitat disturbance occurs. • For HDD crossings, water will be sourced outside of the creek to make up drilling mud and for hydrotesting.
	Operations	• Avoiding broadcast applications of pesticides or herbicides near aquatic habitat.

Table S-4. Specific Measures for Species Protected under the ESA

Species	Project Phase	Conservation Measures
American burying beetle (*Nicrophorus americanus)*	Construction	• Updating density information within the MAR as required for the pre-construction conditions imposed in the BiOp. The following measures would apply during construction: • When working in suitable American burying beetle habitat, confine vehicle traffic used in support of preconstruction activities to approved access roads. • Use construction methods involving sequential replacement of topsoil and re-establishment of natural vegetation to restore natural soil hydrology within the construction ROW and avoid long-term impacts to American burying beetle habitat. • Prior to construction disturbance and grading for the ROW in known American burying beetle habitat, implement trapping and relocating of American burying beetles where access is available to remove adult beetles from the construction ROW in accordance with the Nebraska American Burying Beetle Trapping Protocol. • Keystone would train all workers operating in American burying beetle habitat and would include discussion of American burying beetle habitat, biology, reasons for their decline and responsibilities of all workers for the protection of the American burying beetle (including removing food wastes from the ROW each day, reporting any American burying beetle sightings to an environmental inspector and avoiding bringing dogs and cats to the ROW). • Post signs at all access points to the ROW highlighting the areas as American burying beetle habitat and reminding workers to follow special restrictions in the area. • Keystone would reseed disturbed areas in prime, good, fair and marginal American burying beetle habitats with a seed mix that corresponds to the appropriate Construction/Reclamation unit for that property.
	Operations	• When performing maintenance activities in suitable American burying beetle habitat requiring use of vehicles and ground disturbance, follow similar conservation measures identified for construction (e.g., confine vehicle traffic, sequential replacement of topsoil, trapping and relocation of species prior to disturbance, worker training, posting of signs and reseeding areas of disturbance with appropriate seed mixes).
Northern long-eared bat *(Myotis septentrio-nalis)*	Construction	• Using the HDD method to cross major and sensitive rivers, thereby avoiding most riparian vegetation used by the northern long-eared bat. • Restricting tree removal near known hibernacula. Keystone and any associated utilities (i.e., power lines) would not remove any tree within a 0.25-mile buffer around known northern long-eared bat hibernacula or would remove them in the winter prior to construction. Known hibernacula would be determined using the Nebraska Natural Heritage Inventory database, field surveys and/or coordination with subject matter experts knowledgeable about the species. • Protecting maternity roosts and restricting tree removal near known maternity roosts during the pup season (June 1 through July 31). Keystone and any associated utilities (i.e., power lines) would protect known roosts and avoid cutting or destroying of any trees within 150-foot radius from known, occupied maternity roost trees during the pup season, and only remove trees outside the pup season. Habitat would be removed in the fall/winter prior to construction. Known roosts would be determined through use of the Nebraska Natural Heritage Inventory database, field surveys and/or coordination with subject matter experts knowledgeable about the species.
	Operations	• None identified.

Table S-4. Specific Measures for Species Protected under the ESA

Species	Project Phase	Conservation Measures
Western prairie fringed orchid *(Platanthera praeclara)*	Construction	• Conduct surveys for the western prairie fringed orchid and suitable habitat prior to construction. If present, either the MAR would be realigned around any identified populations or identified individuals would be transplanted out of the ROW prior to any clearing and grading, if possible. • Salvaging and segregating topsoil appropriately where populations have been identified to preserve native seed sources in the soil for use in revegetation efforts in the ROW. • Implementation of a noxious and invasive weed control program consistent with the CMRP and Con/Rec units to reduce the potential for spread or invasion by weeds. • Restricting use of herbicides within 100 feet of areas where the species occurs. • Minimize the potential for altered hydrology (e.g., surface water flow, infiltration and groundwater levels) in suitable habitat in accordance with best management practices in the CMRP. • Providing compensation for impacts to suitable habitat in a Habitat Conservation Trust per Appendix G of the 2013 Biological Opinion. Funds would be used to acquire land though purchase by fee title or through perpetual conservation easements. Funds could also be used for habitat restoration projects. • Restoring and monitoring construction-related impacts to wet meadow habitats identified as suitable habitat consistent with USACE guidelines • The NPPD would complete field surveys during the appropriate bloom periods only in areas along the final line routes that are considered suitable. The NPPD would delineate and mark areas where habitat is present as “avoidance areas” where placement of structures and construction traffic would not occur. • Avoidance of temporary water reductions based on Keystone’s plan to withdraw the volume needed at a rate less than 10 percent of the baseline daily flow and to return water back to its source within a 30-day period.
	Operations	• Identifying populations of western prairie fringed orchid pre-treatment of ROW during maintenance and restricting use of herbicides where populations are present. Application would be conducted by spot spraying.

APLIC = Avian Power Line Interaction Committee; BFD = bird flight diverter; BiOp = Biological Opinion; CMRP = Construction Mitigation and Reclamation Plan; ESA = Endangered Species Act; HDD = horizontal directional drill; MAR = Mainline Alternative Route; NGPC = Nebraska Game and Parks Commission; NPPD = Nebraska Public Power District; ROW = right-of-way; USACE = United States Army Corps of Engineers; USFWS = United States Fish and Wildlife Service

S.3.2 Potential Effects of the Proposed Action Alternative from Accidental Releases

Impacts under normal operations would be negligible to moderate; however, there is potential for environmental impacts from the Proposed Action, should an accidental or otherwise unexpected release of crude oil from the Keystone XL pipeline or facilities occur. These potential impacts are not likely to be significant because (1) the risk of an accidental release is unlikely; (2) Keystone would use continuous monitoring systems and automatic shutoff valves to quickly identify a leak or rupture and halt pumping immediately upon detection of pressure fluctuations; and (3) prompt implementation of Keystone's response plan should mitigate effects.

Keystone, in compliance with local, state and federal regulations, would implement prevention and mitigation measures in the design, construction, operation and maintenance of the pipeline and facilities, including:

- Keystone would incorporate the project-specific Special Conditions recommended by the Pipeline Hazardous Material Safety Administration (PHMSA) and detailed in Appendix Z of the 2014 Keystone XL Final SEIS.
- Keystone would monitor the pipeline and facilities using a supervisory control and data acquisition center (SCADA) system, which would continuously monitor the pipeline facility for leaks.
- Keystone would monitor and control the cathodic protection system 24 hours per day, 365 days per year, from a central control facility located in Edmonton, Alberta, Canada.
- Keystone would maintain required manuals, and file required integrity management plans, as required by the U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration.
- Keystone would implement the following management plans: a Project-Specific Horizontal Directional Drilling Contingency Plan; a CMRP; a Reasonable and Prudent Practices for Stabilization guidance document; an Emergency Response Plan for crude oil pipelines; and Keystone's Environmental, Health and Safety Policy.

The following summarizes potential effects that might occur in the unlikely event of a release.

Land Use, Recreation and Visual Resources: A potential accidental release could result in short- or long-term effects to land use, recreation and visual resources existing within the region of influence (ROI). Agriculture is the predominant land use along the MAR, and a release could limit or prohibit agricultural production until cleanup is complete and contaminated soils are remediated. The MAR crosses 18 warmwater fisheries, and a release affecting areas along the banks and within the stream could temporarily restrict public access for fishing for the duration of cleanup. Physical contamination of open space could adversely affect vegetation, thereby restricting the use of the land for livestock grazing during remediation of any potential spills. In addition, toxicological impacts could include reduced vegetation for grazing. During remediation, contaminated vegetation and soils may require excavation and removal, and vehicles and equipment used to respond to and remediate a spill may increase the potential for soil disturbance (e.g., rutting, compaction and erosion). It is also possible that wind or water erosion could carry contaminated soils off the spill site and adversely affect vegetation used for grazing in areas beyond the spill location.

Geology and Soils: A potential release of crude oil could result in short- or long-term effects to soil resources existing within the ROI; due to the lack of seismic faults or oil, natural gas or coal mining operations along the MAR, no adverse impacts to geology from an accidental release along the MAR

would be anticipated. Large spills (releasing more than 1,000 barrels) that would have the potential to reach mineral resource extraction sites could contaminate those resources and disrupt commercial activity during spill response and remedial activities. The impacts would be short-term and adverse from an economic perspective rather than a natural resource perspective, but substantial contamination of the mineral resources could cause adverse impacts over a longer term. The disruption of commercial activity during response and remedial efforts could result in short-term adverse economic impacts on the owners and operators of mineral extraction sites near a release. These disruptions would likely last longer for a medium spill than if a small spill (releasing 50 barrels or less) were to occur. Small or medium (releasing more than 50 barrels and less than or equal to 1,000 barrels) spills would not likely cause long-term adverse impacts beyond the duration of remedial activities. Contamination of prime farmland soils could affect soil productivity adversely, and the beneficial use for farming or grazing would be restricted during remediation of the spill and potentially after remediation is complete. Remediation may require the excavation and removal of contaminated soils, which would potentially result in a permanent loss of prime farmland soils. Vehicles and equipment used to respond to and remediate a spill may increase the potential for soil disturbance (e.g., rutting, compaction and erosion). It is also possible that wind or water erosion could carry contaminated soils off a spill site and adversely affect prime farmland soils in areas beyond the spill location.

Air Quality and Greenhouse Gases: Direct and indirect impacts in the event of an accidental release from the pipeline would be short-term in nature, likely ranging from a few hours to several weeks. The primary impacts related to air quality would have the potential for adverse effects to human health. Human health impacts arise from inhalation of the hydrocarbons (organic molecules made of hydrogen and carbon atoms) that make up crude oil. Health effects from exposure depend on the concentration of the chemical in the air and the duration of exposure. In addition, degraded air quality and visual obstructions caused by smoke can disrupt professional and/or recreational activities in affected areas, negatively affecting the aesthetic and economic value of affected regions. In the event of a crude oil spill, the effects on air quality would depend on the size of the spill; the type of oil spilled; environmental conditions, including topography; and the weather. Oil spills spread over the ground or via waterways. The volatile and semi-volatile compounds then vaporize, emitting odors and airborne contaminants. Volatile and semi-volatile organic compounds (including polycyclic aromatic hydrocarbons) evaporate most rapidly and disperse according to the wind strength and direction and temperature. Conditions with no wind could result in the highest air concentrations, as wind serves to dissipate the contaminants. The extent of the impacts would depend on the volume of oil spilled, the size of the plume, the proximity of the incident to populated areas, the evaporative and dispersion characteristics of the weather and wind conditions, and the effectiveness of the spill response. While any release of crude oil may have an immediate and direct impact on the air quality near the spill, the potential for air quality impacts reduces with time as the material evaporates.

Releases of crude oil into the environment would have negligible to minor greenhouse gas impacts. Activities resulting from a release of crude oil could contribute to greenhouse gases from fugitive emissions, from combustion of fuel in vehicles and equipment used for spill response and remediation actions, and from combustion of spilled crude oil in the event of a fire (either accidental or intentional). The amount of greenhouse gases emitted would vary depending on the volume of crude oil released and the extent and duration of spill response and cleanup activities. Greenhouse gas emissions from vehicles and equipment used for spill response and remediation would vary depending on the number and types of vehicles and equipment used and the duration of response actions. However, it is unlikely that these greenhouse gas emissions would significantly increase total greenhouse gas emissions under the Proposed Action, because response activities would not occur on a frequent basis.

Noise and Vibration: A potential release of crude oil into the environment could result in short-term noise impacts, primarily during response, restoration and remediation activities. Potential impacts from

noise would likely be associated with the equipment and vehicles used for site access, cleanup and restoration efforts. These impacts would be similar to those of a construction site; however, the activities could occur at all hours of the day and night. Equipment would likely include vehicles and construction equipment, such as bulldozers, excavators and dump trucks, as well as various types of all-terrain vehicles. In addition, response and cleanup efforts could also include the use of watercraft and aircraft. Similar to human sensitive receptors, wildlife can experience impacts from exposure to noise and vibration resulting from human activities during response, restoration and remediation activities. These impacts to wildlife species could include stress, avoidance of feeding and decreased breeding success.

Water Resources:

Groundwater: The extent of impacts to groundwater would vary based on downward infiltration of a potential release, location and response time. Depth to groundwater varies along the MAR from near surface to over 200 feet. Impacts to groundwater resulting from a release would include water quality impacts potentially affecting sources of drinking water or irrigation. Prompt cleanup response would likely be capable of remediating the contaminated soils before the hazardous release reaches groundwater depth.

Surface Water: The extent of impacts to surface water would vary based on location, volume and response time. A crude oil spill in a stream, river or lake would have impacts resulting from the tendency of crude oil to float on the water surface (i.e., free product) and to mix with water. These impacts could include the degradation of water quality from dissolution and mixing of the oil in the water column, contamination of the water by chemical constituents (i.e., hydrocarbons) within crude oil and related degradation by-products and secondary effects such as lower levels of dissolved oxygen that occur from biodegradation of these compounds. The intensity and severity of water quality impacts would be dependent on a number of variables, including the volume of crude oil released into the waterbody and the characteristics of the waterbody (e.g., size, flow volume and rate at the time of the spill, etc.), which would influence propagation of the crude oil. Submerged crude oil could result in a persistent source of contamination (while the source releases crude oil to the environment) because of the slow rate of natural degradation of this material. Thus, submerged crude oil could result in the slow release of dissolved hydrocarbons, resulting in long-term chronic toxicological impacts to aquatic organisms.

Wetlands: The extent of impacts to wetlands would vary based on location, volume and response time. Direct impacts to wetlands would range from stress of vegetation and wildlife to species mortality and the degradation of wetland habitat and function. The severity of impacts on wetlands depends upon the volume and type of crude oil spilled and a variety of environmental factors (e.g., time of year, type of vegetation, amount of surface water present) and the cleanup response actions. Oil type is a major factor in determining the degree and type of impacts on wetland vegetation and wildlife. Lighter crude oils are more acutely toxic than heavier crude oils. Most crude oils affect wetlands through the smothering of leaves and soils.

Floodplains: A release to surface waters or floodplains during flood conditions could affect floodplains along and downstream of the MAR. Remediation and cleanup efforts would have temporary and minor impacts on floodplains as a result of heavy equipment and remediation measures, such as contaminated soil removal. Appropriate steps would be taken to restore vegetation and reduce compaction.

Biological Resources: Although the potential for a major spill is limited due to Keystone's monitoring system and response plans to help mitigate any impacts, the potential release of petroleum products could result in direct and indirect physical and toxicological impacts on biological resources, including habitats, flora and fauna. A spill would have localized impacts on vegetation and generally would be limited to the physical bounds of the spill; however, the spill may have impacts on wildlife that could extend beyond

the spill area. Physical impacts could arise from direct contact with released petroleum products. Toxicological impacts result from the chemical and biochemical actions of petroleum-based compounds on the biological processes of individual organisms and could include: direct and acute mortality; subacute interference with feeding or reproductive capacity; disorientation or confusion; reduced resistance to disease; tumors; reduction or loss of various sensory perceptions; interference with metabolic, biochemical and genetic processes: and many other acute or chronic effects.

Socioeconomics and Environmental Justice: Potential accidental release could result in short-term effects to socioeconomic resources, specifically emergency services. Local fire, police and ambulance departments would typically be the first to respond to an accidental release and may be responsible for evacuating residents, treating injuries as needed, restricting public access and containment of the release. First responders could face greater exposure to crude oil contact or fires and would be more susceptible to human health and safety impacts. Impacts from a leak would generally be localized, but regional impacts may occur if a large number of emergency personnel is needed to respond to a rupture or fire. Minority or low-income populations may experience adverse effects if a product is released in certain census block groups. Depending on the location and extent of a spill or incident, minority or low-income populations could be more vulnerable to health impacts associated with a product release because of reduced access to health care services. This factor could result in disproportionate adverse impacts to minority and low-income populations in the event of a large release.

A spill of crude oil could also affect transportation if it coats roadways or occurs in proximity to roadways or rail lines. Roadways and rail lines may need to be temporarily closed or have traffic restricted until remediation is complete. Road closures or traffic restrictions could result in changes to traffic patterns and limited access to nearby properties. Closure of rail lines or restrictions on trains could result in delays, as trains would have limited alternative routes. Impacts would be minor and range from localized to regional, depending on the location of the release and duration of remediation.

Cultural Resources: A potential accidental release could result in effects to existing cultural resources within the ROI. Direct effects could include physical damage to features and/or artifacts due to the presence of oil, or if remediation activities result in ground disturbance. Indirect effects would consist of visual and auditory intrusions associated with the spill and the remediation activities. In the event of a crude oil release, remediation of the spill also could uncover buried artifacts, features or sites that were not previously known; in these instances, Keystone would utilize the procedures outlined in their Unanticipated Discovery Plan.

Reliability and Safety: Releases of crude oil can affect human health from exposure to the hydrocarbon constituents they contain. Although members of the public could experience long-term exposure after a spill, these effects would likely occur only for individuals who directly interact with the released product over many hours each day for an extended period of time (i.e., spill cleanup professionals). The implementation of health and safety practices and training regarding appropriate personal protective equipment for cleanup, exposure limits, work/rest schedules and other ways to minimize contact with spilled crude oil would mitigate the impacts of long-term exposure. Potential effects of a spill on populated areas could include interruptions to daily activities, such as access to safe drinking water, degraded air quality, restricted water-related activities or temporary relocation of affected individuals during spill response and remediation. State regulatory processes would prohibit the use of drinking water sources until they were confirmed safe for drinking, at which time the appropriate agencies would authorize resumption of use.

DRAFT
Supplemental Environmental Impact Statement
Keystone XL Mainline Alternative Route

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Acronyms

Acronym	Definition
°C	Degrees Celsius
°F	Degrees Fahrenheit
amsl	above mean sea level
APE	area of potential effect
API	American Petroleum Institute
Amsl	above mean sea level
BLM	Bureau of Land Management
Bpd	barrels per day
CEQ	Council on Environmental Quality
CFR	*Code of Federal Regulations*
CMRP	Construction Mitigation and Reclamation Plan
CO_2	carbon dioxide
CO_2-eq	carbon dioxide equivalent
Con/Rec	Construction/Reclamation
dB	decibel
dBA	A-weighted decibel
Department	U.S. Department of State
Dilbit	diluted bitumen
EA	Environmental Assessment
EIA	Energy Information Administration
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FR	*Federal Register*
GIS	geographic information system
H_2S	hydrogen sulfide
HAP	hazardous air pollutant
HDD	horizontal directional drill
IMLV	Intermediate mainline valve
KXL	Keystone XL
LOS	Level of Service
MAR	Mainline Alternative Route
MBTA	Migratory Bird Treaty Act
MLV	mainline valve
MP	milepost
MW	megawatt
MWRWSS	Mni Wiconi Rural Water Supply System
NAAQS	National Ambient Air Quality Standards
NDEQ	Nebraska Department of Natural Resources and Environmental Quality

Acronym	Definition
NDNR	Nebraska Department of Natural Resources
NE HBS	Nebraska Historic Buildings Survey
NEPA	National Environmental Policy Act
NGPC	Nebraska Game and Parks Commission
NHPA	National Historic Preservation Act
NHT	National Historic Trail
NID	National Interest Determination
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPPD	Nebraska Public Power District
NPS	National Park Service
NRCS	National Resources Conservation Service
NRHP	National Register of Historic Places
NSHS	Nebraska State Historical Society
PHMSA	Pipeline and Hazardous Materials Safety Administration
ppb	parts per billion
ppm	parts per million
PSC	Public Service Commission
ROI	region of influence
ROW	right-of-way
SCADA	Supervisory Control and Data Acquisition
SEIS	Supplemental Environmental Impact Statement
SHPO	State Historic Preservation Office
SPCC	Spill Prevention Control and Countermeasure
SO_2	sulfur dioxide
TCP	Traditional Cultural Property
THPO	Tribal Historic Preservation Officer
TUP	Temporary Use Permit
TWA	Temporary Workspace Area
U.S.	United States
USACE	U.S. Army Corps of Engineers
USC	*U.S. Code*
USDA	U.S. Department of Agriculture
USDOI	U.S. Department of Interior
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	volatile organic compound
WCSB	Western Canadian Sedimentary Basin
WPA	waterfowl production area

1 INTRODUCTION

The U.S. Department of State (the Department) has prepared this Draft Supplemental Environmental Impact Statement (SEIS) for the Mainline Alternative Route (MAR) of the Keystone XL Pipeline in Nebraska. Consistent with the National Environmental Policy Act (NEPA) of 1969 (as implemented by the regulations of the Council on Environmental Quality [CEQ], found at 40 *Code of Federal Regulations* [CFR] 1500–1508), this Draft SEIS will support the Bureau of Land Management's (BLM) review of a right-of-way (ROW) application pursuant to the Mineral Leasing Act of 1920.

The MAR was included by TransCanada Keystone Pipeline, L.P. (Keystone) as an alternative to its Preferred Route in their February 16, 2017 application to the Nebraska Public Service Commission (Nebraska PSC) seeking approval for the Keystone XL Project. Keystone's Preferred Route was considered in the Department's 2014 Final Supplemental Environmental Impact Statement for the Keystone XL Project (2014 Keystone XL Final SEIS). After reviewing Keystone's application, the Nebraska PSC approved the MAR on November 20, 2017. This Draft SEIS supplements the 2014 Keystone XL Final SEIS, considers the direct, indirect and cumulative impacts related to the MAR and identifies any potential mitigation measures to minimize adverse effects. This Draft SEIS also considers new information related to the Keystone XL Project, including studies conducted of the proposed Keystone XL pipeline's crossing of the Missouri River.

1.1 BACKGROUND

In 2008, Keystone filed an initial Presidential Permit application with the Department requesting authorization to construct, operate and maintain the Keystone XL crude oil pipeline and ancillary facilities at the United States-Canada border in Phillips County, Montana. This initial application was followed by Keystone XL route modifications, a new Presidential Permit application in 2012 and subsequent reviews by the Department. Table 1-1 presents the sequence of actions pertaining to the Keystone XL pipeline leading up to the issuance of a Presidential Permit for the Keystone XL pipeline in March 2017.

Table 1-1. Summary of Actions Related to the Keystone XL Pipeline

Date	Keystone and Department Actions
September 2008	Keystone filed an initial Presidential Permit application requesting authorization to build and operate the Keystone XL pipeline.
August 2011	Department evaluated the original pipeline alignment and published a Final EIS.
January 2012	President denied the Presidential Permit application for the Keystone XL pipeline.
April 2012	Keystone proposed a new alignment in Nebraska with the goal of avoiding the Sand Hills Region in Nebraska.
May 2012	Keystone filed a new application for a Presidential Permit for the Keystone XL pipeline that included a new alignment avoiding the Sand Hills Region of Nebraska.
January 2014	Department evaluated the route modifications in a SEIS and published the 2014 Keystone XL Final SEIS.
November 2015	Secretary of State denied the Presidential Permit application for the Keystone XL pipeline.
January 2017	Presidential Memorandum Regarding Construction of the Keystone XL Pipeline issued January 24, 2017. Keystone resubmitted the application for a Presidential Permit. The re-submitted application included minor route alterations due to agreements with local property owners for specific rights-of-way and easement access, but the proposed route, herein referred to as the Preferred Route, remained entirely within the areas previously analyzed by the Department in the 2014 Keystone XL Final SEIS.
March 2017	Under Secretary of State for Political Affairs issued the Presidential Permit to Keystone.

May 2018	The Department publishes a Notice of Intent in the *Federal Register* (FR) to solicit public comments regarding scope and content of an Environmental Assessment (EA) of the MAR over a 30-day period.
July 2018	The Department publishes a Notice of Availability in the FR regarding availability of the Keystone XL Mainline Alternative Route Project Draft EA and to solicit comments on the Draft EA over a 30-day public comment period.
August 2018	The United States District Court for the District of Montana orders the 2014 Keystone XL Final SEIS must be supplemented to consider the MAR.
September 2018	In response to the United States District Court's Order, the Department issued this Draft SEIS, based on the 2018 July Draft EA, to supplement the 2014 Keystone XL Final SEIS and to evaluate potential impacts of the proposed MAR and related facilities.

EA = Environmental Assessment; EIS = Environmental Impact Statement; FR = *Federal Register*; PSC = Public Service Commission; SEIS = Supplemental Environmental Impact Statement

After resubmitting its Presidential Permit application for the Keystone XL pipeline in January 2017, Keystone filed an application for approval under Nebraska's Major Oil Pipeline Siting Act with the Nebraska PSC (Nebraska PSC 2017a). Nebraska's Major Oil Pipeline Siting Act, which became law in 2011, requires applicants to provide evidence of consideration of alternative routes and whether any other utility corridors exist that are feasible and could be beneficially used. Keystone's application to the Nebraska PSC therefore included three routes through Nebraska: the Keystone XL Preferred Route (analyzed in the 2014 Keystone XL Final SEIS) that had been proposed for approval by the Nebraska PSC, and two alternative routes called the "Keystone XL MAR" and the "Sandhills Alternative Route." On November 20, 2017, the Nebraska PSC approved the MAR basing their decision on the application review, hearings and reviews of the MAR by Nebraska state agencies (Nebraska PSC 2017b).

As shown in Figure 1-1, the MAR starts at a point 110 miles south of the Nebraska-South Dakota border (near proposed milepost [MP] 711) located just north of the Elkhorn River in Antelope County. From this starting point, the proposed MAR heads in a southeasterly direction across Madison and Stanton counties for approximately 43 miles. At proposed MP 754, the MAR then intercepts the existing ROW for the Keystone Mainline pipeline and heads towards the south paralleling the existing Keystone Mainline for approximately 50 miles, crossing Shell Creek and the Platte River in Colfax County. The MAR then shifts away from its co-location with the existing Keystone Mainline pipeline at proposed MP 804 for approximately 29 miles by routing west around the Seward County wellhead protection area. The MAR then rejoins the existing Keystone Mainline pipeline route at proposed MP 833 and continues south for an additional 40 miles through Saline County, terminating in Jefferson County where it rejoins the Keystone XL Preferred Route at MP 873. The total length of the proposed Keystone XL pipeline through Nebraska would be approximately 281 miles, of which the MAR would be approximately 162 miles long. Table 1-2 summarizes key differences between the Keystone XL Preferred Route and the MAR in Nebraska.

Table 1-2. Summary of Key Changes of the Proposed Keystone XL Pipeline in Nebraska

Project Component	Previous Nebraska Totals 2014 Keystone XL Final SEIS	Current Nebraska Totals (considering the MAR)	Net Difference of MAR
Pipeline Length (miles)	274	281	+7
Co-location of ROW (miles)[a]	2.0	106.8	+104.8
Required Pump Stations	5	6	+1

[a.] Co-location includes pipeline, utility and road ROW.
MAR = Mainline Alternative Route; ROW = right-of-way; SEIS = Supplemental Environmental Impact Statement

The Keystone XL Preferred Route contained a total of five pump stations located in Nebraska. The MAR requires an additional pump station for a total of six pump stations in Nebraska. The MAR would be approximately 7 miles longer than the Keystone XL Preferred Route and co-located with the existing Keystone Mainline for approximately 88.7 miles and other utility and transportation ROW corridors for approximately 18.3 miles, which is 66 percent of its route; whereby the Keystone XL Preferred Route was co-located with existing linear facilities for only 2 miles. See Section 2.4.1 for further information on co-location of the MAR.

The Department addressed direct, indirect and cumulative effects of the proposed Keystone XL pipeline in the previous 2011 Keystone XL Final EIS and in the 2014 Keystone XL Final SEIS. The focus of this Draft SEIS is on specific direct, indirect and cumulative impacts related to the MAR, with consideration as to whether those impacts are consistent with those described in the 2014 Keystone XL Final SEIS, and consideration of new relevant information related to the Keystone XL Project for the purpose of BLM decision-making.

1.2 PURPOSE AND NEED

1.2.1 Keystone

The primary purpose of the proposed Keystone XL pipeline is to provide the infrastructure to transport up to 830,000 barrels per day (bpd) of crude oil from the Western Canadian Sedimentary Basin (WCSB) in Canada and the Bakken Shale Formation in the United States to existing pipeline facilities near Steele City, Nebraska for onward delivery to Cushing, Oklahoma and the U.S. Gulf Coast area.

As explained in detail in Section 1.4 of the 2014 Keystone XL Final SEIS, there is existing demand by Gulf Coast area refiners for secure sources of crude oil. Refiners in the Gulf Coast area are configured to efficiently process heavy oil but process crude oil with a wide range of qualities, from light sweet (low sulfur content) to heavy sour (higher sulfur content). Those refiners generally have access to a wide variety of crude oils through an extensive pipeline network for delivering domestic crude oils as well as waterborne imports from countries around the world. Currently, refiners in the Gulf Coast area obtain heavy crude oil primarily via waterborne foreign imports, but the reliability of those supplies is uncertain because of declining production and political uncertainty associated with the major traditional suppliers, notably Mexico (approximately 50 percent decline in 20 years) and Venezuela (greater than 50 percent decline in 20 years) (U.S. Department of State 2014).

Since the 2014 Keystone XL Final SEIS was published, imports from Mexico and Venezuela, which historically were the largest sources of heavy crudes for Gulf Coast refineries, have further declined nearly 13 and 40 percent, respectively, according to the most recent data from the Energy Information Administration (EIA). Over the past year, crude oil supply disruptions internationally have continued to impact oil markets and availability of crude oil for U.S. refineries. While total unplanned disruptions have fallen to their lowest levels since 2012, the trends in decline of production from traditional suppliers are likely to continue in the short term and has accelerated since 2017. The potential shortfalls in production from Venezuela, Mexico and other traditional suppliers, coupled with their inability to raise output in the short term, increase U.S. energy security concerns. Impacts from anticipated decreases in production and exports from other major oil exporters, including Iran, also extend uncertainty and volatility.

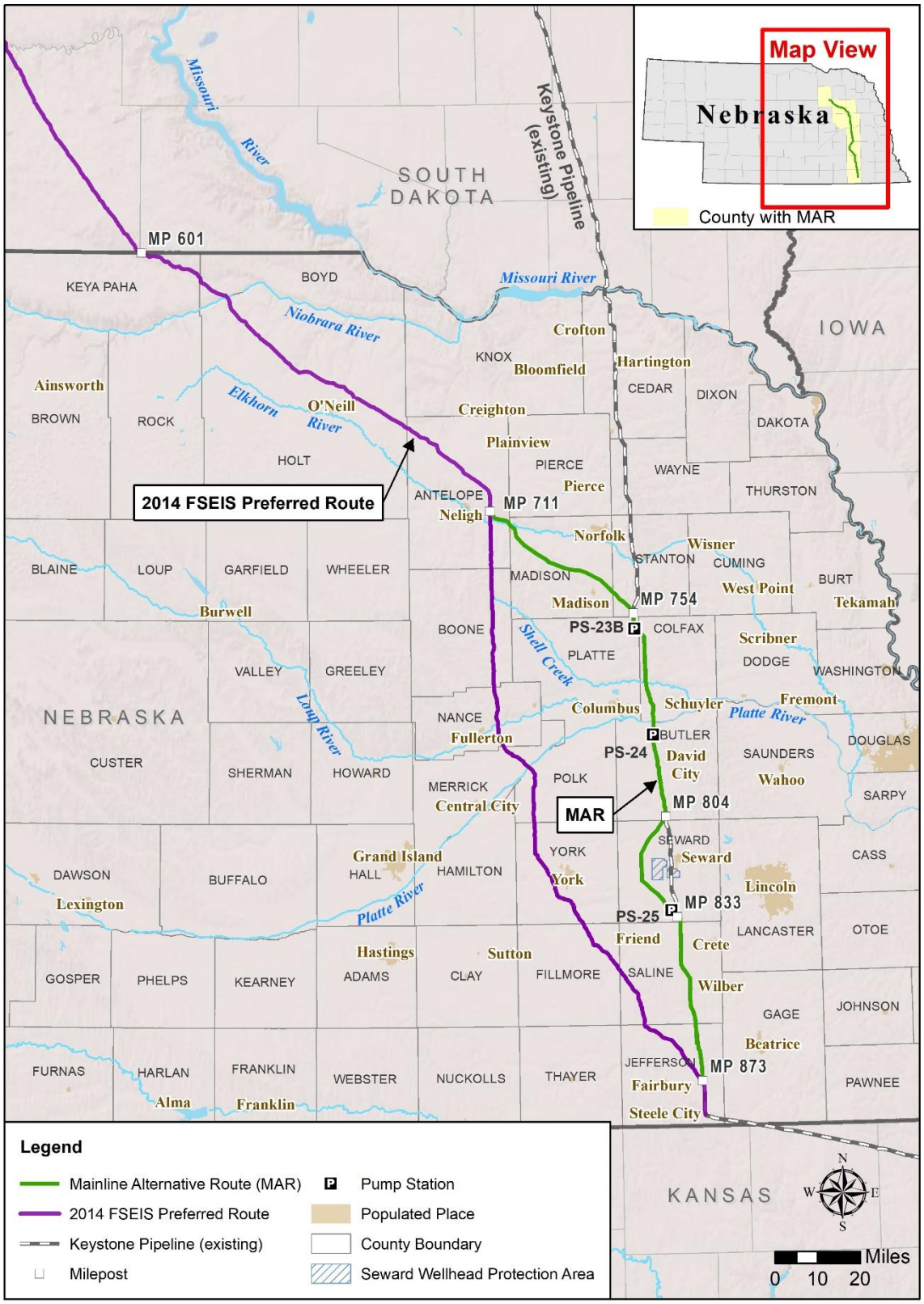

Figure 1-1. Proposed MAR Route in Comparison with 2014 Keystone XL Final SEIS Preferred Route

The WCSB is projected to have significant increases in production, with much of this increase to come from the oil sands. EIA predicts a growth trend of increased production in the short term, with over 550,000 bpd in crude production growth in Canada through 2019 over 2017 production levels. The long-term additional crude oil production in the WCSB is projected to come to the market as heavy crude oil, in the form of diluted bitumen (dilbit). The exact mix volume and final destination of crude oil types that would be transported by the Keystone XL pipeline would be determined by market forces (U.S. Department of State 2014). During consideration of the January 2017 re-submitted application for its Presidential Permit, Keystone affirmed that it maintains shipping contracts that will be substantially similar to those represented in its 2012 application for a Presidential Permit to transport approximately 555,000 bpd of WCSB crude oil to existing Gulf Coast area delivery points and 155,000 bpd of WCSB crude oil to Cushing, Oklahoma.

1.2.2 Department

This Draft SEIS is being prepared to evaluate the potential environmental impacts of the MAR in support of the BLM's review of Keystone's updated application for a ROW.

1.2.3 Bureau of Land Management

The proposed Keystone XL pipeline would cross lands managed by the BLM in Montana. The BLM's purpose and need is to respond to the Keystone application under Section 28 of the Mineral Leasing Act, as amended, for a ROW grant and Temporary Use Permit (TUP) to construct, operate, maintain and decommission a crude oil pipeline and related facilities on federal lands in compliance with the Mineral Leasing Act, BLM ROW regulations and other applicable federal laws. The BLM will decide whether to approve, approve with modification or deny issuance of a ROW grant and TUP to Keystone for the proposed Keystone XL pipeline, and if approved, under what terms and conditions. The BLM will use this Draft SEIS, as well as the 2011 Keystone XL Final EIS, the 2014 Keystone XL Final SEIS, and other information and factors, to support its review of the Keystone XL pipeline.

1.3 AGENCY, TRIBAL AND PUBLIC INVOLVEMENT

The Department published a Notice of Intent (NOI) in the *Federal Register* (FR) on May 25, 2018 to solicit public comments of the proposed MAR and related facilities.

The NOI announced a public scoping period (83 FR 24383) and solicited public comments via http://www.regulations.gov. The public scoping period extended from May 25 to June 25, 2018, during which the Department received comments from stakeholders, including Indian tribes, non-governmental organizations and members of the public. The Department received 56 comment submissions, of which 10 were campaigns that provided a total of 212,604 signatures. The public scoping comments addressed a broad range of concerns, including the scope of this environmental review, the role of the Department and BLM in the NEPA process, the need for the project based on market conditions, potential cumulative and connected actions, pipeline safety and the potential for spills, spill incident records and corporate history, and the adequacy of regulatory oversight for pipelines and pipeline safety. Commenters also raised concerns about potential impacts on environmental and human resources, specifically including soil erosion, soil productivity, water resources (e.g., the Ogallala aquifer), biological resources (e.g., whooping cranes), Indian treaties, cultural and tribal resources, socioeconomic conditions, environmental justice, damage to property and landowner access. Commenters additionally expressed concerns about the potential for cumulative impacts associated with the project that may adversely affect U.S. energy use and dependence on nonrenewable resources, and the contribution to greenhouse gases and global climate change. Many comments also requested a full SEIS be performed because the project could cause significant impacts and stated that this environmental review should encompass the whole

Keystone XL pipeline. Finally, numerous stakeholders submitted comments simply expressing opposition for the project. The Department considered these scoping comments in the preparation of this Draft SEIS.

Scoping comments related to the 2014 Keystone XL Final SEIS and existing Presidential Permit were considered out of scope of the MAR analysis (see Section 1.1). This included requests for environmental review of the entire Keystone XL pipeline previously addressed as part of the 2014 Keystone XL Final SEIS analysis. Scoping comments also requested that other permitting agencies such as the BLM or U.S. Army Corps of Engineers (USACE) act as the lead agency and prepare a SEIS. Scoping comments also raised concerns for construction worker camps. The MAR does not involve the establishment of additional camps beyond those analyzed in the 2014 Keystone XL Final SEIS.

Scoping comments requested that the environmental review include new information since the 2014 Keystone XL Final SEIS. The Department reviewed the latest available data in the preparation of this Draft SEIS including relevant studies, surveys and reports for biological resources and protected species (see Section 3.7) and cultural resources (see Section 3.9). Accidental release occurrences and studies since the 2014 Keystone XL Final SEIS, including recent major spills of crude oil pipelines, the site-specific risk assessment conducted for the Missouri River crossing (see Section 5.2), and the USACE Missouri River scour analysis (see Section 5.4.3.2), were also considered.

Prior to this Draft SEIS, the Department prepared a Draft EA regarding the MAR and published an NOA announcing the availability of the Draft EA in the FR (83 FR 36659) on July 30, 2018. The public comment period extended from July 30 to August 29, 2018. The Department will consider comments received during both the Draft EA and the Draft SEIS public comment periods in the Final SEIS document.

The Department distributed the Draft SEIS to other federal, state and local government agencies that may have expertise relevant to this environmental review (see Appendix A, Indian Tribe, Agency and Elected Official Coordination). The Department also published the Draft SEIS on its website, announced publication of this document in the FR and local newspapers (e.g., the *Omaha World-Herald* and the *Lincoln Journal Star*), and invited public comments by mail or through http://www.regulations.gov.

The Department invited the following agencies to participate as cooperating agencies for preparation of this Draft SEIS:

Federal Agencies

- U.S. Bureau of Reclamation
- U.S. National Park Service (NPS)
- Pipeline and Hazardous Materials Safety Administration (PHMSA)
- U.S. Army Corps of Engineers (USACE)
- U.S. Bureau of Land Management (BLM)
- U.S. Department of Agriculture (USDA), Farm Service Agency
- USDA, Natural Resources Conservation Service
- USDA, Rural Utilities Service
- U.S. Department of the Interior
- U.S. Environmental Protection Agency (USEPA)
- U.S. Fish and Wildlife Service (USFWS)
- Western Area Power Administration

State Agencies

- Nebraska Department of Environmental Quality (NDEQ)

The following agencies accepted to participate as cooperating agencies: BLM, NDEQ, NPS, PHMSA, USACE, USDA Rural Utilities Service, USFWS, and Western Area Power Administration. The USEPA agreed to participate in this Draft SEIS as a coordinating agency. The Department coordinated with the USEPA during the development of the Draft EA and further coordinated telephonically and through email correspondence for this SEIS.

During development of this Draft SEIS, the Department also consulted with the USFWS regarding the potential for adverse effects to protected resources (see Appendix A). In addition, the Department coordinated with the Nebraska State Historical Society / State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation.

In addition, the Department invited the following Indian tribes involved in the Keystone XL Pipeline Programmatic Agreement to participate in the NEPA process for the MAR (refer to Appendix A for a sample letter):

Indian Tribes

- Absentee-Shawnee Tribe of Indians of Oklahoma
- Alabama-Coushatta Tribe of Texas
- Apache Tribe of Oklahoma
- Assiniboine & Sioux Tribes of the Fort Peck Indian Reservation
- Blackfeet Tribe of the Blackfeet Indian Reservation of Montana
- Cherokee Nation
- Cheyenne and Arapaho Tribes
- Cheyenne River Sioux Tribe of the Cheyenne River Reservation
- Chippewa Cree Indians of the Rocky Boy's Reservation
- Confederated Tribes of the Goshute Reservation
- Crow Creek Sioux Tribe of the Crow Creek Reservation
- Crow Tribe of Montana
- Delaware Tribe of Indians
- Duckwater Shoshone Tribe of the Duckwater Reservation
- Eastern Band of Cherokee Indians
- Shoshone Tribe of the Wind River Reservation
- Ely Shoshone Tribe of Nevada
- Forest County Potawatomi Community
- Fort Belknap Indian Community
- Hannahville Indian Community
- Ho-Chunk Nation of Wisconsin
- Kaw Nation, Oklahoma
- Kialegee Tribal Town
- Kickapoo Traditional Tribe of Texas
- Kickapoo Tribe in Kansas
- Kiowa Tribe
- Lower Brule Sioux Tribe of the Lower Brule Reservation
- Lower Sioux Indian Community in the State of Minnesota
- Match-e-be-nash-she-wish Band of Pottawatomi Indians of Michigan
- Nez Perce Tribe
- Northern Arapaho Tribe of the Wind River Reservation
- Northern Cheyenne Tribe
- Nottawaseppi Huron Band of the Potawatomi
- Oglala Sioux Tribe of the Pine Ridge Reservation
- Omaha Tribe of Nebraska
- Otoe-Missouria Tribe of Indians
- Pawnee Nation of Oklahoma
- Poarch Band of Creeks

- Pokagon Band of Potawatomi Indians
- Ponca Tribe of Indians of Oklahoma
- Ponca Tribe of Nebraska
- Prairie Band of Potawatomi Nation
- Red Lake Band of Chippewa Indians
- Rosebud Sioux Tribe of the Rosebud Indian Reservation
- Sac and Fox Nation of Missouri in Kansas and Nebraska
- Sac and Fox Nation
- Sac and Fox Tribe of the Mississippi in Iowa
- Santee Sioux Nation
- Shakopee Mdewakanton Sioux Community of Minnesota
- Shoshone-Bannock Tribes of the Fort Hall Reservation
- Sisseton-Wahpeton Oyate of the Lake Traverse Reservation
- Skull Valley Band of Goshute Indians of Utah
- Southern Ute Indian Tribe
- Spirit Lake Tribe
- Standing Rock Sioux Tribe of North & South Dakota
- The Modoc Tribe of Oklahoma
- The Osage Nation
- Thlopthlocco Tribal Town
- Three Affiliated Tribes of the Fort Berthold Reservation
- Tonkawa Tribe of Indians of Oklahoma
- Turtle Mountain Band of Chippewa Indians of North Dakota
- Upper Sioux Community
- Ute Indian Tribe of the Uintah & Ouray Reservation
- Ute Mountain Ute Tribe
- Wichita and Affiliated Tribes
- Yankton Sioux Tribe of South Dakota
- Ysleta del Sur Pueblo

Two Indian tribes responded to the Department: the Otoe-Missouria Tribe of Indians and the Ysleta del Sur Pueblo. The Otoe-Missouria Tribe of Indians provided a preferred contact to engage in coordination. The Ysleta del Sur Pueblo stated that they do not have comments and do not request consultation on the project since it is outside of their area of interest.

2 DEVELOPMENT OF ALTERNATIVES

The Department considered and evaluated the direct, indirect and cumulative effects of three route alternatives in the 2014 Final SEIS, including the Preferred Route. This Draft SEIS supplements the 2014 Final SEIS to assess any environmental impacts along the MAR. The MAR was developed as part of the planning process and in support of Keystone's application to the Nebraska PSC for approval of a pipeline route. Keystone employed a multidisciplinary approach to identify potential pipeline corridor routes through Nebraska. This process produced the Preferred Route that was previously analyzed by the Department in the 2014 Keystone XL Final SEIS and two alternatives, including the MAR. In developing the range of reasonable alternatives for this Draft SEIS, the Department considered the Nebraska PSC's review and approval of the MAR, and the following criteria that were used in its development:

- Site new pipeline and supporting facilities to minimize impacts to environmentally sensitive areas (e.g., surface waters, wetlands, protected species and their habitat, and heritage resources).
- Site new pipeline to maximize the use of existing ROW, access roadways and pipeline infrastructure to the greatest extent possible to minimize impacts to landowners and land uses.
- Minimize the route length and the construction of permanent aboveground facilities.
- Avoid wellhead protection areas.
- Cross the Niobrara River at a location not designated as scenic or recreational under the National Wild and Scenic River Act of 1968.

Based on the siting criteria and the approval of the MAR by the Nebraska PSC, this Draft SEIS considers two alternatives for detailed analysis: the Proposed Action (Section 2.1) and the No Action Alternative (Section 2.2). Section 2.3, Alternatives Dismissed from Further Consideration, describes the alternatives considered but eliminated from detailed analysis during the screening process and explains the basis for elimination. The BLM will consider the analysis described within this SEIS, among other factors, when determining whether to approve, approve with modification or deny issuance of a ROW grant to Keystone for the Keystone XL Project, and if so, under what terms and conditions.

2.1 PROPOSED ACTION

Under the Proposed Action, Keystone would construct and operate the portion of the Keystone XL Project in Nebraska along the MAR. This would include approximately 162 miles of construction, connection, operation and maintenance along the MAR of the proposed new 36-inch diameter pipeline and related ancillary facilities within Nebraska that were not analyzed within the 2014 Keystone XL Final SEIS. See Figure 1-1 and Section 2.4 for a detailed description of the MAR.

2.2 NO ACTION ALTERNATIVE

Consistent with CEQ regulations for implementing NEPA, the Department is including the No Action Alternative for consideration within this Draft SEIS. The No Action Alternative serves as a baseline for comparing effects of the Proposed Action. Under the No Action Alternative, the Nebraska portion of the Keystone XL Project would not be constructed or operated along the MAR.

2.3 ALTERNATIVES DISMISSED FROM FURTHER CONSIDERATION

The Department conducted a robust analysis of alternatives in both the 2014 Keystone XL Final SEIS and in the earlier 2011 Keystone XL Final EIS. This included consideration of transportation of crude oil by rail, trucking or use of existing pipelines, as well as use of alternative energy sources and energy conservation. Ultimately the Department dismissed each of these alternatives from detailed analysis as they failed to meet the purpose and need.

The environmental review process also involved shifting a portion of the proposed pipeline route in Nebraska (the proposed Steele City Segment analyzed in the 2011 Keystone XL Final EIS) further to the east to avoid the sensitive Sand Hills Region in Nebraska. This revised route is presented and analyzed as the Preferred Route in the 2014 Keystone XL Final SEIS. The Department dismissed the following alternatives to the proposed MAR based on the siting criteria and the Nebraska PSC's lack of approval:

- The Keystone XL Preferred Route Alternative (analyzed in the 2014 Keystone XL Final SEIS) – this alternative does not maximize the use of existing ROW compared to the proposed MAR; and
- The Steele City Segment Alternative (presented as the Sandhills Alternative Route in the Nebraska Public Service Commission application) – this alternative does not minimize impacts to environmentally sensitive areas (e.g., Sand Hills Region).

2.4 OVERVIEW OF THE KEYSTONE XL MAINLINE ALTERNATIVE ROUTE PROJECT

The MAR, as analyzed in this Draft SEIS, is the portion of the pipeline route in Nebraska that deviates from the Preferred Route that was analyzed in the 2014 Keystone XL Final SEIS (see Figure 1-1). The MAR consists of approximately 162 miles of new 36-inch diameter pipeline that traverses Antelope, Madison, Stanton, Platte, Colfax, Butler, Seward, Saline and Jefferson counties in Nebraska. As shown in Figure 2-1, the MAR starts near MP 711 in Antelope County and heads in a southeasterly direction across Madison and Stanton counties for approximately 43 miles. At proposed MP 754, the MAR then intercepts the existing ROW for the Keystone Mainline pipeline and heads towards the south paralleling the existing Keystone Mainline for approximately 50 miles, crossing Shell Creek and the Platte River in Colfax County. The MAR then shifts away from its co-location with the existing Keystone Mainline pipeline at proposed MP 804 for approximately 29 miles by routing west around the Seward County wellhead protection area. The MAR then rejoins the existing Keystone Mainline pipeline route at proposed MP 833 and continues south for an additional 40 miles through Saline County, terminating in Jefferson County where it rejoins the Keystone XL Preferred Route at MP 873.

The MAR would involve the construction of facilities ancillary to the pipeline including pump stations, mainline valves (MLVs), access roads, pipe storage yards, contractor yards and rail siding facilities. In total, the MAR would be approximately 162 miles with a total of three pump stations.

Figure 2-1. Proposed MAR Alignment

2.4.1 Land Requirements

Table 2-1 presents surface disturbances associated with the construction and operation of the MAR. Pipeline construction of the MAR would disturb approximately 2,844 acres of land with approximately 1,026 acres retained as permanent ROW and for permanent ancillary facilities. Keystone would restore all disturbed acreage after construction according to landowner agreements and Construction/Reclamation (Con/Rec) units which prescribe land reclamation conditions based on Con/Rec type. The approximately 1,026 acres of permanent ROW would not be restored to original uses but would serve to provide adequate space for designated pipeline ROW maintenance and aboveground facilities including pump stations and valves. The expected life of the proposed pipeline is approximately 50 years.

Table 2-1. Summary of Lands Affected by the Mainline Alternative Route Project Facility

Facility	MAR Lands Affected (acres)[a]	
	Construction	Operations
Pipeline ROW[b]	2,142.3	989.7
Additional Temporary Workspace Areas	237.6	0.0
Access Road Easement	64.8	0.3
Pipe Yard	280.0	0.0
Contractor Yard	59.1	0.0
Rail Siding	11.9	0.0
Pump Stations[b, c]	36.0	36.0
Total	**2,831.7**	**1,026.0**

a. These are estimated acreages; locations have not been finalized at this time. Values exclude the 10.7 acres of disturbance avoided through use of horizontal directional drilling (HDD).

b. All MLVs and meters would be located within the areas associated with a pump station or permanent ROW. Consequently, the acres of disturbance for these aboveground facilities are captured within the Pipeline ROW and Pump Station categories within the table.

c. Pump stations acreages are a nominal 12 acres.

MAR = Mainline Alternative Route; MLV = mainline valve; ROW = right-of-way

The MAR is co-located with the existing Keystone Mainline pipeline ROW and other linear facilities for a total of 107 miles, which is approximately 66 percent of the MAR. In approving the MAR, the Nebraska PSC recognized many benefits to maximizing the co-location of the proposed MAR pipeline route with the existing Keystone Mainline, primarily that co-location would minimize land disturbance during construction and land use changes during operations (Nebraska PSC 2017b). Table 2-2 summarizes the types and lengths of co-location opportunities found with the MAR.

Table 2-2. Co-location of the Mainline Alternative Route

MAR Co-location Feature	Length of Co-location (miles)
ROW (Keystone Mainline Pipeline)	88.7
Utility Corridors	7.1
Roads	9.6
Railroads	1.6

ROW = right-of-way

2.4.2 Pipeline Right-of-Way

Installation of the new 36-inch diameter pipeline would occur within a 110-foot-wide construction ROW, consisting of a 60-foot temporary construction ROW and a 50-foot permanent ROW (i.e., permanent easement). Though the typical width of the construction ROW would be 110 feet, this width may be adjusted based on best management practices to address natural resources or engineering and safety concerns. Keystone would reduce the construction ROW to 85 feet to avoid or minimize impacts on wetlands and certain other sensitive environmental features.

2.4.3 Temporary Workspace Areas

In addition to the typical construction ROW, pipeline construction requiring special techniques (e.g., river, wetland and road/rail crossings; horizontal directional drill [HDD] entry and exit points; steep slopes and rocky soils) and construction staging areas would involve temporary workspace areas (TWAs) for short durations.

Keystone would adjust the location of TWAs as the MAR continues to be designed and site-specific engineering, landowner requests and environmental studies are completed. This would involve the adjustment of TWAs as necessary related to delineated wetland and waterbody locations, side-hill cuts and rough terrain. For example, Keystone would adjust TWAs at the prescribed setback distance from wetland and waterbody features unless impractical and as determined on a site-specific basis. Table 2-3 lists the dimensions and acreages of typical TWAs

Table 2-3. Dimensions and Acreage of Typical Temporary Workspace Areas

Crossing Type	Dimensions of Workspace (length by width in feet at each side of feature crossed)	Acreage of Workspace[a]
Waterbody crossing using HDD	250 x 150, as well as the length of the drill plus 150 x 150 on exit side	1.4
Waterbody crossing ≥ 50 feet wide	300 x 100[b]	0.7
Water crossing < 50 feet wide	150 x 25 on working and spoil sides or 150 x 50 on working side only	0.2
Bored highways and railroads	175 x 25 on working and spoil sides or 175 x 50 on working side only	0.2
Open-cut or bored county or private roads	125 x 25 on working and spoil sides or 125 x 50 on working side only	0.1
Foreign pipeline/utility/other buried feature crossings[c]	125 x 50	0.1
Push-pull wetland crossings	50 feet x length of wetland	Varies
Construction spread mobilization and demobilization	470 x 470	5.1
Stringing truck turnaround areas	200 x 80	0.4

a. Total for each feature.
b. At each end of crossing.
c. Pipeline/utility/other buried features owned/operated by entities other than Keystone.
≥ = greater than or equal to; < = less than; HDD = horizontal directional drill

2.4.4 Pipe Yards, Contractor Yards and Railroad Sidings

Pipeline construction requires temporary pipe storage sites (i.e., pipe yards), contractor yards and railroad sidings to store materials and equipment. To the extent practical, Keystone uses existing commercial/industrial sites or sites that previously were used for construction. Keystone would also maximize the use of existing public or private roads to access each yard. Keystone would use pipe yards and contractor yards on a temporary basis and would restore, as appropriate, upon completion of construction per landowner requirements. Pipeline construction would require pipe yards at 30- to 80-mile intervals and would require contractor yards at approximately 60-mile intervals. Table 2-4 provides a summary of the pipe yards, contractor yards and railroad sidings, as currently known, for the MAR by county, location and acreage.

Table 2-4. Temporary Pipe Yards, Contractor Yards and Railroad Sidings

Facility Type	Facility Name	County	Milepost	Construction (Acres)	Operations (Acres)
Pipe Yard	PY-24 SITE 6	Madison	724.5	35.0	0.0
	Norfolk-4	Stanton	744.4	34.4	0.0
	Columbus-6	Colfax	776.8	65.1	0.0
	Garrison1	Butler	795.0	26.5	0.0
	Garrison2	Butler	795.8	27.1	0.0
	Dorchester	Saline	838.2	39.0	0.0
	Plymouth	Jefferson	862.6	53.0	0.0
Contractor Yard	Alt_Dorchester	Saline	838.4	31.6	0.0
	Alt_Norfolk-4B2	Madison	739.7	27.6	0.0
Rail Siding	David City	Butler	790.6	11.9	0.0

2.4.5 Construction Camps

No construction camps are proposed along the MAR in Nebraska.

2.4.6 Temporary and Permanent Access Roads

Keystone would use existing public and private roads to gain access to most of the construction ROW. Keystone would build temporary access roads where existing roads are lacking or unavailable for use, and construct permanent access roads from public roads to pump stations and MLVs. The typical access road would be 30 feet wide. Temporary access roads would be reclaimed to landowner requirements following construction. Keystone would be responsible for maintenance of the new permanent access roads.

2.4.7 Aboveground Facilities

The MAR would require approximately 37 acres of land, other than permanent ROW, along the proposed route for aboveground facilities, including pump stations with MLVs, and intermediate MLVs that are not associated with a pump station (see Table 2-1).

2.4.7.1 Pump Stations

The MAR would require three pump stations, resulting in a total of six pump stations located in Nebraska. Although Keystone has not yet determined the exact locations of the pump stations, Figure 2-1 shows the approximate locations proposed for the three pump stations associated with the MAR. To the extent practicable, pump stations would be located to minimize adverse effects on sensitive resources (e.g., wildlife, vegetation, waterbodies, etc.). In addition, Keystone would locate the pump stations to minimize interference with agricultural operations on adjacent land and facilitate access by Keystone maintenance crews, as needed.

2.4.7.2 Power Lines and Substations

Each of the pump stations along the proposed MAR would operate using electrical power supplied by the regional provider, Nebraska Public Power District (NPPD). Each pump station would occupy approximately 12 acres of land, which would include the associated substation required for operation of the facility. A power line to each pump station facility would be constructed, operated and maintained by local power providers to provide electrical service to pumping stations (see Table 2-5). The private power companies providing the distribution lines are responsible for obtaining the necessary permits, approvals or authorizations from federal, state or local governments.

Table 2-5. Summary of Lands Affected by Power Lines to Pump Stations

Pump Station	Linear Feet of New Power Line[a]
PS-23B	5,280
PS-24	5,280
PS-25	33,264
Total	**43,824**

[a.] Value represents a maximum potential distance based on the existing utility grid and proximity to the pump station.
PS = pump station

2.4.7.3 Mainline Valves

Keystone would install MLVs at pump stations, major river crossings and other locations, as required to comply with PHMSA regulations at 49 CFR 195.260 and in the 2014 Keystone XL Final SEIS Appendix Z Condition 32. Each MLV not associated with a pump station (referred to as an "intermediate MLV" or IMLV) would occupy a fenced site within the pipeline ROW, approximately 40 by 50 feet in size, located within the 50-foot-wide permanent ROW. Table 2-6 presents the location of MLVs for the proposed MAR. The number and location of valves may be further refined when final MAR design is complete.

Table 2-6. Mainline Valve Locations

MLV Identification	Type	County	Milepost
CK-MLV-43A	Check and Motor Operated	Antelope	716.9
MLV-44A	Motor Operated	Madison	730.9
MLV-45A	Motor Operated	Madison	748.1
MLV-46	Motor Operated	Colfax	770.9
CK-MLV-47	Check and Motor Operated	Colfax	781.9
MLV-48	Motor Operated	Butler	796.7
CK-MLV-49	Check and Motor Operated	Seward	808.4
MLV-50	Motor Operated	Seward	825.5
MLV-51	Motor Operated	Saline	857.5
MLV-52	Motor Operated	Jefferson	864.2

MLV = mainline valve

2.4.8 Construction Procedures

Keystone would design, construct, test and operate the MAR facilities in accordance with all applicable requirements included in the U.S. Department of Transportation's (USDOT) regulations at 49 CFR 195, *Transportation of Hazardous Liquids by Pipeline*, other applicable regulations, as well as special conditions set forth in Appendix Z of the 2014 Keystone XL Final SEIS (Link to Appendix Z). The 2014 Keystone XL Final SEIS contains detailed descriptions of procedures Keystone would use for pipeline construction. The following sections incorporate by reference and summarize construction procedures for the proposed MAR described in Chapter 2 of the 2014 Keystone XL Final SEIS (Link to Chapter 2) and the Keystone XL Construction Mitigation and Reclamation Plan (CMRP) located in Appendix G of the 2014 Keystone XL Final SEIS by reference (Link to Appendix G).

2.4.8.1 General Pipeline Construction Procedures

Keystone has proposed the installation of 36-inch diameter pipeline for the entire length of the MAR in Nebraska. Pipeline construction will generally proceed in a linear fashion on each spread (e.g., pre-determined construction segments), with each operation usually separated by a designated number of miles.

Pipeline construction would generally proceed as a moving assembly line, comprising:

- Surveying and staking the construction ROW;
- Clearing and grading;
- Stringing and bending;
- Welding and coating;
- Trenching;
- Lowering-in and backfilling;
- Hydrostatic testing; and
- Cleanup and restoration.

2.4.8.2 Restoration

The CMRP contains procedures that would be used throughout the Keystone XL Project, including the area of the MAR, to avoid or minimize impacts. Subsections of the CMRP address specific environmental conditions, including:

- General conditions;
- Spill prevention and containment;
- Uplands;
- Drain tile systems;
- Wetland crossings;
- Waterbodies and riparian areas; and
- Hydrostatic testing.

2.4.8.3 Aboveground Facility Construction Procedures

Construction activities at each of the new pump stations would follow a standard sequence of activities: clearing and grading, installing foundations for the electrical building and support buildings, and erecting the structures to support the pumps and/or associated facilities. Keystone would confine construction activities and the storage of building materials to the pump station construction sites.

2.4.8.4 Special Pipeline Construction Techniques

Pipeline construction would entail special construction techniques for crossing roads, highways and railroads; pipeline, utility and other buried feature crossings; steep terrain; unstable soils; perennial waterbodies; wetlands; areas that require ripping; and residential and commercial areas. Discussion of impacts and mitigation measures for sensitive areas contained within the CMRP is summarized below.

Waterbody Crossings

The MAR would cross 17 perennial waterbodies. Pipeline construction for perennial waterbody crossing would use one of four techniques: the open-cut wet method (the preferred method), dry flume method, dry dam-and-pump method or HDD.

The actual crossing method employed at a perennial stream would also be dependent on permit conditions from the USACE. Intermittent waterbodies that are dry or have nonmoving water at the time of construction would be crossed using conventional upland construction methods. As currently planned, pipeline construction would use HDD for crossing both the Elkhorn and Platte rivers. Other waterbodies would be crossed by either wet or dry open-cut methods.

The pipeline would have a minimum of 5 feet of cover at waterbodies, ditches and drainages except in areas of consolidated bedrock where the minimum cover would be 3 feet. Where the HDD method is used, the pipeline would be at least 25 feet beneath the bottom of the waterbody. The pipeline would be weighted to counteract buoyancy for non-HDD installations as needed. TWAs would be needed on both sides of waterbodies to stage construction, fabricate the pipeline and store materials.

Keystone would install erosion and sediment control measures across portions of the construction ROW in accordance with the CMRP to reduce sediment transport into the waterbody.

Wetland Crossings

Keystone used data from preliminary windshield surveys conducted in December of 2017 along the MAR, aerial photography, field surveys where permission was granted, and National Wetland Inventory maps to identify wetlands crossed by the MAR.

Construction methods and reclamation procedures for wetland crossings are detailed in Section 6.0 of the CMRP. The wetland crossing method used would depend largely on the stability of the soils at the time of construction. The typical construction ROW in wetland areas would be 85 feet wide, but may be as wide as 110 feet if conditions require. Over most of the construction ROW, clearing of vegetation would be limited to flush-cutting trees and shrubs and their subsequent removal. Keystone would limit stump removal, grading, topsoil segregation and excavation to the area immediately over the trench line.

2.4.9 Operation and Maintenance

Keystone would use the same general pipeline operation procedures for the MAR as for the rest of the Keystone XL pipeline (as described in the 2014 Keystone XL Final SEIS (Section 2.1)). Adoption of the MAR has no impact on operating procedures. Keystone would operate, maintain, monitor and inspect the proposed pipeline in accordance with PHMSA regulations, Special Conditions in the 2014 Keystone XL Final SEIS Appendix Z (Link to Appendix Z) and applicable permit requirements.

Keystone would maintain a 50-foot-wide permanent ROW along the proposed route during operation of the pipeline. This includes periodic clearing of woody vegetation along the permanent ROW to maintain accessibility for pipeline integrity surveys. Keystone would conduct mechanical mowing or cutting along the permanent ROW, as needed, for normal vegetation maintenance. If permanent ROW maintenance requires herbicides for noxious weed control, Keystone would apply herbicides through spot spraying.

Prior to application, Keystone would survey the area for populations of plant species of concern (i.e., western prairie fringed orchid) and would avoid herbicide use at those locations. Most agricultural crops could be grown within this permanent ROW, but structures and deep-rooted vegetation such as trees would not be allowed. In areas where the pipeline would be installed using HDD, the pipeline would be deeper and trees could remain in the ROW. During pipeline operations, Keystone would institute direct observation methods, including aerial patrols, ground patrols and public and landowner awareness programs, to monitor pipeline integrity and safety.

2.4.10 Decommissioning

PHMSA has requirements that apply to the decommissioning of crude oil pipelines in 49 CFR 195.402(c)(10) and in 49 CFR 195.59 and 195.402. These regulations require that for hazardous liquid pipelines, the procedural manuals for operations, maintenance and emergencies must include procedures for abandonment, including safe disconnection from an operating pipeline system, purging of combustibles and sealing abandoned facilities left in place to minimize safety and environmental hazards (49 CFR 195.402). Further, these regulations require that for each abandoned onshore pipeline facility that crosses over, under or through a commercially navigable waterway, the last operator of that facility must file a report upon abandonment of that facility. The report must contain all reasonably available information related to the facility, including information in the possession of a third party. The report must contain the location, size, date, method of abandonment and a certification that the facility has been abandoned in accordance with all applicable laws.

Keystone would adopt operating procedures to address these requirements for the Keystone XL Project. Keystone typically does not abandon large-diameter pipelines but generally decommissions the pipe by either idling or deactivation, as market conditions dictate. This allows a dormant pipeline to be

reactivated or converted to another purpose in the future, subject to landowner permission and applicable regulatory approvals. When a pipeline or a segment of a pipeline is idled or deactivated, the pipe generally is purged of its contents, filled with an inert gas and left in place with warning signage intact. Cathodic protection would likely be left functional as would other integrity measures such as periodic inspections under the integrity management plan.

Decommissioning activities would be conducted consistent with all applicable regulatory requirements that are in place at the time of decommissioning. Since regulations at the federal, state and local level change over time, it would be highly speculative to estimate what regulatory framework would apply to the Keystone XL pipeline (including the MAR) decommissioning at the end of its useful life of more than 50 years in the future.

The ROW grant on federal lands under the management of the BLM for the Keystone XL pipeline would have a maximum term not-to-exceed 30 years. For the Keystone XL pipeline to extend beyond 30 years, the approved ROW grant would require a renewal authorization-certification decision by the BLM. While there are no state regulations applicable to pipeline decommissioning in Montana, South Dakota or Nebraska, environmental specifications developed by Montana Department of Environmental Quality would address reclamation of areas disturbed during abandonment.

Prior to decommissioning, Keystone would identify the decommissioning procedures it would use along each portion of the route, identify the regulations with which it would be required to comply and submit applications for the appropriate environmental permits. At that point, Keystone and the issuing agencies would address the environmental impacts of implementation of the decommissioning procedures and identify the mitigation measures required to avoid or minimize impacts.

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3 AFFECTED ENVIRONMENT

3.1 INTRODUCTION

This chapter presents the affected environment for resources expected to experience environmental impacts from construction, maintenance and normal operations of the proposed MAR. Consistent with NEPA and CEQ regulations, the description of the affected environment focuses on those resources and conditions potentially subject to effects from implementing the Proposed Action. As stated in Section 1.1, Background, the scope of this SEIS is focused on resources within the MAR. This chapter supplements baseline conditions within the 2014 Final SEIS to include the MAR.

Table 3.1-1 identifies the resources analyzed within this SEIS and provides justification for the level of analysis.

Table 3.1-1. Analysis of Resources

Resource	Level of SEIS Analysis and Justification
Land Use, Recreation and Visual Resources	Construction of the pipeline and associated facilities within the MAR would require both ROW and land transfer to Keystone. This SEIS contains an assessment of existing land use, recreation and visual resources along the MAR (Section 3.2) and an analysis of impacts to these resources from construction, normal operations and maintenance activities (Section 4.2).
Geology and Soils	Construction of the pipeline within the MAR would require ground disturbance from trenching activities, siting of TWAs and siting of permanent facilities (e.g., pump stations). Construction equipment could leak or spill fuels, lubricants or coolants resulting in soil contamination. This SEIS contains an assessment of existing geology and soil resources along the MAR (Section 3.3) and an analysis of impacts to geology and soils from construction, normal operations and maintenance activities (Section 4.3).
Air Quality and Greenhouse Gases	Construction and operations of the pipeline within the MAR would introduce both air and greenhouse gas emissions. The 2014 Keystone XL Final SEIS contains detailed analysis of lifecycle emissions for the entire Keystone XL pipeline. This SEIS contains an assessment of existing air quality conditions and greenhouse gas considerations within the MAR (Section 3.4) and an analysis of air quality impacts and greenhouse gas emissions focusing on greenhouse gas emissions resulting from the MAR, including construction and operational (pump station) emissions (Section 4.4).
Noise and Vibration	Construction of the pipeline within the MAR would temporarily generate noise. Pipeline facilities with the MAR (e.g., pump stations) would generate long-term noise. This SEIS contains an assessment of the existing noise environment along the MAR (Section 3.5) and an analysis of impacts to sensitive receptors due to noise and vibration from construction, normal operations and maintenance activities (Section 4.5).
Water Resources	Construction of the pipeline within the MAR would involve new crossings of water resources, floodplains and wetlands. This SEIS identifies locations and characteristics of these resources along the MAR alignment (Section 3.6) and provides an analysis of impacts to these resources from construction, normal operations and maintenance activities (Section 4.6).
Biological Resources	Construction of the pipeline within the MAR would require land clearing and stream crossings, which has the potential to adversely affect terrestrial and aquatic habitat and species that occupy these habitats. The 2014 Keystone XL Final SEIS and 2013 Biological Opinion contain mitigation measures agreed to by Keystone that would be adhered to for construction, normal operations and maintenance activities within the MAR. This SEIS identifies biological resources within the MAR alignment (Section 3.7) and provides an analysis of impacts to these resources from construction, normal operations and maintenance activities (Section 4.7).

Table 3.1-1. Analysis of Resources

Resource	Level of SEIS Analysis and Justification
Socioeconomics and Environmental Justice	The 2014 Keystone XL Final SEIS evaluated overall impacts to socioeconomic conditions and environmental justice populations within Nebraska. This SEIS evaluates socioeconomic conditions of the counties located within the MAR and identifies minority and low-income populations within these areas (Section 3.8). This SEIS also provides an analysis of impacts to these resources from construction, normal operations and maintenance activities (Section 4.8).
Cultural Resources	Construction of the pipeline with the MAR would require ground disturbance and construction of facilities (e.g., pump stations), which have the potential to adversely affect cultural resources. The 2013 Amended Programmatic Agreement (Appendix E of the 2014 Keystone XL Final SEIS) contains mitigation measures agreed to by Keystone which would be adhered to for construction, normal operations and maintenance activities within the MAR. This SEIS identifies cultural resources within the MAR alignment (Section 3.9) and provides an analysis of impacts to these resources from construction, normal operations and maintenance activities (Section 4.9).
Reliability and Safety	The transport of crude oil along the proposed MAR would introduce risk of potential release. This SEIS discusses the risk and potential effects on resources along the MAR and considers new information regarding studies conducted for the proposed Keystone XL pipeline's crossing of the Missouri River (Chapter 5). The 2014 Keystone XL Final SEIS contains detailed discussions on worker safety (construction and long-term maintenance), construction-related public safety and health effects from new pipeline construction, and safe storage of materials and the handling, treatment and disposal of hazardous wastes. Keystone would adhere to these measures during construction, operations and maintenance of the MAR.

MAR = Mainline Alternative Route; ROW = right-of-way; SEIS = Supplemental Environmental Impact Statement; TWA = temporary workspace area

3.2 LAND USE, RECREATION AND VISUAL RESOURCES

This section discusses the land use, recreation and visual resources within the MAR. The region of influence (ROI) includes the land uses and recreational resources within and adjacent to the 110-foot-wide ROW, which includes the 50-foot-wide operational ROW.

This SEIS considers the following data sources for characterizing land use, recreational resources and visual resources:

- Geographic Information System (GIS) land cover data generated by USDA, USFWS, U.S. Geological Survey and Nebraska Game and Parks Commission
- Current and historic satellite imagery to review changes in land cover and determine proximity to residences
- Government websites relating to state and national protected land, and recreational and scenic areas, and other conservation programs (e.g., National Park Service, USFWS, Nebraska Department of Transportation, NDEQ, Nebraska Game and Parks Commission)
- May 2018 site visit

3.2.1 Land Use, Recreation and Visual Resources Overview

The MAR extends approximately 162 miles across Antelope, Madison, Stanton, Platte, Colfax, Butler, Seward, Saline and Jefferson counties in Nebraska. The MAR pipeline ROW would be co-located with the existing Keystone Mainline pipeline and other ROWs for approximately 107 miles, while approximately 55 miles of the MAR pipeline would be located in a new ROW. Table 2-2, Co-location of the Mainline Alternative Route, lists the total distances where the MAR ROW would be co-located with another existing ROW. Pipeline installation would occur within a 110-foot wide construction ROW, while ongoing pipeline operations and maintenance would require establishing a 50-foot wide permanent operational ROW within the 110-foot wide ROW. The MAR also would involve the construction of permanent and temporary aboveground facilities ancillary to the pipeline including three pump stations, ten MLVs, access roads, pipe storage yards, contractor yards and rail siding facilities.

3.2.1.1 Land Use

Land Ownership

More than 99 percent of the MAR includes privately owned land, and only a small portion of the MAR (approximately 0.25 percent) passes through land under state ownership. The MAR would not cross any federal or locally owned land. Table 3.2-1 shows the total distance by land ownership type that the MAR crosses.

Table 3.2-1. Land Ownership

Land Ownership	Length Crossed (miles)
Federal	0.0
State	0.4
Local	0.0
Private	160.4
Water	0.0
Road Crossings	1.2
Total	**162.0**

Land Uses

The MAR and associated facilities primarily pass through agricultural land and rural grassland used for livestock grazing. Some forested land, wetlands, developed land and open water occur as well. Table 3.2-2 lists the land uses along the MAR broken down by the permanent operational and temporary construction ROW.

Table 3.2-2. Land Use

Primary Land Use Category	Land Use Sub-Category	Area Within ROW (acres)	
		Construction	Operations[a]
Agriculture	Cultivated crops	2,319.1	832.3
	Pasture/hay	10.1	3.3
Grassland/rangeland	N/A	335.1	125.4
Developed	N/A	115.7	39.9
Forest	N/A	34.5	11.6
Water and wetlands	Emergent herbaceous wetlands	7.7	0.3
	Woody wetlands	5.9	2.3
	Open water	3.7	0.3
Total		**2,831.8**	**1,015.4**

a. Includes land associated with permanent facilities such as pump stations.
N/A = not applicable; ROW = right-of-way

The MAR construction ROW includes approximately 116 acres of developed land. This acreage includes all land currently identified as developed based on the National Land Cover Database, as well as recent aerial photography. The majority of this land consists of open space, defined as space consisting of less than 20 percent constructed surfaces; most land categorized as open space consists of vegetative cover such as lawn-type grasses. Developed land may include structures such as residences, barns, silos, cattle yards and parking and storage areas. No actual structures are located within the MAR ROW. Based on Keystone field survey data, aerial photography and land use records, the nearest structure to the pipeline is located approximately 140 feet from the construction ROW (Google Earth 2018a). There are 157 structures located within 500 feet of the ROW. There are no structures located within 500 feet of the proposed pump station locations. The nearest structure to a pump station is located approximately 800 feet away, and 16 structures are located within 0.5 mile of the proposed pump station locations.

Special Management Areas and Conservation Easements

The MAR crosses approximately 297 acres of the Rainwater Basin region, a region spanning 21 counties in southeastern Nebraska. The Rainwater Basin includes numerous wetlands formed in shallow basins that provide resting and feeding areas for tens of millions of birds during annual spring and fall migrations (NGPC 2018b, USFWS 2018a). There are 84 publicly owned wetlands in this region that are managed by the USFWS and the Nebraska Game and Parks Commission. The USFWS manages 61 individual waterfowl production areas (WPAs) scattered through 21 counties, as part of the National Wildlife Refuge System. While the pipeline passes through the Rainwater Basin, a review of land ownership records indicates that the construction and operational ROWs would not cross any land managed by the USFWS or by the state of Nebraska for wildlife habitat (USFWS 2017; NGPC 2018a). Temporary and permanent aboveground facilities associated with the MAR would also not be located within 0.5 mile of any special management area.

The USDA and the USFWS both support various types of conservation easements with private landowners in the Rainwater Basin region to help enhance wetlands, improve water quality and conserve soils (Rainwater Basin Joint Venture 2016). USDA easement programs include the Wetlands Reserve Enhancement Program, Conservation Reserve Program, Conservation Reserve Enhancement Program and State Acres for Wildlife Enhancement Program. USFWS conservation easement programs enroll private lands into the National Wildlife Refuge System and place restrictions on certain land uses including farming and development; livestock grazing, however, is typically permitted. A review of land easement records indicates the MAR ROW would not include any lands currently enrolled in USDA or USFWS easements (USDA 2018a, USFWS 2017).

3.2.1.2 Recreation

The MAR does not pass through or near any national parks or national forests. However, the MAR does cross two National Historic Trails (NHTs) (NPS 2009). The NPS manages but does not own these NHTs, which "recognize original trails or routes of travel of national historic significance including past routes of exploration, migration, and military action" (NPS 2018). The MAR crosses the following NHTs on private property and at public roads designated as NHT driving routes that approximate the actual trail (NPS 2017a, 2017b, 2006):

- California NHT, actual route: Two crossings near Bellwood, Nebraska
- California NHT, driving route: State Road 92 near David City, Nebraska
- Mormon Pioneer NHT, actual route: One crossing near Richland, Nebraska
- Mormon Pioneer NHT, driving route: US Route 30 near Richland, Nebraska

Some aboveground facilities associated with the MAR would be located within 0.5 mile of the NHTs. A proposed temporary rail siding at David City would be approximately 0.2 mile east of the California NHT (Oxbow Trail segment) in Butler County. Pump Station 24 would be located approximately 0.4 mile from the California NHT (Oxbow Trail Alternative Route segment) in Butler County.

The MAR would not cross any designated National Recreational Rivers or Wild and Scenic Rivers (USDA 2018b). However, the MAR crosses several perennial waterbodies that the NDEQ has designated as recreational, as shown in Table 3.2-3. Existing water-based recreational use may also take place on or near other waterbodies crossed by the MAR that do not have a formal "recreational use" designation.

Table 3.2-3. Waterbodies Designated for Recreational Use

County	Waterbody	Type	Nearest MAR Milepost	Impairments[a]
Antelope	Elkhorn River	Perennial River	716	No
Stanton	Union Creek	Perennial River	747	Yes
Colfax	Shell Creek	Perennial River	771	Yes
Butler	Platte River	Perennial River	781	Yes
Saline	West Fork Big Blue River	Perennial River	835	Yes

Source: NDEQ 2016

[a.] Impaired waterbodies are those not meeting the applicable state water quality standards and designated uses, as stipulated by Section 303(d) of the federal Clean Water Act.

The MAR does not pass through any state parks or recreational areas (NGPC 2018a). The nearest state recreational area is Blue River State Recreation Area, which is located approximately 0.9 mile west of the pipeline near MAR MP 833. The recreational area is located on the west fork of Big Blue River at the crossing of the Big Blue River (west fork) and U.S. Route 6. None of the pump stations would be located close to any recreational areas. Pump Station 24, the nearest to a state park or recreational area, is located approximately 2 miles northwest of the Blue River State Recreational Area.

3.2.1.3 Visual Resources

Visual resources are the visible physical features of a landscape that have an aesthetic value to viewers. Examples of visual resources include rivers and other waterbodies, national and state parks, other recreation areas and scenic roads. While most land has inherent visual values that warrant different levels of management, the aesthetic value of landscape views is a subjective characteristic. Federal and state agencies may regulate development in and around designated scenic areas to preserve their visual characteristics.

The MAR crosses a variety of landscapes, including agricultural land, rangeland, wetlands, waterways, floodplains and forest, with the most common landscapes being agricultural land and rangelands. The MAR would not cross any federal lands that are managed for their scenic value. NHTs are managed in coordination with NPS but are not considered federal lands except where they cross federally owned property. Visual resources for these trails are managed in accordance with the regulations of the agency or entity that owns the land that the trail traverses. Because the trails are found on private property there is no visual resources management requirement, with the exception of the scenic byways.

The MAR would cross one designated Nebraska Scenic Byway, U.S. Route 30, near Richland, Nebraska. Scenic byways are designated based on “the number and quality of the proposed byway’s unusual, exceptional or distinctive scenic, historic, recreational, cultural or archeological features within a 40-mile radius of the proposed byway” along with other criteria (Nebraska Department of Transportation 2014). However, designation as a scenic byway does not place any restrictions on future development along or near the byway. No pump stations would be located close to U.S. Route 30.

The state of Nebraska does not have formal guidelines for managing visual resources for private or state-owned lands.

3.3 GEOLOGY AND SOILS

This section discusses the geology and soils along the proposed MAR. Chapter 4, Environmental Consequences from Construction and Normal Operations, considers a ROI that includes the geology and soils within and adjacent to the 110-foot-wide construction ROW (i.e., 60-foot-wide temporary ROW and the 50-foot-wide permanent operational ROW).

This SEIS considers the following data sources for characterizing geology and soils:

- USEPA Ecoregions
- U.S. Geological Survey
- Nebraska Geological Survey
- USDA, Natural Resource Conservation Service
- 2014 Keystone XL Final SEIS

3.3.1 Geology Overview

Much of the description of the geologic conditions described for the Nebraska portion of the Preferred Route in the 2014 Keystone XL Final SEIS (Section 3.1) is also applicable to the MAR, such as the description of the surface and bedrock geology, fossil fuel and mineral resources, paleontological resources and geologic hazards. The proposed route extends through relatively flat and stable areas, and the potential for seismic hazards (earthquakes), landslides or subsidence (sink holes) is low. There are no known active oil, natural gas or coal mining operations along the MAR. The main mineral resource along the MAR is aggregate (sand and gravel) used for road and building construction. There are 12 mineral operations within 1 mile of the MAR centerline, mostly sand and gravel, but all operations are abandoned or inactive; 6 are located in Antelope County, 4 in Saline County and 2 in Seward County (University of Nebraska-Lincoln 2018). The pipeline would not cross any known active faults. Eastern Nebraska has experienced earthquakes in the past, however, and is within approximately 500 miles from the New Madrid fault zone which is the most active seismic area in the United States east of the Rocky Mountains.

The MAR lies within two different Level II Ecoregions of the Great Plains Physiographic Province: the northern portion of the MAR lies within the Western Corn Belt Plains, and the southern portion of the proposed route lies within the Central Great Plains. A brief overview of the physiographic characteristics of these two ecoregions is provided below (Chapman et al. 2001; Burchett 1986).

- Western Corn Belt Plains (MP 710.61 to 770.90). This region crosses through transitional sandy plain and northeastern Nebraska loess hills and is a mixture of level to rolling plains and glaciated, rolling low hills and perennial streams. The elevation ranges between 1,100 and 2,000 feet above mean sea level (amsl), and the local relief ranges between 5 and 300 feet, with significant local relief found near the Elkhorn River. The surficial geology includes alluvial sand, gravel and lacustrine silt and sediments, limestone and shale; and the underlying bedrock consists of shale, limestone and sandstone of the Niobrara Formation and Ogallala sandstone.
- Central Great Plains (MP 770.90 to 835.42). This region primarily crosses the Platte River Valley and Rainwater Basin Plains. It is a mixture of flat wide alluvial valley, shallow streams on a sandy bed and flat to rolling dissected plains with a deep layer of loess. It also contains intermittent and perennial streams (historically extensive rainwater basins and wetlands). The elevation ranges between 1,300 and 2,900 feet amsl, and the local relief ranges between 2 and 100 feet. The surficial geology includes calcareous loess, alluvial sand, gravel and lacustrine sand and silt, shale, limestone, sandstone and Greenhorn limestone. The underlying bedrock

consists of shale, limestone and sandstone of the Carlisle Shale, Greenhorn Formation and Graneros Shale. Dakota Formation sandstone and shale underlie the proposed MAR from Butler County to the Kansas border.

3.3.1.1 Paleontological Overview

Approximately 4,133 acres were subject to a detailed pedestrian or visual paleontological survey based on bedrock formations. Within the MAR, two new non-significant fossil localities were documented during this effort and were found in loose limestone boulders lying on the surface (Exp and Paleo Solutions Inc. 2018). These fossils consist of Inoceramid (bivalve) shell fragments, coral impressions and unidentifiable bivalve shell fragments, and are likely from the Greenhorn Limestone. No in situ bedrock was observed during the field survey. According to the records search during the survey, there are no previously recorded fossil localities within the MAR; however, two previously recorded fossil localities are located within 5 miles. These localities produced mammals, including a short-faced bear and an American Mastodon, in Pleistocene age deposits (Exp and Paleo Solutions Inc. 2018).

3.3.2 Soils Overview

The soil conditions along the MAR are very similar to those discussed for Nebraska in Section 3.2 of the 2014 Keystone XL Final SEIS. Specifically, the MAR footprint lies within the following two land resource regions, located within the south-central part of the Great Plain Province of the Interior Plains Physiographic Region (NRCS 2004; 1998):

- Central Feed Grains and Livestock Region which encompasses Antelope, Madison, Stanton, Platte, Colfax Butler, Saline and Jefferson counties in Nebraska. The region extends for 71.72 miles (44 percent of the route), from MP 710 to 781.72. This is further classified as the Loess Uplands Resource Area.
- Central Great Plains Winter Wheat and Range Region which encompasses Butler, Seward and Saline counties in Nebraska. It extends a distance of 92.25 miles (56 percent of the route) from MP 781.73 to 873.98. The major resource areas crossed include the Central Nebraska Loess Hills, Loess Uplands, Central Loess Plains and Nebraska and Kansas Loess-Drift Hills.

The dominant landforms in the northern portion crossed by the MAR are stagnation moraines, end moraines, glacial outwash plains, terraces and floodplains. Progressing south, the MAR crosses uplands covered primarily by loess and underlain by glacial drift. The soils of these two land resource regions are very dark colored, base-rich, mineral soils known as Mollisols. Such soils generally have a frigid soil temperature regime, are very deep, have a loamy texture and range from well-drained to very poorly drained. Table 3.3-1 includes a summary of the physical and interpretative characteristics of the soil series within the MAR. Key definitions of soil characteristics identified in the table are provided below.

- Drought-prone soils include coarse-textured soils (sandy loams and coarser) that are moderately well to excessively drained.
- Hydric soils are saturated for a sufficient period of time during the growing season that the upper soil level is without oxygen. The Natural Resource Conservation Service defines hydric soils as soils under normal conditions that are saturated for a sufficient period of time during the growing season to support the growth of hydrophytic vegetation (NRCS 2018a); soils found in wetlands are called hydric soils.
- Prime farmland is defined by the Natural Resource Conservation Service as “having the best combination of chemical and physical characteristics for producing food, feed, forage, fiber and oilseed crops and is also available for these uses” (NRCS 2000). Undeveloped land with high crop production potential may be classified as “prime farmland.”

- Soil loss tolerance (T-factor) is defined as the maximum rate of annual soil erosion that will permit crop productivity to be sustained economically and indefinitely. The T-factors are integer values from 1 through 5 tons per acre per year. The factor of 1 ton per acre per year is for shallow or otherwise fragile soils and 5 tons per acre per year is for deep soils that are least subject to damage by erosion. The classes of T-factors are 1, 2, 3, 4 and 5 (NRCS 2018b).

Table 3.3-1. Soil Characteristics within Proposed MAR

Soil Characteristics	Centerline Crossing (Miles)[a]	Acres Disturbed in ROW and Construction Areas [a, b]	Percentage of Route[a]
Drought Prone	6.98	108	4
Hydric	42.43	804.8	28
Prime Farmland	112.63	1,972.46	69
T-Factor Soil Loss Tolerance			
3 tons per year	32.79	678.3	24
5 tons per year	127.02	2,085.43	73

Source: NRCS 2018b, 2018c, 2018d

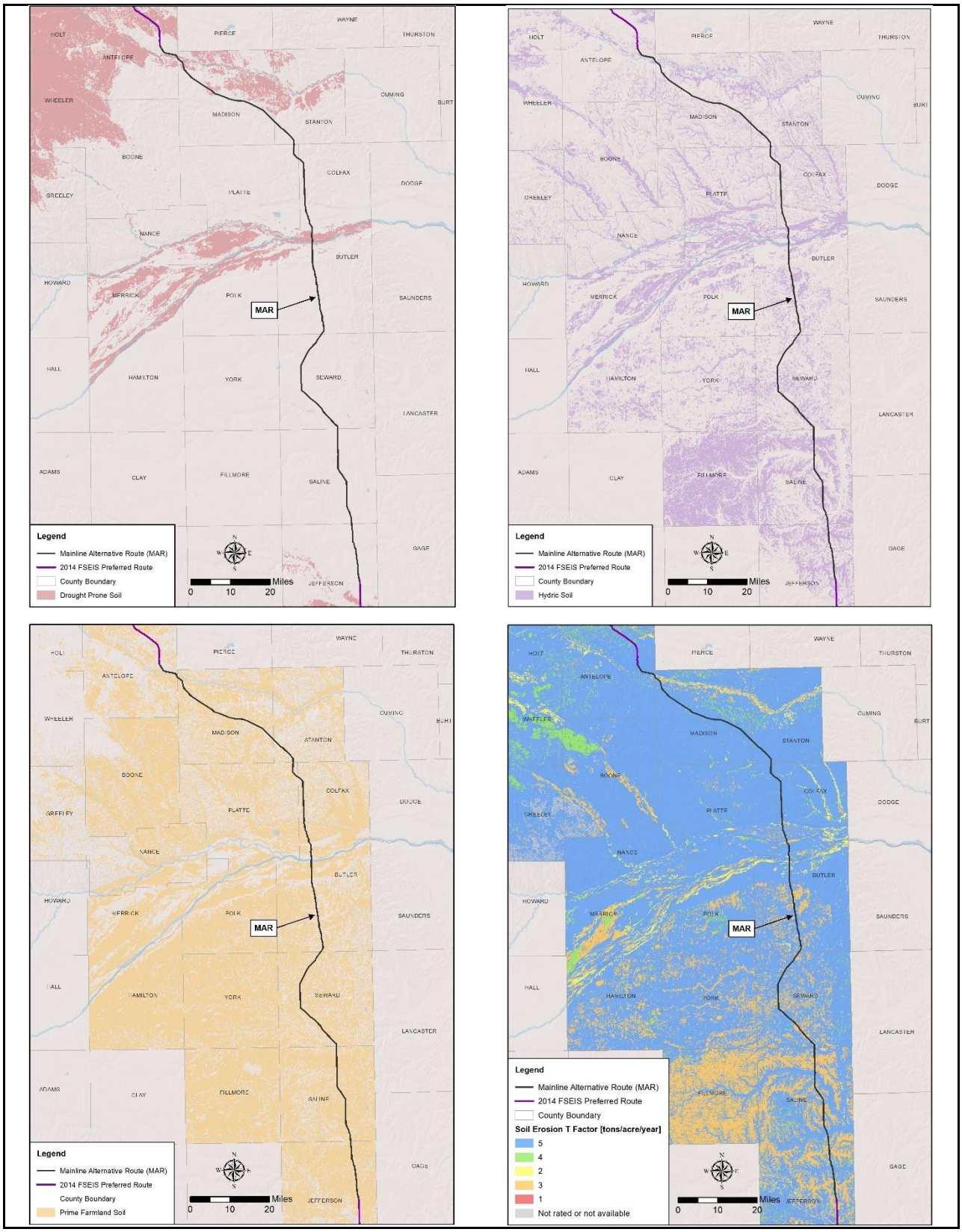
a. Percentages do not add up to 100 percent as soil types often contain more than one characteristic (e.g., soils in a given area can be classified as both hydric and prime farmland).

b. Acreage for the Construction ROW include the pipeline ROW, additional temporary workspace areas, access road easement, pipe yard, contractor yard, rail siding and pump stations.

NRCS = Natural Resource Conservation Service

As seen in the table, soils along the MAR are dominated by prime farmland (69 percent) and soils with a high loss tolerance of 5 tons per year (73 percent). The higher T-factor soils indicate the MAR contains deep soils that are least subject to damage by erosion. Twenty-eight percent of soils within the MAR are classified as hydric, and a small percentage (4 percent) are drought prone. Soils within the MAR are also prone to compaction (surface clay loam or soils of finer texture with poor to very poor drainage classes) and are dominant throughout the MAR, comprising 86 percent of the total area (Exp 2018). The most compaction prone soils are found along the southern portion of the route, below the Platte River.

Figure 3.3-1 shows the distribution of drought-prone, hydric and prime farmland soils along the MAR along with T-factor classifications. As seen in the figure, the drought prone soils are limited to the northern portion of the route on each side of the Antelope Madison county line, another portion of Madison County and just north of the Platte River in Colfax County. Hydric soils are scattered throughout the route but more concentrated next to waterbodies found along the MAR. Prime farmland is also scattered throughout the MAR but slightly more concentrated in the southern portion of the route. As discussed above, the MAR crosses through soils with soil erosion T-factors split primarily between 3 and 5 tons per year, including a fairly even split within the southern portion of the route and the 5 tons per year class dominating in the northern portion of the route.



Source: NRCS 2018b, 2018c, 2018d

Figure 3.3-1. MAR Soil Characteristics

3.4 AIR QUALITY AND GREENHOUSE GASES

This section discusses the air quality within the potentially affected environment of the proposed MAR and considers trends, applicable standards and guidance related to greenhouse gas emissions, as well as public and agency concerns. Air pollution is the presence of one or more contaminants (e.g., dust, fumes, gas, mist, odor, smoke, vapor) in the outdoor atmosphere in quantities and of characteristics and duration such as to be injurious to human, plant or animal life. Air quality, as a resource, incorporates components that describe air pollution within a region, sources of air emissions and regulations governing those emissions. Regional climate, local terrain features and meteorological conditions also influence ambient air quality.

The ROI for air quality extends beyond land-based construction and operational ROW boundaries of the MAR to include the greater Antelope, Madison, Stanton, Platte, Colfax, Butler, Seward, Saline and Jefferson counties, since air pollution dissipates throughout the atmosphere. This SEIS considers the following data types for characterizing air quality:

- Ambient air monitoring station data for Antelope, Madison, Stanton, Platte, Colfax, Butler, Seward, Saline and Jefferson counties,
- National Ambient Air Quality Standards (NAAQS), and
- Designations of attainment or nonattainment (i.e., meeting or not meeting the NAAQS).

Greenhouse gases include water vapor, carbon dioxide (CO_2), methane, nitrous oxide, ozone and several classes of halogenated substances that contain fluorine, chlorine or bromine (including chlorofluorocarbons). After water vapor, CO_2 is the most abundant greenhouse gas and could remain in the atmosphere for centuries. There is increasing concern that rising atmospheric greenhouse gas concentrations are significantly altering global climate systems with the potential for long-term impacts on human society and the environment. The ROI for greenhouse gases differs from other resource areas considered in this SEIS since the concerns about greenhouse gas emissions are primarily related to climate change, which is global and cumulative in nature. Therefore, this analysis considers the ROI for greenhouse gases on global, national and regional scales.

This SEIS considers the following data sources for characterizing greenhouse gases:

- 2014 Keystone XL Final SEIS and 2017 Final SEIS for the Line 67 Expansion
- Federal greenhouse gas initiatives from sources including the USEPA and USDOT websites and 40 CFR 98,
- Regional and state actions to address greenhouse gas concerns,
- Intergovernmental Panel on Climate Change, 5th Assessment Report and other reports that provide current global assessments of climate change including basic scientific information on causes of climate change, greenhouse gas emissions and projections, and
- USEPA U.S. Greenhouse Gas Inventory, which contains an assessment of greenhouse gas emissions in the United States and trends by greenhouse gas and economic sector.

3.4.1 Air Quality Overview

3.4.1.1 National Ambient Air Quality Standards

The MAR and associated facilities have the potential to affect local and regional ambient air quality. The USEPA sets NAAQS and develops regulations to help ensure good air quality. In the state of Nebraska,

the NDEQ is responsible for monitoring compliance with ambient air quality standards and regulating air pollutant emissions. NDEQ samples countywide areas and compares the data with NAAQS. States may develop and enforce state-specific ambient air quality standards that are more stringent than federal regulations but cannot enforce rules that are less stringent.

NAAQS represent the maximum levels of background pollution that are considered safe, with an adequate margin of safety, to protect the public health and welfare (Table 3.4-1). Areas that do not meet these NAAQS are called nonattainment areas; areas that meet both primary and secondary standards are known as attainment areas. All counties crossed by the MAR in Nebraska (Antelope, Madison, Stanton, Platte, Colfax, Butler, Seward, Saline and Jefferson counties) are currently classified as either in "attainment" or "unclassified/attainment" (USEPA 2018a).

Table 3.4-1. National and State Ambient Air Quality Standards

Pollutant	Primary / Secondary	Averaging Time	National	Nebraska [a]
CO	Primary	8-hour [b]	9 ppm (10,000 µg/m^3)	9 ppm (10,000 µg/m^3)
	Primary	1-hour [b]	35 ppm (40,000 µg/m^3)	35 ppm (40,000 µg/m^3)
NO_2	Primary	1-hour [c]	100 ppb (188 µg/m^3)	100 ppb (188 µg/m^3)
	Primary and Secondary	Annual mean	53 ppb (100 µg/m^3)	53 ppb (100 µg/m^3)
O_3	Primary and Secondary	8-hour [d]	0.07 ppm	0.075 ppm
Pb	Primary and Secondary	Rolling 3-month average [e]	0.15 µg/m^3	0.15 µg/m^3
$PM_{2.5}$	Primary	Annual mean[f]	12.0 µg/m^3	12.0 µg/m^3
	Secondary	Annual mean [f]	15.0 µg/m^3	15.0 µg/m^3
	Primary and Secondary	24-hour[g]	35 µg/m^3	35 µg/m^3
PM_{10}	Primary and Secondary	24-hour[h]	150 µg/m^3	150 µg/m^3
SO_2	Primary	1-hour[i]	75 ppb (196 µg/m^3)	75 ppb (196 µg/m^3)
	Secondary	3-hour [b]	0.5 ppm	0.5 ppm
Total Reduced Sulfur	Primary	Maximum 1-minute average	N/A	10.0 ppm [j]
	Primary	Maximum 30-minute rolling average	N/A	0.10 ppm [j]

Source: USEPA 2018b; NDEQ 2018a

a. State ambient air quality standards only supersede NAAQS if more stringent.

b. Not to be exceeded more than once per year.

c. To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 100 ppb.

d. The 3-year average of the fourth-highest daily maximum 8-hour average O_3 concentrations measured at each monitor within an area over each year must not exceed the standard.

e. NAAQS for lead not to be exceeded.

f. To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed the standard.
g. The 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m^3.
h. Not to be exceeded more than once per year on average over 3 years.
i. To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.075 ppm.
j. These standards apply only where human exposure occurs. Ambient concentrations of total reduced sulfur emissions occurring as a result of natural activities that have no associated economic benefits, such as seasonal stratification or turnover of lakes and lagoons, and the release of water uncontaminated by process or industrial activity from lakes, reservoirs, lagoons and water impoundment systems shall not constitute violation of these standards. Specifics on these standards can be found under Nebraska Administrative Code Title 129, Chapter 4, Section 007 (NDEQ 2018a).

CO = carbon monoxide; N/A = not applicable; NAAQS = National Ambient Air Quality Standards; NO_2 = nitrogen dioxide; O_3 = ozone; Pb = lead; $PM_{2.5}$ = particulate matter of diameter 2.5 microns or less; PM_{10} = particulate matter of diameter 10 microns or less; ppb = parts per billion; ppm = parts per million; SO_2 = sulfur dioxide; µg/m^3 = microgram per cubic meter

3.4.1.2 Air Quality Monitoring Network

Nebraska has a network of strategically placed outdoor air quality monitoring stations throughout the state. The air monitoring stations are composed of instrumentation owned and operated both by state agencies and by cooperating local agencies. The monitoring stations measure concentrations of the specific air pollutants relevant to that regional area and local meteorological conditions, such as wind speed and temperature. The monitoring stations measure characteristics of ambient air quality levels to determine the effects of emissions from all sources of criteria pollutants, track concentrations of air pollution over time and determine compliance with NAAQS and the state ambient air quality standards, thus assisting in the designation of nonattainment areas. However, the Nebraska air quality monitoring system does not include monitoring equipment in any of the counties crossed by the MAR (NDEQ 2018b).

3.4.1.3 Climate

Regional climate and meteorological conditions can influence the transport and dispersion of air pollutants that affect air quality. The climate along the MAR in Nebraska is warm during the summer when temperatures tend to be in the 70s degrees Fahrenheit (°F) and very cold during the winter when temperatures tend to be in the 20s°F. The warmest month of the year is July with an average maximum temperature of approximately 86°F near the northern point of the MAR (Tilden, Nebraska) and approximately 90°F near the southern point (Plymouth, Nebraska), while the coldest month of the year is January with an average minimum temperature of approximately 8°F to 12°F along the route. Temperature variations between night and day tend to be moderate during summer with a difference that can reach 25°F, and moderate during winter with an average difference of 23°F. The annual average precipitation ranges from approximately 27 inches to 31 inches along the route. Rainfall is fairly evenly distributed throughout the year. The wettest month of the year is June near the northern point of the MAR, and May near the southern point, with an average rainfall of approximately 4 to 5 inches along the route (Idcide 2018).

3.4.1.4 Nebraska Air Quality Rules

The MAR and associated facilities would not be subject to NDEQ or federal air permitting requirements because no stationary emissions sources would be installed. The pump stations are not considered stationary sources of air emissions because they would be operated using electrical power supplied by offsite sources.

According to 40 CFR 93.153(b), federal actions require a Conformity Determination for each pollutant where the total of direct and indirect emissions in a nonattainment or maintenance area caused by a federal action would equal or exceed any of the rates in paragraphs 40 CFR 93.153(b)(1) or (2). However, because the USEPA have classified all counties in Nebraska as in attainment for all NAAQS (USEPA 2018a), no Conformity Determination is required.

Nebraska has general air quality rules relating to air quality considerations that are applicable to construction of the MAR, including prevention of construction dust and prevention of visible emissions from diesel-powered motor vehicles. Table 3.4-2 summarizes general air quality rules applicable to the construction of the MAR, facilities and access roads.

Table 3.4-2. Nebraska Air Quality Regulations Pertaining to Construction of the MAR

Title	Details	Applicability to the Proposed Action
NDEQ, Title 129, Chapter 32, Sections 001, 002 Duty to Prevent Escape of Dust	No person may cause or permit the handling, transporting or storage of any material in a manner which may allow particulate matter to become airborne in such quantities and concentrations that it remains visible in the ambient air beyond the premises where it originates. No person may cause or permit a building or its appurtenances or a road, or a driveway or an open area to be constructed, used, repaired or demolished without applying all such reasonable measures to prevent particulate matter from becoming airborne so that it remains visible beyond the premises where it originates. The Director may require such reasonable measures as may be necessary to prevent particulate matter from becoming airborne, including but not limited to paving or frequent cleaning of roads, driveways and parking lots; application of dust-free surfaces; application of water; and the planting and maintenance of vegetative ground cover.	Construction of the MAR pipeline, pump stations and access roads would require excavation, temporary storage, moving and grading of soil, which can result in airborne particulate matter.
NDEQ, Title 129, Chapter 39, Section 001 Visible Emissions from Diesel-Powered Motor Vehicles	No person shall operate a diesel-powered motor vehicle on any public street or highway in such a manner that smoke discharged from the exhaust is of a shade or density equal to or darker than that designated as No. 1 on the Ringelmann Chart or an equivalent opacity of 20% for 10 consecutive seconds or longer.	Construction of the MAR and associated facilities and access roads would require use of diesel-powered motor vehicles of which some would travel on highways and public streets.

Source: NDEQ 2018c
% = percent; MAR = Mainline Alternative Route; NDEQ = Nebraska Department of Environmental Quality

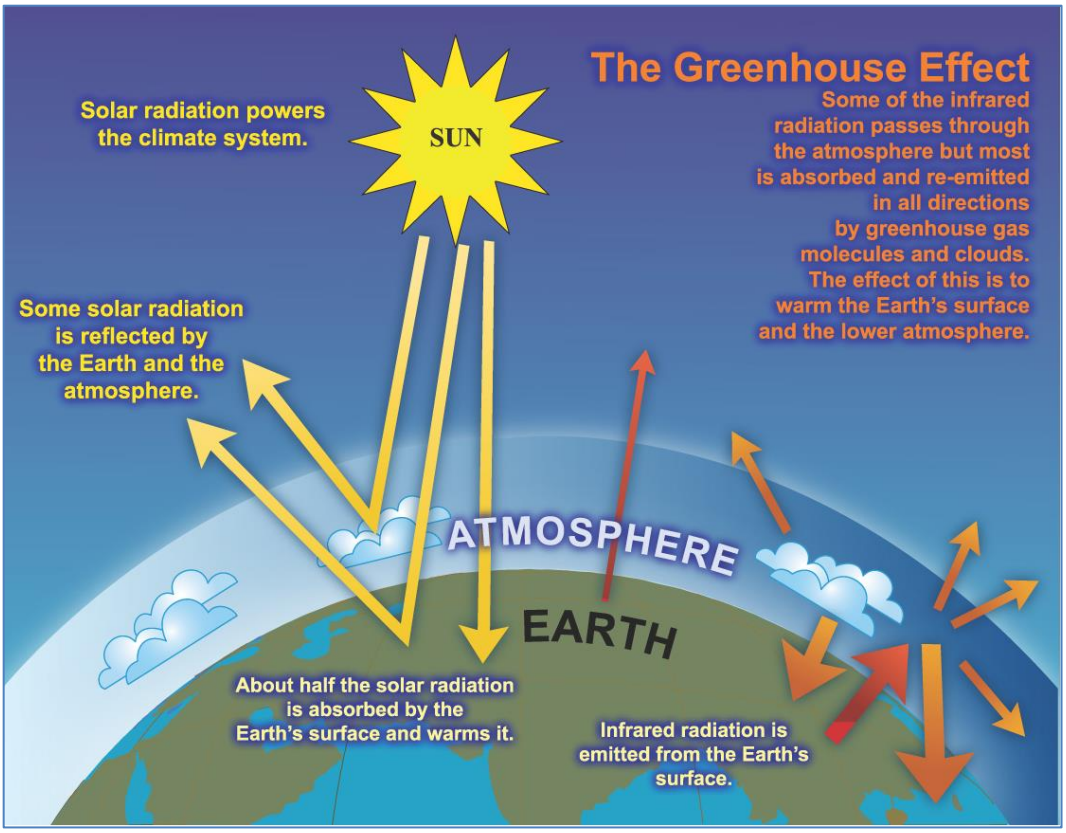
3.4.1.5 Class 1 Areas

Under the Clean Air Act, the Class I area designations were given to 156 areas that met certain criteria (e.g., national parks greater than 6,000 acres, national wilderness areas and national memorial parks greater than 5,000 acres, and one international park) (40 CFR 81.400). The purpose of the Class I areas is to provide a protection program for specific air quality concerns at each Class I area. Section 162(a) of the Clean Air Act granted these areas special air quality protections. Generally, air quality impacts at Class I areas are evaluated when a proposed emissions source is a major source and is within 100 kilometers (62 miles) of a Class I area. There are no Class I National Park and Wilderness Areas in Nebraska; the nearest sites are in Colorado and South Dakota. NDEQ provides fine particulate and particulate speciation monitors at the Nebraska National Forest in Halsey, Thomas County, intended to

provide information for studying regional haze that may impact Class I National Park and Wilderness Areas, as part of the Interagency Monitoring of Protected Visual Environments (IMPROVE) program (NDEQ 2018b).

3.4.2 Greenhouse Gases Overview

Greenhouse gases in the earth's atmosphere help regulate the temperature of the planet by trapping solar heat (Intergovernmental Panel on Climate Change 2007). When solar radiation (sunlight) reaches the earth, part is reflected back into space, and about half is absorbed by the earth's surface and then re-emitted as infrared radiation. Figure 3.4-1 illustrates the greenhouse effect that occurs when gases in the earth's atmosphere absorb some of this emitted infrared radiation and cause the atmosphere's temperature to rise.



Source: Intergovernmental Panel on Climate Change 2007

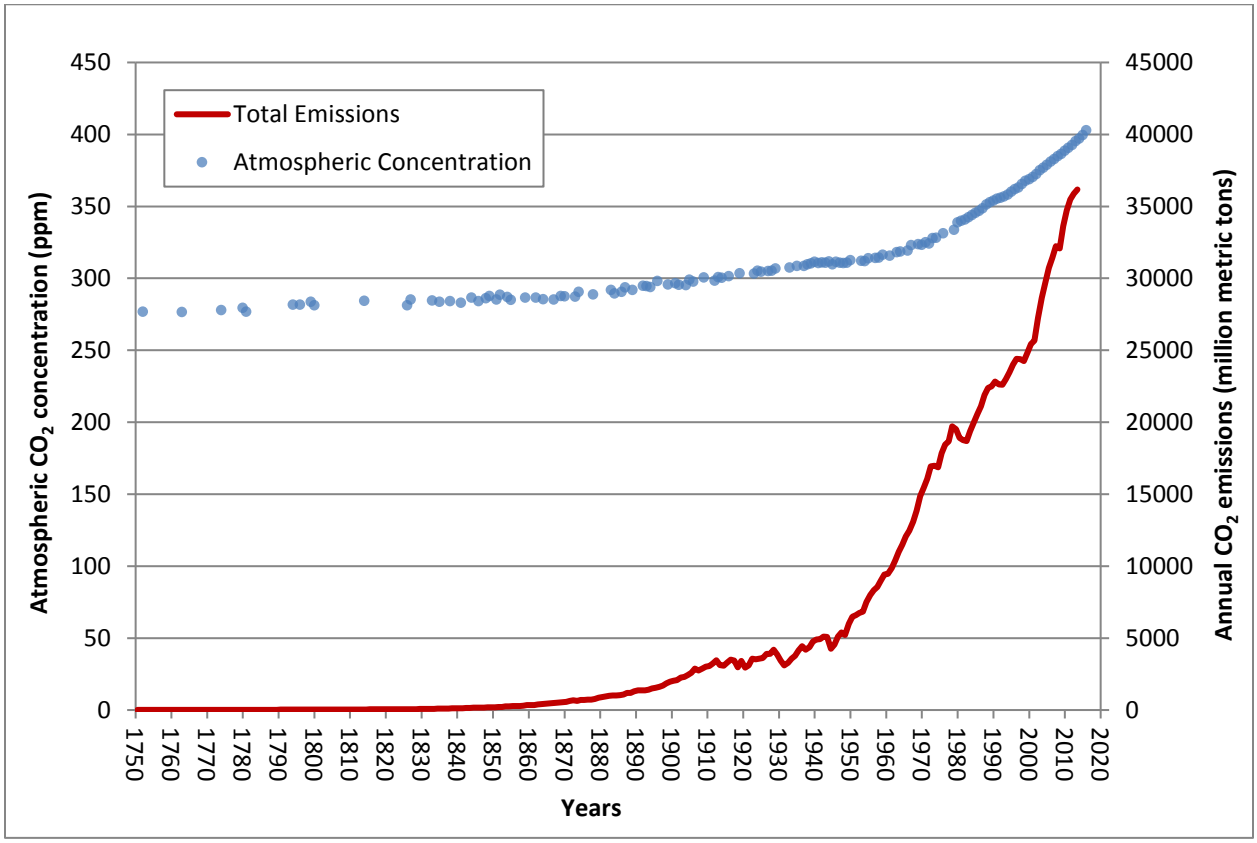
Figure 3.4-1. The Greenhouse Effect

After water vapor, CO_2 is the second most abundant greenhouse gas in the atmosphere and accounts for the majority of anthropogenic greenhouse gas emissions. It could remain in the atmosphere for centuries and tends to mix quickly and evenly throughout the lower levels of the global atmosphere. Other significant greenhouse gases include methane, nitrous oxide and industrial fluorinated gases. In addition, gases such as carbon monoxide, nitrogen oxides and non-methane volatile organic compounds (VOCs) have an indirect effect on terrestrial or solar radiation absorption by influencing the formation or destruction of greenhouse gases such as ozone. Extremely small particles, such as sulfur dioxide or elemental carbon emissions, can also affect the absorptive characteristics of the atmosphere and therefore influence the greenhouse effect.

3.4.2.1 Atmospheric Greenhouse Gas Concentrations

At the beginning of the industrial era (circa 1750 AD), the concentration of CO_2 in the atmosphere was approximately 280 parts per million (ppm) (Etheridge et al. 1998). From the 1700s to the present, global atmospheric concentrations of CO_2 have risen approximately 44 percent (USEPA 2018d). In 1958, C.D. Keeling and others began measuring the concentration of atmospheric CO_2 at Mauna Loa in Hawaii. These measurements show that the amount of CO_2 in the atmosphere has been steadily increasing. In 1959, the concentration of CO_2 at Mauna Loa was approximately 316 ppm, and in 2017 it was approximately 406 ppm (Tans and Keeling 2018). The average annual CO_2 concentration growth rate at Mauna Loa has been significantly higher during the last decade (2001–2010 average: 2.04 ppm per year) than the average CO_2 growth rate during the previous decade (1991–2000 average: 1.55 ppm per year) or during the last 50 years (1961–2010 average: 1.47 ppm per year) (NOAA 2018).

The trend in atmospheric CO_2 concentrations observed at Mauna Loa is similar to other global observation sites. In 2017, the annual global mean CO_2 concentration was approximately 405 ppm, and between 2001 and 2010, annual global mean CO_2 concentration increased by an average of 2.01 ppm per year (Dlugokencky and Tans 2018; NOAA 2018). Data analysis correlates this increase in global concentrations of CO_2 with increased greenhouse gas emissions resulting from human activities, such as the use of fossil fuels and changes in land use (Intergovernmental Panel on Climate Change 2014). Figure 3.4-2 depicts the changes in global CO_2 concentrations and CO_2 emissions from fossil fuel use since the beginning of the industrial era (circa 1750).



Source: Developed from Boden et al. 2017; Dlugokencky and Tans 2018; Etheridge et al. 1998
CO_2 = carbon dioxide; ppm = parts per million

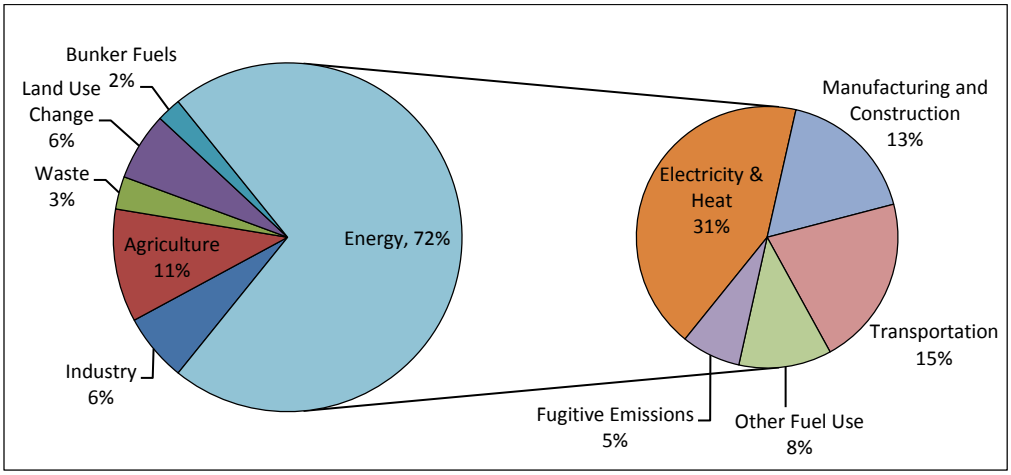
Figure 3.4-2. Historical Trends in Global Atmospheric CO_2 Concentrations and Emissions

Like CO_2, atmospheric concentrations of other greenhouse gases have also increased since the start of the Industrial Revolution. Methane concentrations have increased from approximately 720 parts per billion (ppb) to around 1,800 to 1,900 ppb, while nitrous oxide concentrations have increased from approximately 270 ppb to approximately 325 ppb (Oak Ridge National Laboratory 2014). Current atmospheric concentrations of other industrial greenhouse gases, including chlorofluorocarbons, hydrofluorocarbons and halons, were essentially zero in the pre-industrial era, but currently range from a few parts per trillion to a few hundred parts per trillion.

3.4.2.2 Global Trends in Greenhouse Gas Emissions

The increase in atmospheric concentrations of greenhouse gases has been attributed primarily to human activities (Intergovernmental Panel on Climate Change 2014). Global greenhouse gas emissions have increased steadily since the onset of the Industrial Revolution around 250 years ago, with the rate of emissions accelerating rapidly in the 20th century. For example, about half of all CO_2 emissions from human activity have occurred in the decades since 1970. Global greenhouse gas emissions equaled 48,892 million metric tons carbon dioxide equivalent (CO_2-eq) in 2014, up from 33,823 million metric tons CO_2-eq in 1990 and 22,341 million metric tons CO_2-eq in in 1970 (European Commission 2018; World Resources Institute 2018).

Human activities from all sectors of the economy emit greenhouse gases into the atmosphere. Notably, energy generation, transportation and industrial and agricultural activities release CO_2, methane, nitrous oxide, ozone and chlorofluorocarbons (Intergovernmental Panel on Climate Change 2014). Greenhouse gas emissions from burning fossil fuels account for the majority of global emissions, and the contribution of fossil fuel emissions toward climate change has continued to increase in recent decades. Figure 3.4-3 shows the contribution to global emissions by economic sector.



Source: World Resources Institute 2018, based on 2014 emissions data.
Note: All ratios are expressed in terms of CO_2-eq. Energy sub-sector emissions, shown as percentage of total global emissions, add up to 72 percent.

Figure 3.4-3. Global Greenhouse Gas Emissions by Economic Sector

Increasing greenhouse gas concentrations in the atmosphere are a leading contributor to a range of ongoing and predicted changes in global climate, including rising surface temperatures, changes in precipitation, rising sea levels, and a possible increase in extreme weather events (Intergovernmental Panel on Climate Change 2014). These changes are not geographically uniform, however, and some regions are likely to experience greater change than others.

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3.5 NOISE AND VIBRATION

This section discusses the noise conditions within the potentially affected environment of the proposed MAR. The ROI extends 0.5 mile from the 110-foot construction ROW edge, which is the area that could be susceptible to noise impacts.

This SEIS considers the following data sources for characterizing the noise environment and vibration:

- Aerial photography to identify potential noise-sensitive receptors near the pipeline including the USDA Farm Service Agency National Imagery Program county mosaics for counties within the Project area.
- The 2012 USDOT High-Speed Ground Transportation Noise and Vibration Impact Assessment methodology to estimate ambient, construction and operational noise levels, and to evaluate general noise and vibration concepts.
- USEPA methodology for noise concepts and limits.
- TransCanada Keystone XL Pipeline Nebraska Environmental Report, April 2018.

3.5.1 Noise and Vibration Overview

Sound is a physical phenomenon consisting of vibrations that travel through a medium, such as air, and are sensed by the human ear. Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing or is otherwise intrusive. Human response to noise varies depending on the type and characteristics of the noise, distance between noise source and receptor, receptor sensitivity and time of day. Noise is often generated by activities essential to a community's quality of life, such as construction or vehicular traffic.

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air, and sensed by the human ear.

Noise is defined as any unwanted sound. The human ear experiences sound as a result of pressure variations in the air.

Sound varies by both intensity and frequency. The physical intensity or loudness level of noise is expressed quantitatively as the sound pressure level. Sound pressure levels are defined in terms of decibels (dB), which are measured on a logarithmic scale. Sound can be quantified in terms of its amplitude (loudness) and frequency (pitch). Frequency is measured in hertz, which is the number of cycles per second. The typical human ear can hear frequencies ranging from approximately 20 hertz to 20,000 hertz. Typically, the human ear is most sensitive to sounds in the middle frequencies where speech is found and is less sensitive to sounds in the low and high frequencies.

Since the human ear cannot perceive all pitches or frequencies equally, measured noise levels in dB will not reflect the actual human perception of the loudness of the noise. Thus, the sound measures can be adjusted or weighted to correspond to a scale appropriate for human hearing. The common sound descriptors used to evaluate the way the human ear interprets dB from various sources are as follows:

- **Decibel (dB)**: Sound pressure level measurement of intensity. The decibel is a logarithmic unit that expresses the ratio of a sound pressure level to a standard reference level.
- **A-Weighted Decibel Scale (dBA):** Often used to describe the sound pressure levels that account for how the human ear responds to different frequencies and perceives sound.
- **Hertz**: Measurement of frequency or pitch.

- **Equivalent Sound Level (L_{eq}):** The L_{eq} represents the average sound energy over a given period, presented in decibels.
- **Day-Night Average Sound Level (L_{dn}):** The L_{dn} is the 24-hour L_{eq}, but with a 10-dB penalty added to nighttime noise levels (10 p.m. to 7 a.m.) to reflect the greater intrusiveness of noise experienced during this time.
- **Sensitive Receptors**: Locations or land uses associated with indoor or outdoor areas inhabited by humans that may be subject to significant interference from noise (i.e., nearby residences, schools, hospitals, nursing home facilities and recreational areas).

The adjusted scales are useful for gauging and comparing the subjective loudness of sounds to humans. The threshold of perception of the human ear is approximately 3 dB. A 5-dB change is considered to be clearly noticeable to the ear, and a 10-dB change is perceived as an approximate doubling (or halving) of the noise level (MPCA 1999). Table 3.5-1 presents a list of sounds encountered in daily life and their approximate levels in dBA. Table 3.5-2 presents the typical sound levels associated with residential communities.

Table 3.5-1. Examples of Common Sound Levels

Noise Level (dBA)	Description	Typical Sources
140	Threshold of pain	–
125	Uncomfortably loud	Automobile assembly line
120	Uncomfortably loud	Jet aircraft
100	Very loud	Diesel truck
80	Moderately loud	Motor bus
60	Moderate	Low conversation
40	Quiet	Quiet room
20	Very quiet	Leaves rustling

Source: Liu and Lipták 1997
dBA = A-weighted sound level in decibels

Table 3.5-2. Typical L_{90} Sound Levels in Residential Communities

Description	Typical Range (dBA)	Average (dBA)
Very Quiet Rural or Remote Area	26 to 30	28
Very Quiet Suburban or Rural Area	31 to 35	33
Quiet Suburban Residential	36 to 40	38
Normal Suburban Residential	41 to 45	43
Urban Residential	46 to 50	48
Noisy Urban Residential	51 to 55	53
Very Noisy Urban Residential	56 to 60	58

Source: USEPA 1974
dBA = A-weighted decibel
Note: L_{90} is the level exceeded for 90 percent of the time. For 90 percent of the time, the noise level is above this level. It is generally considered to be representing the background or ambient level of a noise environment.

Ambient or background noise is a combination of various sources heard simultaneously. Calculating noise levels for combinations of sounds does not involve simple addition, but instead uses a logarithmic scale (HUD 1985). As a result, the addition of two noises, such as a garbage truck (100 dBA) and a lawn mower (95 dBA) would result in a cumulative sound level of 101.2 dBA, not 195 dBA.

Noise levels decrease (attenuate) with distance from the source. The decrease in sound level from any single noise source normally follows the "inverse square law." That is, the sound level change is inversely proportional to the square of the distance from the sound source. A generally accepted rule is that the sound level from a stationary source would drop approximately 6 dB each time the distance from the sound source is doubled. Sound level from a moving "line" source (e.g., a train or vehicle) would drop 3 dB each time the distance from the source is doubled (USDOT 2012).

Barriers, both manmade (e.g., sound walls) and natural (e.g., forested areas, hills, etc.) may reduce noise levels, as may other natural factors, such as temperature and climate. Standard buildings typically provide approximately 15 dB of noise reduction between exterior and interior noise levels (USEPA 1978). Noise generated by stationary and mobile sources has the potential to impact sensitive noise receptors, such as residences, hospitals, schools and churches. Persistent and escalating sources of sound are often considered annoyances and can interfere with normal activities, such as sleeping or conversation, such that these sounds could disrupt or diminish quality of life.

Vibration refers to the oscillations or rapid linear motion of parts of a fluid or elastic solid whose equilibrium has been disturbed. Vibration is often expressed in terms of the peak particle velocity (PPV), as inches per second or millimeters per second, when used to evaluate human annoyance and building damage impacts. Common sources of ground-borne vibration are trains, heavy farm or construction machinery and ground-breaking construction activities such as blasting, drilling and operating heavy earth-moving equipment. Although it is unusual for vibration from sources such as buses and trucks to be perceptible, ground-borne vibration can be a serious concern for sensitive receptors near construction activities, a transit system route or maintenance facility. The impacts of ground-borne vibration include perceptible movement of the building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. In severe cases, the vibration can cause damage to buildings (USDOT 2012).

There are no federal standards for vibration; however, various researchers and organizations have published guidelines. The human response to vibration involves barely perceptible vibration levels (in PPV) of 0.01 inch per second, distinctly perceptible levels of 0.04 inch per second and strongly perceptible of 0.10 inch per second (Jones and Stokes 2004). The vibration levels represent continuous, frequent or intermittent sources that are typical of construction activities such as directional drilling operations. Additionally, 0.2 inch per second is the threshold at which there is a risk of architectural damage to normal structures, such as dwellings (Jones and Stokes 2004).

3.5.1.1 Existing Noise Environment

The MAR would be constructed in primarily rural agricultural areas. The existing noise level in a particular area is generally based on its proximity to nearby major roadways or railroads or on population density (USDOT 2006). The majority of the MAR corridor is not close to major roadways or railways. Therefore, ambient noise levels were estimated based on the population density of each affected county using the methodology described in USDOT's Transit Noise and Vibration Impact Assessment (USDOT 2006).

According to the U.S. Census Bureau, the population density of the affected counties is between approximately 8 and 61 people per square mile (U.S. Census Bureau 2010). As a result, the existing L_{dn}

in the vicinity of the MAR is estimated with be 35 dBA, and the existing ambient equivalent continuous sound levels (in L_{eq}) during daytime and nighttime are estimated to be approximately 35 and 25 dBA, respectively (USDOT 2006). Ambient (background) noise levels occur from infrequent roadway traffic, farm machinery on a seasonal basis, pets and various other household noises. However, depending on the distance from the pumping units, residences near pump stations can experience increased ambient noise levels because of operation of the pumps for the pipeline.

The closest noise-sensitive receptor is located approximately 140 feet from the pipeline construction ROW. Additionally, there are approximately 157 noise-sensitive receptors located within 500 feet and approximately 1,090 within 0.5 mile of the construction ROW. Table 3.5-3 presents the closest nearby noise-sensitive receptors within 0.5 mile of each pump station.

Table 3.5-3. Nearest Noise-Sensitive Receptors to the Pump Stations

Pump Station Location	County	Nearest Milepost	Distance from Source to Noise-Sensitive Receptor (feet)	Direction from Nearest Receptor to Source	Number of Residences within 0.5 Mile of Source
Pump Station 23B	Platte	758	798	Southwest	9
Pump Station 24	Butler	785	1,520	East	4
Pump Station 25	Seward	830	2,031	Northwest	3

Source: Google Earth 2018b
dBA = A-weighted decibel
Note: Aerial imagery was used to identify potential nearby sensitive receptors (Google Earth 2018b).

The closest federal and state parks to the MAR are the Blue River State Recreational Area in Seward County, Nebraska and the De Soto National Wildlife Refuge in Harrison County, Iowa, which are approximately 0.9 mile west and 78 miles east of the construction ROW, respectively.

3.5.1.2 Noise Regulations

The Noise Control Act of 1972 (42 *United States Code* [USC] 4901) directs federal agencies to comply with applicable federal, state, interstate and local noise control regulations. The primary responsibility of addressing noise pollution has shifted to state and local governments. In 1974, the USEPA published its document entitled *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin on Safety*, which evaluated the effects of environmental noise with respect to health and safety (USEPA 1974). The document provides information for state and local agencies to use in developing their ambient noise standards. As set forth in the publication, the USEPA provided information suggesting that an $L_{eq(24)}$ of 70 dBA is the level above which environmental noise could cause hearing loss if heard consistently over several years. An L_{dn} of 55 dBA outdoors and 45 dBA indoors is the threshold above which noise could cause interference or annoyance (USEPA 1974).

No standardized criteria have been developed for assessing construction noise impact (i.e., short-term or temporary activities; usually less than 1 year). Nebraska does not have regulatory noise limits for construction, although some local governments have ordinances governing noise from construction or industrial activities. In the absence of standardized criteria for a detailed assessment of construction noise, the Federal Transit Administration recommends the following for residential areas: construction noise levels at the sensitive receptor should not exceed an 8-hour L_{eq} of 80 dBA during daytime (7 a.m. to 10 p.m.), an 8-hour L_{eq} of 70 dBA during nighttime (10 p.m. to 7 a.m.) and a 30-day average L_{dn} of 75 dBA. In urban areas with very high ambient noise levels (L_{dn} greater than 65 dBA), L_{dn} from construction operations should not exceed existing ambient plus 10 dBA (USDOT 2006).

Aside from the USEPA noise standards described above, Keystone has agreed to a 55 dBA L_{dn} measured at the nearest noise-sensitive receptor in Nebraska during operations at pump stations (Exp 2018). Additionally, noise levels of the proposed Project plus baseline noise levels would not exceed a 10-dBA increase from the baseline noise levels at pump stations (U.S. Department of State 2014).

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3.6 WATER RESOURCES

This section discusses water resources along the MAR, to include groundwater, surface water, wetlands, floodplains and wild and scenic rivers. The ROI includes water resources within and adjacent to the 110-foot-wide construction ROW, which includes the 50-foot-wide operational ROW.

This SEIS considers the following data sources for characterizing water resources:

- USEPA
- Nebraska Departments of Natural Resources and Environmental Quality (NDEQ)
- State of Nebraska geographic databases
- U.S. Geological Survey
- Surface Water Quality Standards
- Waterbody and wetland surveys conducted for the MAR
- Federal Emergency Management Agency (FEMA)

3.6.1 Water Resources Overview

3.6.1.1 Groundwater

Groundwater resources are a primary source of irrigation and potable water in Nebraska. While the MAR includes slight changes from descriptions in Section 3.3.2 of the 2014 Keystone XL Final SEIS for Nebraska, the underlying groundwater and aquifer descriptions within the MAR are similar. Principal groundwater aquifers underlying the MAR include alluvial aquifers and the Northern High Plains Aquifer, a nationally important water resource that underlies much of the state; and the Lower Cretaceous Aquifer. A principal aquifer is defined as a regionally extensive aquifer or aquifer system that has the potential to be used as a source of potable water (USGS 2003, 2002).

Alluvial aquifers are found within the uppermost (shallow) groundwater-bearing zones and are unconsolidated sediment (sand and gravel) aquifers representing a variety of settings, including river and stream valleys (alluvial aquifers) and glacial drainages (glacial drift aquifers) (Divine and Sabray 2017). Alluvial aquifers that underlie the MAR typically consist of sediments deposited in stream valleys. Where these stream valley aquifers cross the Northern High Plains Aquifer, the stream valleys are hydraulically connected to, and considered to be part of, the underlying Northern High Plains Aquifer. Groundwater in the alluvial aquifers is typically shallow (less than 50 feet below ground surface) and unconfined (USGS 1997).

The Northern High Plains Aquifer consists of hydraulically connected geologic units from the late Tertiary through Quaternary geologic time. The principal geologic unit in the Northern High Plains aquifer in Nebraska is the Ogallala Formation. This unit covers the largest area in Nebraska and is the most plentiful source of groundwater in the aquifer. The Ogallala mostly consists of unconsolidated sand and gravel, although its occurrence along the MAR is limited to the northern most portion of the route (Antelope and Madison counties) where the formation is primarily underlain by the Pierre Shale, as described further below. Depth to groundwater in the Ogallala Formation ranges from near the surface to 200 feet below ground surface, and the median depth to groundwater in this unit is 110 feet below ground surface (U.S. Department of State 2014). Where the Ogallala Formation is not present, the Northern High Plains Aquifer is typically described to include groundwater bearing Quaternary and recent aeolian,

fluvial and glacial alluvium overlying and adjacent to the Ogallala Formation; as such, conditions overlap somewhat with the shallow alluvial aquifers described previously.

Other units in the Northern High Plains Aquifer include younger deposits which provide sources of water. These groundwater regions that underlie the MAR include Quaternary/recent alluvium of the Eastern Nebraska Unit (including the Northeast and Southeast Nebraska Glacial Drift and South Central Plains) and the Platte River Valley Unit. The Eastern Nebraska Unit refers to the late Tertiary and Quaternary in the eastern part of the Northern High Plains where the Ogallala is thin or absent (USGS 2007). This unit consists of sand and gravel and overlies Cretaceous-age bedrock. The median depth to groundwater in this unit is 79 feet below ground surface level (U.S. Department of State 2014).

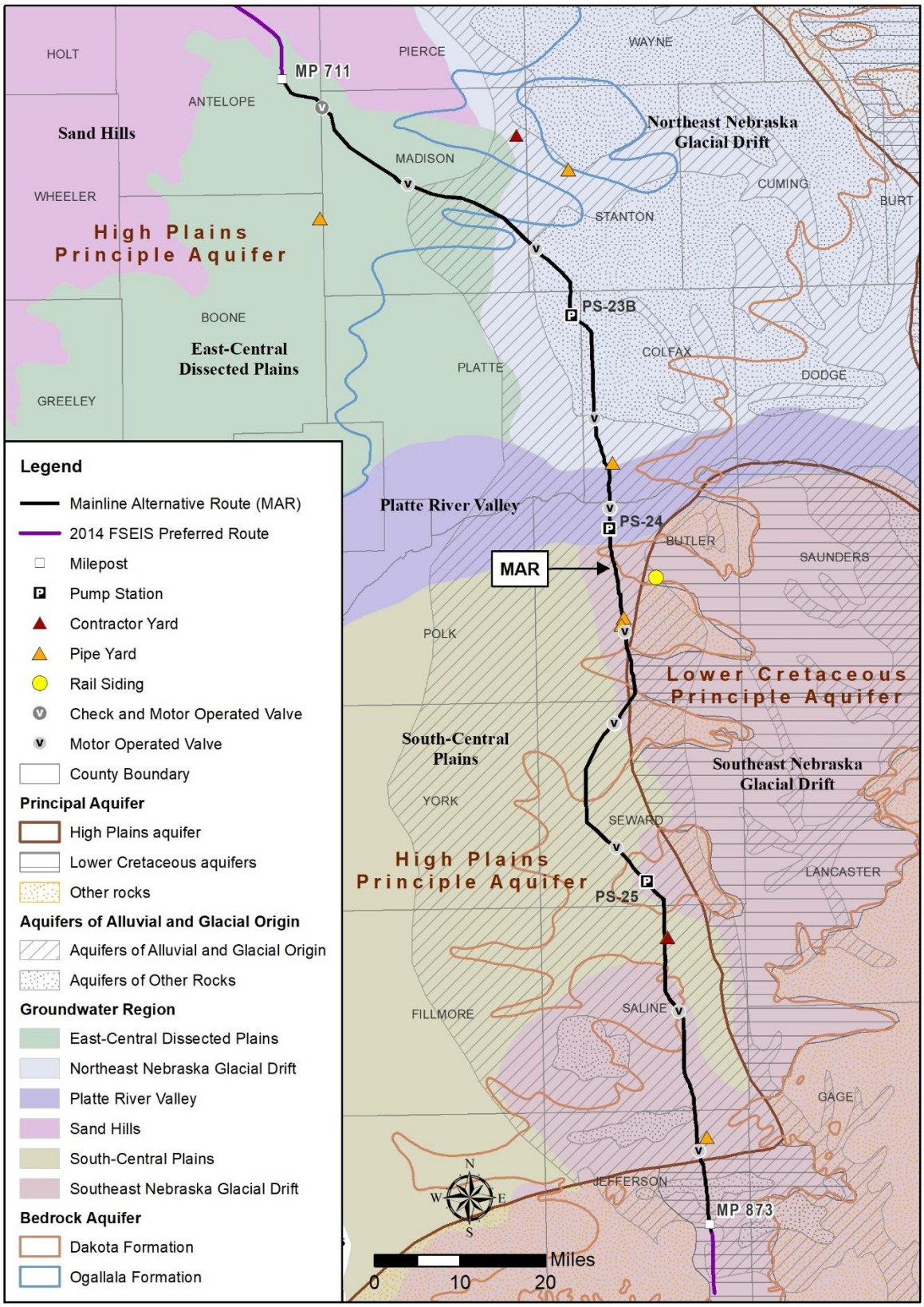
The Platte River Valley Unit includes alluvial sediments within the Platte River Valley of the Northern High Plains Aquifer. This unit consists of stream deposited sand, gravel and clay of Quaternary to Holocene age and also overlies Cretaceous-age bedrock. Depth to groundwater is generally less near the Platte River because it is hydraulically connected to the aquifer through the stream valley aquifers that parallel the rivers (USGS 1997). The median depth to groundwater in this unit is approximately 5 feet below ground surface level (U.S. Department of State 2014).

When present, the Ogallala Formation and associated alluvial aquifers are a primary source of groundwater for agricultural, domestic, commercial, industrial and potable use. Available studies and reports indicate that, in general, water within the Northern High Plains Aquifer and alluvial aquifers in the state exhibit low concentrations of total dissolved solids, making the water in the shallow aquifers generally suitable for irrigation, potable and industrial uses (USGS 2007). Along the MAR, the primary use is for irrigation; other uses include potable use, livestock watering and industrial use. However, while the water quality of the High Northern Plains Aquifer is suitable for drinking, impacts from farming operations are present in areas of shallow groundwater (e.g., elevated levels of fertilizers, pesticides, herbicides).

Figure 3.6-1 shows the distribution of these aquifers within the ROI. The MAR would extend 148.5 linear miles through areas underlain by the Northern High Plains Aquifer. A further breakout of the specific groundwater regions crossed include the following: 31.3 miles through the East Central Dissected Plains/Ogallala Formation, 35 miles through the Northeast Nebraska Glacial Drift, 9.1 miles through the Platte River Valley, 29.3 miles through the South Central Plains, and 58.7 miles through the Southeast Nebraska Glacial Drift, for a total of 163.4 miles. The majority of the MAR overlies aquifers of alluvial and glacial origin (113.8 miles) (Figure 3.6-1) (USGS 2003, 2002).

As shown in Figure 3.6-1, the principal aquifer unit underlying the northern portion of the MAR includes unconsolidated sediments of Quaternary age (including the Northeast Nebraska Glacial Drift Aquifer) and the Ogallala Group, where present in Antelope and Madison counties. The Ogallala Group was historically more widespread; however, extensive use from irrigation has eroded away its occurrence in the southeast portion of Madison County and from portions underlying the MAR in Stanton County; it is completely absent in Colfax County. The principal aquifer unit underlying the portion of the MAR that crosses the Platte River (southern Colfax and northern Butler counties) is the Platte River Valley Unit of the High Northern Plains Aquifer. The southern portion of the MAR overlies the Southeast Nebraska Glacial Drift and South Central Plains units.

In addition, because primary aquifers are thin or absent in parts of eastern Nebraska, the population in eastern Nebraska relies on secondary aquifers for water use. Secondary aquifers are bedrock aquifers of Cretaceous age (Lower Cretaceous Principal Aquifer) that lie below the principal aquifers. There are four secondary aquifers in eastern Nebraska. The extent to which they are used varies, but the aquifer with the largest number of active registered wells (more than 3,000 statewide) is the Dakota Aquifer that underlies a small portion (approximately 13 miles) of the MAR in Butler and Jefferson counties.



Source: USGS 2003, 2002

Figure 3.6-1. Aquifers Crossed by the MAR

Most of the wells are private domestic wells (over 70 percent). The concentration of registered private wells is especially high in southern Jefferson County. Secondary aquifers generally have lower yield than primary aquifers and, because they are hosted by bedrock units, they are more consolidated and harder to drill through (Divine and Sabray 2017).

A total of 12 private water wells are located within 100 feet of the MAR, although 3 are abandoned. Of the nine active wells, two wells are classified as domestic and seven wells are classified as irrigation. The active wells are located in Madison, Butler, Seward, Saline and Jefferson counties. Their approximate milepost locations and distance from the centerline are identified in Table 3.6-1.

Table 3.6-1. Private Wells within 100 Feet of the MAR

County	Approximate Milepost	Distance from Centerline (feet)
Madison	727.13	2.54
Madison	736.89	8.10
Butler	802.06	10.28
Seward	821.56	32.73
Saline	835.56	54.01
Saline	836.53	25.97
Saline	846.89	67.81
Jefferson	860.67	94.50
Jefferson	870.92	10.39

Source: NDNR 2018
MAR = Mainline Alternative Route

The MAR also lies within 1 mile of seven wellhead protection areas (WHPAs), which are areas regulated to prevent contamination of a well or well field supplying a public water supply system. Their locations are listed by county in Table 3.6-2.

Table 3.6-2. Wellhead Protection Areas within 1 Mile of the MAR

County	Approximate Milepost	Distance and Direction from Centerline (miles)
Antelope (City of Tilden)	717.60	0.28 SW
Madison (City of Battle Creek)	732.14	0.23 NNE
Seward (Village of Goehner)	822.62	0.25 NE
Seward (City of Milford)	829.33	0.83 NE
Saline (Village of Dorchester)	837.56	0.50 W
Jefferson (Village of Plymouth)	863.41	0.14 E
Jefferson (Village of Harbine)	869.84	0.49 E

Source: NDEQ 2018d
E = east; MAR = Mainline Alternative Route; N = north; NE = northeast; SW = southwest; W = west

3.6.1.2 Surface Water

Nebraska's rivers of the central High Plains typically flow through broad, flat valleys and deposit and rework sediments. These sediments form dynamic and unstable braided channel and transient depositional bars within relatively flat and broad valleys (Wiken et al. 2011). The proposed MAR would

cross three major river basins in Nebraska: Elkhorn, Lower Platte and Big Blue. Streams are typically overloaded with fine-grain sediment, mostly silt and sand with smaller quantities of gravel. The MAR crosses a total of 105 waterbodies, including 31 perennial rivers and streams, 60 intermittent/ephemeral streams and 14 other waterbodies (e.g., levee and water control structures such as man-made ditch, etc.) (Exp and Westech 2018a). A perennial river or stream is one that flows continuously. An intermittent stream is one that flows only at certain times of the year when it receives water from springs or from some surface source such as melting snow in mountainous areas. An ephemeral stream is one that flows only in response to direct precipitation and whose channel is always above the water table. Table 3.6-3 provides a listing of the perennial streams crossed by the proposed MAR, as well as state water quality designation and proposed crossing method. Table 3.7-2 in Section 3.7 provides state classifications with respect to aquatic life.

The total waterbody crossing distance within the MAR would be 0.7 mile, 0.36 mile of which would be crossed using the HDD method. Figure 3.6-2 illustrates the major watersheds in Nebraska and the significant river and stream waterbodies within those watersheds that would be crossed by the MAR.

Table 3.6-3. MAR Perennial Stream Crossings

County	Milepost	Waterbody	Crossing Length[a] (feet)	State Water Quality Classification	Crossing Method
Antelope	712.5	Trueblood Creek	16	Agricultural Water Supply – Class A; Aesthetics	Open-Cut
Antelope	716.3	Elkhorn River	209.16	Primary contact recreation; Agricultural Water Supply – Class A; Aesthetics	HDD
Antelope	716.4	Giles Creek	51.33	Agricultural Water Supply – Class A; Aesthetics	Open Cut
Madison	723.7	Buffalo Creek	12.36	Agricultural Water Supply – Class A; Aesthetics	Open Cut
Madison	731.7	Battle Creek	6.68	Agricultural Water Supply – Class A; Aesthetics	Open Cut
Madison	737.5	Tributary to Taylor Creek	4.5	N/A	Open Cut
Madison	742.6	Tributary to Union Creek	6.3	N/A	Open Cut
Stanton	747.1	Union Creek	29.64	Primary contact recreation; Agricultural Water Supply – Class A; Aesthetics	HDD
Stanton	748.4	Tributary to Meridian Creek	8.83	N/A	Open Cut
Colfax	771.4	Shell Creek	69.23	Primary contact recreation; Agricultural Water Supply – Class A; Aesthetics	Open Cut
Colfax	778.7	Lost Creek	29.75	Agricultural Water Supply – Class A; Aesthetics	Open Cut
Butler	781.1	Platte River	1429.74	Primary contact recreation; Public Drinking Water Use; Agricultural Water Supply – Class A; Aesthetics	HDD

Table 3.6-3. MAR Perennial Stream Crossings

County	Milepost	Waterbody	Crossing Length[a] (feet)	State Water Quality Classification	Crossing Method
Butler	781.5	Tributary to Platte River	10.18	Agricultural Water Supply – Class A; Aesthetics	Open Cut
Butler	783.5	Deer Creek	18.01	Agricultural Water Supply – Class A; Aesthetics	Open Cut
Butler	786.3	Tributary to Deer Creek	4.84	N/A	Open Cut
Butler	788.1	Tributary to Deer Creek	2.10	N/A	Open Cut
Butler	790.0	Tributary to Little Blue River	17.37	N/A	Open Cut
Butler	793.7	Tributary to Little Blue River	21.67	N/A	Open Cut
Butler	798.7	Tributary to Little Blue River	13.61	N/A	Open Cut
Butler	800.2	Tributary to Little Blue River	6.24	N/A	Open Cut
Seward	807.7	Big Blue River	41.42	Agricultural Water Supply – Class A; Aesthetics	HDD
Seward	812.0	Lincoln Creek	30.9	Agricultural Water Supply – Class A; Aesthetics	Open Cut
Saline	834.7	West Fork, Big Blue River	71.86	Primary contact recreation; Agricultural Water Supply – Class A; Aesthetics	Open Cut
Saline	841.0	Turkey Creek	38.11	Agricultural Water Supply – Class A; Aesthetics	Open Cut
Saline	842.5	Spring Creek	39.29	Agricultural Water Supply – Class A; Aesthetics	Open Cut
Saline	849.3	Dry Creek	2.95	Agricultural Water Supply – Class A; Aesthetics	Open Cut
Saline	849.4	Dry Creek	8.13	Agricultural Water Supply – Class A; Aesthetics	Open Cut
Saline	856.6	Swan Creek	41.43	Agricultural Water Supply – Class A; Aesthetics	Open Cut
Jefferson	867.0	Cub Creek	29.22	Agricultural Water Supply – Class A; Aesthetics	Open Cut
Jefferson	867.8	Tributary to Cub Creek	7.69	N/A	Open Cut
Jefferson	867.8	Tributary to Cub Creek	74.23	N/A	Open Cut
Jefferson	872.8	Tributary to Big Indian Creek	15.78	N/A	Open Cut

Source: NDEQ 2014

[a.] Crossing length is the linear distance the waterbody is intersected by the pipeline, as measured in feet.

HDD = horizontal directional drill; MAR = Mainline Alternative Route; N/A = not applicable (unnamed tributary does not have a use classification)

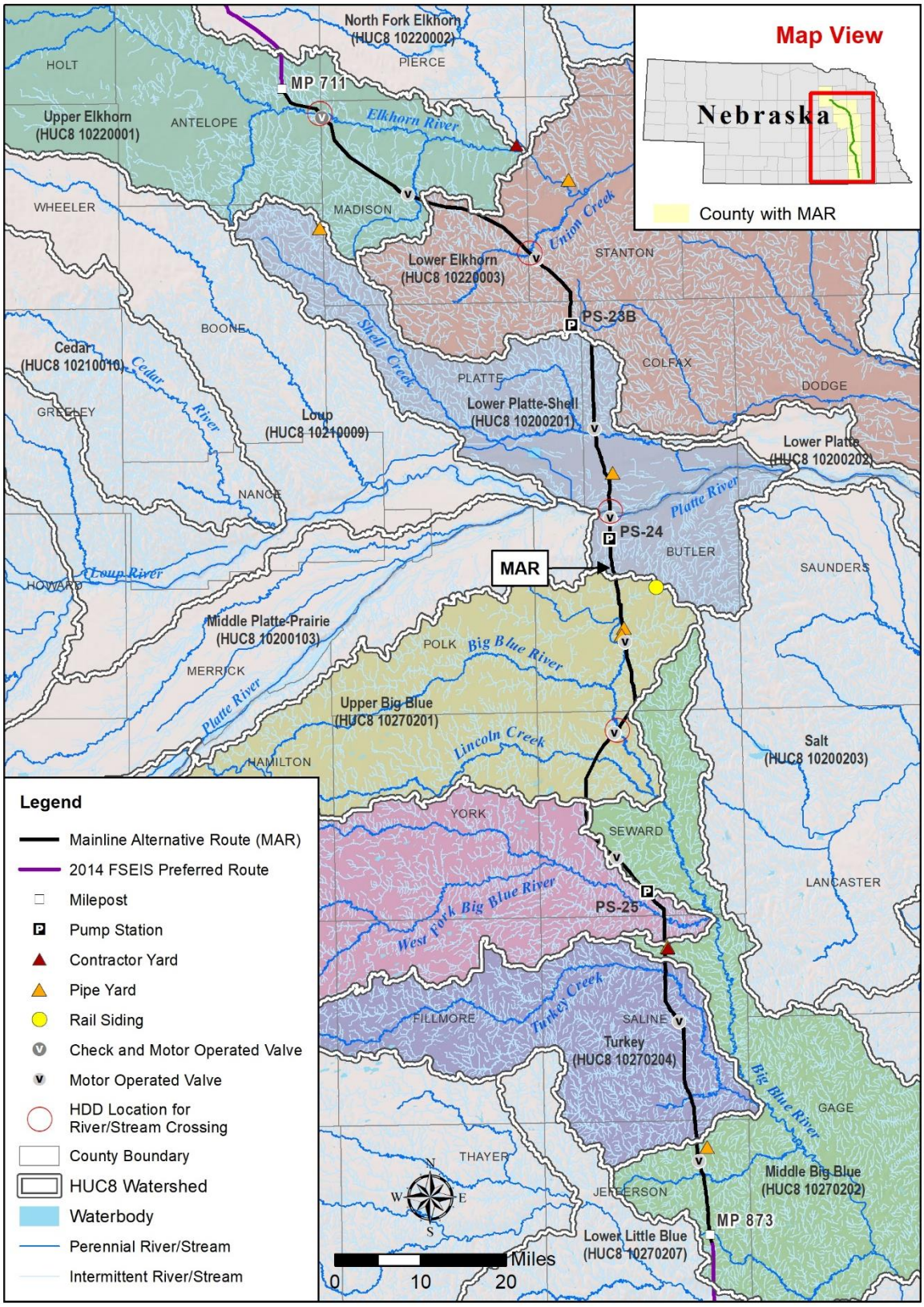


Figure 3.6-2. Watersheds and Major Rivers Crossed by the MAR

3.6.1.3 Water Quality

Table 3.6-3 identifies the rivers and streams crossed by the MAR with state water use designations based on their surface water classification or by waterbody type. With respect to water use, all are Class A waters used for general agricultural purposes (irrigation and livestock watering) without treatment and are aesthetically acceptable (NDEQ 2014). Five are also suitable for contact recreation (swimming), and one (Platte River) is suitable for drinking water use, as indicated in Table 3.6-3. Section 3.7 (Table 3.7-2) presents stream classifications with respect to aquatic life in perennial rivers and streams.

The Clean Water Act requires that states report on water quality of their waters. Through ambient water quality monitoring, states determine if a waterbody satisfies the water quality criteria associated with each state's designated uses. Section 401 of the Clean Water Act requires applicants of a federal license or permit provide a certification that any discharges from the facility will comply with the act, including state-established water quality standard requirements. When a state-defined designated use is not met or supported by the waterbody, it is deemed impaired. Designated uses are defined on a state-by-state basis and documented according to the reporting requirements of Clean Water Act Sections 303 and 305.

The 2016 Water Quality Integrated Report documents contamination or impairment of waters (NDEQ 2016) for eight impaired waterbodies crossed by the MAR. Contamination in these water bodies include bacteria (E. coli), pesticides (Atrazine) and metals (selenium). Table 3.6-4 provides the names of the waterbodies, host county and the impairment or contaminant identified.

Table 3.6-4. Impaired Waterbodies along the Proposed MAR

Waterbody Name	County	Impairment
Elkhorn River	Antelope	Bacteria and other microbes (E. coli)
Battle Creek	Madison	Bacteria (E. coli)
Union Creek	Stanton	Bacteria (E. coli)
Shell Creek	Colfax	Bacteria (E. coli) Atrazine (pesticides), selenium (metal); May – June
Platte River	Butler	E. coli; selenium, hazard index compounds
Big Blue River	Seward	Bacteria (E. coli)
Lincoln Creek	Seward	Atrazine, selenium (metals); May – June
Turkey Creek	Saline	Bacteria (E. coli) Atrazine, selenium

Source: NDEQ 2016

3.6.1.4 Wetlands

Wetlands are areas where water covers the soil or is present either at or near the surface of the soil all year or for varying periods of time during the year. Water saturation largely determines how the soil develops and the types of plant and animal communities supported by the wetland. Wetlands provide food and habitat for a diverse array of plants and animals, act as buffers to flooding and erosion and serve as key links in the global water cycle. Wetlands are primarily regulated at the federal level by the USACE and at the state level by the NDEQ per Sections 401 and 404 of the Clean Water Act. Section 401 has been discussed previously. Section 404 requires permitting of certain activities

(i.e., the placement of structures and/or fill material) occurring within the boundaries of wetlands meeting certain criteria. The permits are often authorized by a Nationwide Permit or could be authorized by an individual permit.

Wetlands are classified according to shared environmental factors, such as vegetation, soils and hydrology (Cowardin et al. 1979). This analysis considers wetland and waterbody surveys completed on the MAR between April 25, 2018 and June 4, 2018 where access was allowed (approximately 75 percent of the MAR). It also uses USFWS National Wetland Inventory data in locations where surveys were unable to be completed. Wetland systems along the proposed MAR are classified as palustrine or riverine/open water, based on vegetation and/or surface water cover. These types of wetlands are characterized by a dominance of trees, shrubs or persistent emergent herbaceous vegetation. Subsystems of the palustrine wetland types within the MAR include palustrine emergent, palustrine scrub-shrub and palustrine forested.

Many of the wetlands along the MAR have been extensively altered by historical and current agricultural practices. Table 3.6-5 includes a summary of the wetlands and acreages crossed by the MAR. As shown in the table, the primary wetland type crossed by the MAR is palustrine emergent wetlands. These are associated both with rivers and streams (riparian wetlands) as well as agricultural lands; all forested wetlands appear to be riparian in nature (USFWS 2018b).

Table 3.6-5. Wetland Types Crossed by the MAR

Land Cover Type	Temporary ROW[a] and Construction Areas	Permanent Pipeline ROW	Permanent Facilities
Emergent Herbaceous Wetlands	24.4	0[b]	0
Scrub-Shrub Wetlands	0	0	0
Forested Wetlands	0.6	0.7[b]	0

Source: Exp and Westech 2018a

[a.] The temporary ROW values do not include acreages for vegetation communities that would be avoided through use of HDD.

[b.] 0.4 acre of forested wetlands and 0.2 acre of emergent wetlands in the permanent ROW would be avoided through use of HDD at the larger stream crossings. Remaining forested wetlands would be converted to PEM wetlands through the life of operations. All other areas would be restored per USACE Nationwide Permit conditions for a no net loss of PEM wetlands.

< = less than; HDD = horizontal directional drill; MAR = Mainline Alternative Route; PEM = palustrine emergent; ROW = right-of-way; USACE = United States Army Corps of Engineers

Based on the 2018 field surveys (Exp and Westech 2018a), hydrophytic vegetation was typically dominated by the non-native, and somewhat invasive, reed canarygrass (*Phalaris arundinaceae*). Other common grasses included various species of foxtail such as shortawn foxtail (*Alopecurus aequalis*), creeping meadow foxtail (*Alopecurus arundinaceus*) and meadow foxtail (*Alopecurus pratensis*); Kentucky bluegrass (*Poa pratensis*); and occasionally broadleaf cattail (*Typha latifolia*) or narrowleaf cattail (*Typha angustifolia*). Incidental or less common native species were frequently Emory's sedge (*Carex emoryi*) and clustered field sedge (*Carex praegracilis*). Forested wetlands were primarily found along streams and the Platte River. Dominant trees included green ash (*Fraxinus pennsylvanica*), peachleaf willow (*Salix amygdaloides*) and plains cottonwood (*Populus deltoides*). Understory vegetation was often dominated by reed canarygrass (Exp and Westech 2018a).

Wetlands of special concern that may be crossed by the MAR include wetlands within the Rainwater Basin Region (small portion of southern Butler and western Seward counties). The Rainwater Basin Region in south-central Nebraska was named for the abundant natural wetlands that formed where clay-bottomed playa depressions occur. These depressions flood quickly during heavy rainstorms and snow melt. The MAR wetland crossings in the Rainwater Basin Region are outside of the Rainwater Basin Wetland Management District, which contains approximately 60 wetland easements

in south-central Nebraska and is managed by the USFWS and Nebraska's Game and Parks Commission. Wetland areas crossed by the MAR within the Basin have mostly been cultivated for agriculture (i.e., converted to rotated cropland) as indicated by National Wetland Inventory Mapping (USFWS 2018b) and confirmed during the 2018 field surveys. No features were found to currently meet the definition of a traditional historic rainwater basin wetland (Exp and Westech 2018a).

3.6.1.5 Floodplains

Floodplains are areas of land adjacent to rivers and streams that convey overflows during flood events. Floodplains form where overbank floodwaters spread out laterally and deposit fine grain sediments. Floodplains typically support a complex array of wetland, riparian and woodland habitats. Flooding in Nebraska typically occurs in the spring; however, ice jams, rapid snowmelt and intense rainfall have all contributed to major flooding in the recent past as described in the 2014 Keystone XL Final SEIS. Blockage of channels by ice jams in some of the larger braided rivers such as the Elkhorn and Platte have the potential to cause significant channel migration (Mason and Joeckel 2007).

FEMA defines a floodplain as being any land area susceptible to being inundated by water from any source (FEMA 2017). FEMA prepares Flood Insurance Rate Maps (FIRMs) that delineate flood hazard areas, such as floodplains, for communities. These maps are used to administer floodplain regulations and to reduce flood damage. Typically, these maps indicate the locations of 100-year floodplains, which are areas with a 1 percent chance of flooding occurring in any single year. Executive Order 11988, Floodplain Management, states that actions by federal agencies are to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplain development wherever there is a practicable alternative. Each agency is to provide leadership and shall take action to reduce the risk of flood loss; to minimize the impact of floods on human safety, health and welfare; and to restore and preserve the natural and beneficial values served by floodplains.

Seward County is the only county crossed by the MAR that does not have FEMA or state emergency management mapping of floodplains (29.4 miles), although floodplains are expected to be present with the majority of rivers and streams crossed by the MAR. In general, seasonal flooding occurs in areas where the MAR crosses active stream and river channels. In addition, the portions of the MAR located along channels or intermittent drainages could be subject to flash flooding. A review of the mapped portions of the MAR route indicate it would cross approximately 10.8 miles of mapped floodplains in Nebraska, all of which lie within the Special Flood Hazard Area shown on FEMA FIRMs defined as the area within the 100-year flood zone (FEMA 2018). Figure 3.1.2-4 in the 2014 Keystone XL Final SEIS shows the flood hazard areas in Nebraska. Areas showing the highest flood hazard appear to be located along the major rivers along the MAR (i.e., the Elkhorn River in Antelope and Madison counties, Platte River in Colfax and Butler counties, Big Blue River in the eastern portions of Seward and Saline counties and Little Blue River in Jefferson County).

3.6.1.6 Wild and Scenic Rivers

Nebraska has approximately 79,056 miles of rivers, of which 197 miles are designated as wild and scenic, within two separate rivers: Missouri River and the Niobrara River. Neither of these rivers would be crossed by the MAR. Keystone's crossing of the Niobrara River has been previously evaluated in the 2014 Keystone XL Final SEIS (USFWS 2018c).

3.7 BIOLOGICAL RESOURCES

This section discusses the biological resources within the potentially affected environment of the proposed MAR. The ROI includes the biological resources within and adjacent to the 110-foot-wide construction ROW, which includes the 50-foot-wide operational ROW.

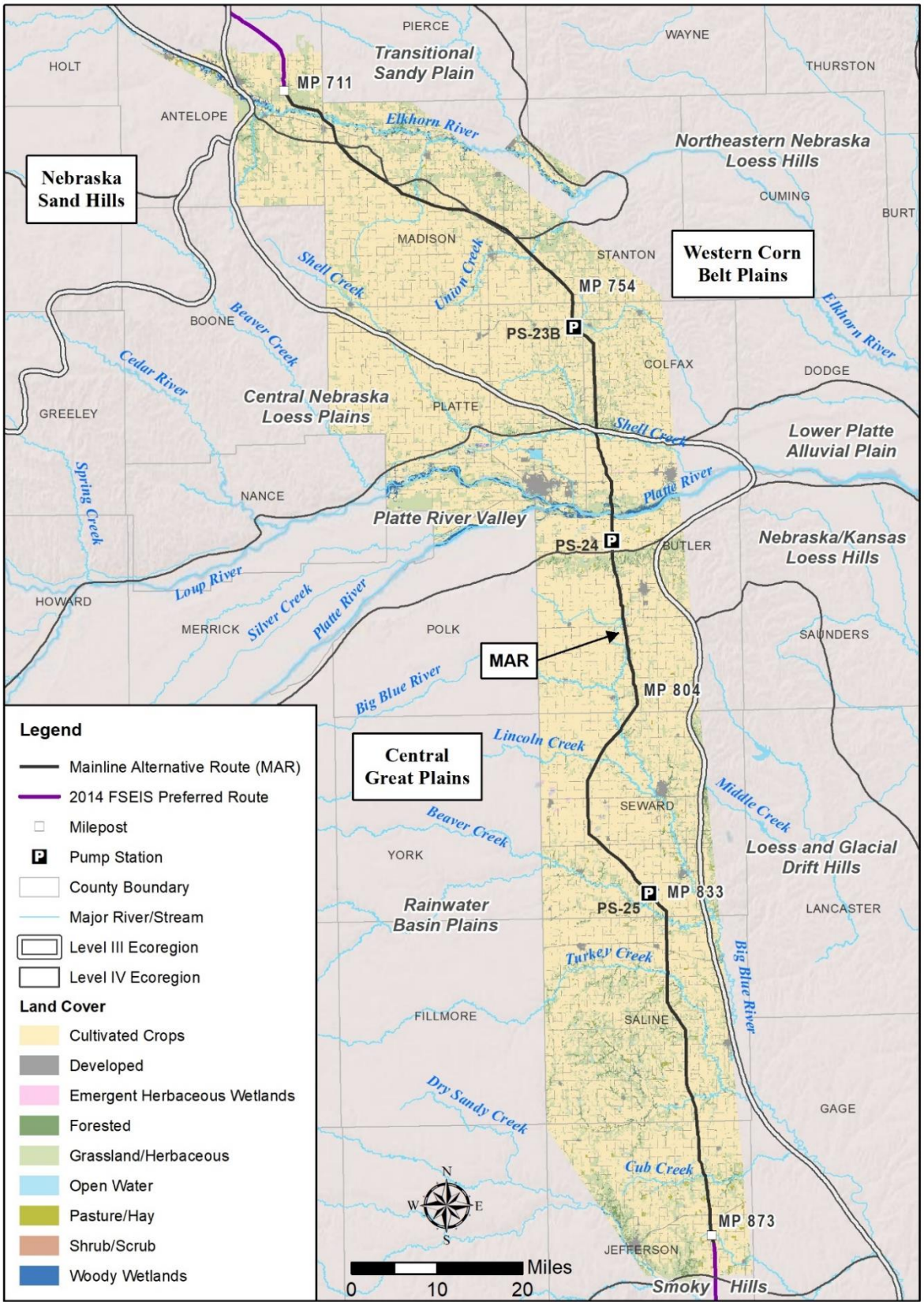
This SEIS considers the following data sources for characterizing biological resources:

- USFWS databases
- USEPA Ecoregion mapping
- U.S. Geological Survey (USGS) National Land Cover Data
- Nebraska Surface Water Quality Standards
- Coordination with federal and state agencies
- Biological field surveys conducted for the MAR

3.7.1 Biological Resources Overview

3.7.1.1 Vegetation Communities

This SEIS uses both ecoregions and land cover types to identify vegetation communities along the MAR. Figure 3.7-1 depicts both Level IV ecoregions and land cover types. As shown in Figure 3.7-1, the MAR crosses five Level IV ecoregions; the Transitional Sandy Plain and Northeastern Nebraska Loess Hills which are subsets of the Level III Western Corn Belt Plains ecoregion, and the Central Nebraska Loess Plains, Platte River Valley and Rainwater Basin Plains which are subsets of the Level III Central Great Plains ecoregion. Figure 3.7-1 also shows that cultivated crops are the dominant land cover/vegetation type within the MAR and greater region. Table 3.7-1 further describes vegetation communities within these ecoregions. Section 3.7.1.2 contains a discussion of "Biologically Unique Landscapes and Vegetation Communities of Conservation Concern".



Source: USGS 2011

Figure 3.7-1. Ecoregions and Land Cover Types

Table 3.7-1. Descriptions of USEPA Ecoregions Crossed by the MAR

Level III Ecoregion	Level IV Ecoregion	Potential Natural Vegetation Communities and Use
Western Corn Belt Plains	Transitional Sandy Plain	Natural vegetation is a combination of Sand Hills prairie, tallgrass prairie and some wet meadow communities. Use includes both dryland and irrigated cropland. Corn and alfalfa are the principal crops, with a smaller acreage of winter wheat, oats and grain sorghum.
	Northeastern Nebraska Loess Hills	Natural vegetation is predominately tallgrass prairie communities. Wet meadows and cottonwood woodland are often located in floodplains. Use as cropland, especially corn, is common.
Central Great Plains	Central Nebraska Loess Plains	Natural vegetation is mixed-grass prairie communities. Predominant uses include rangeland with large areas of cropland planted in winter wheat, corn and forage crops. Irrigation agriculture continues to expand in this area.
	Platte River Valley	Natural vegetation communities include lowland tallgrass prairie with areas of wet meadow and marsh. With flood management and reduced river flow, floodplain forests have increased along the Platte River. Extensive cropland of corn, grain sorghum, soybeans and alfalfa exists, much of which is irrigated. Some native rangeland and hay lands exist. Channelized streams and flood control structures also exist.
	Rainwater Basin Plains	Natural vegetation includes transitional tallgrass prairie communities with areas of wet meadow and marsh. Extensive cropland exists with sorghum and winter wheat as the principal dryland crops. Corn and alfalfa are the principal irrigated crops. Historically, the region contained extensive rainwater basins and wetlands that provide important habitat for migrating bird species. Most of the basins have been drained for cultivation, and only a few remnants still exist.

Source: Chapman et al. 2001
MAR = Mainline Alternative Route; USEPA = United States Environmental Protection Agency

As shown in Figure 3.7-1, the MAR crosses the following general land cover types (USGS 2011):

- **Cultivated cropland**: Areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco and cotton, and also perennial woody crops such as orchards and vineyards.
- **Pasture/hay**: Areas of grasses, legumes or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle.
- **Grassland herbaceous**: Areas dominated by gramanoid or herbaceous vegetation such that these species generally represent more than 80 percent of total vegetation. These areas are not subject to intensive management such as tilling but can be utilized for grazing.
- **Deciduous forest:** Areas in which trees greater than 5 meters tall represent more than 20 percent of total vegetation cover. More than 75 percent of the tree species shed foliage simultaneously in response to seasonal change.
- **Emergent herbaceous wetland:** Areas where perennial herbaceous vegetation accounts for greater than 80 percent of vegetative cover and water periodically saturates or covers the soil or substrate.
- **Woody wetlands:** Woody and herbaceous communities associated with larger rivers and streams that are subject to at least seasonal inundation.
- **Open water:** Open water, sometimes associated with wetland habitat.
- **Developed:** Areas with a mixture of constructed materials which can contain impervious surface and vegetation.

3.7.1.2 Biologically Unique Landscapes and Vegetation Communities of Conservation Concern

Section 3.5.4 of the 2014 Keystone XL Final SEIS includes a discussion of biologically unique landscapes and vegetation communities of conservation concern. The 2014 SEIS defines these communities of concern because of declining abundance, sensitivity to disturbance and/or reliance of listed or sensitive species on the habitats that they create (U.S. Department of State 2014). Similar to the Preferred Route in Nebraska, the MAR crosses the following landscapes and communities of conservation concern:

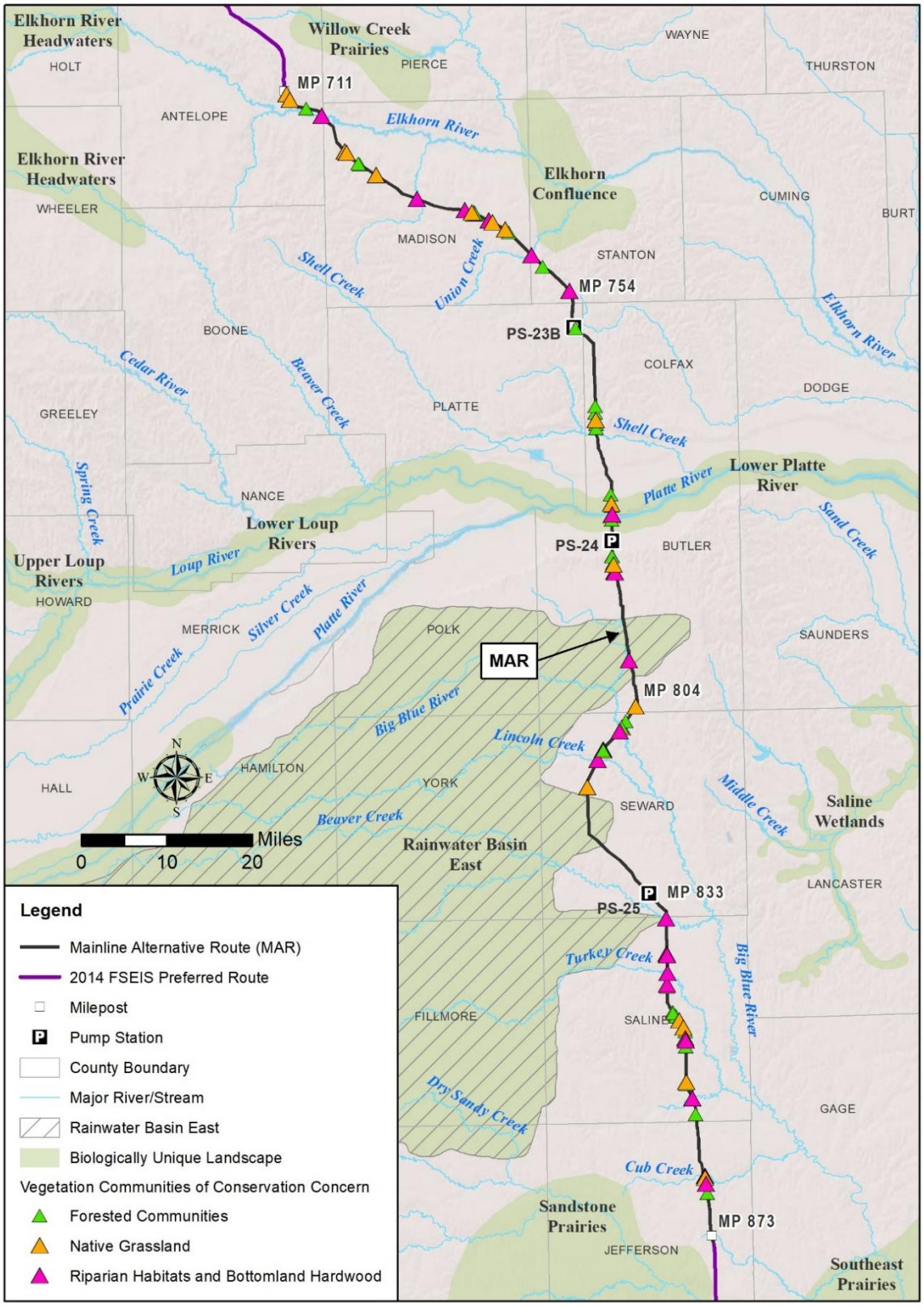
- **Rainwater Basin Landscape:** A complex of wetlands and grasslands on the flat to rolling loess-covered plains of the Rainwater Basin Plains which encompasses a 17-county area in central Nebraska. This region supports millions of migratory ducks, geese and shorebirds. Natural vegetation communities include mixed grass, tallgrass and saline prairie communities.
- **Native Grassland:** This community is among the most threatened native vegetation communities in the United States and includes tallgrass prairies, mixed-grass prairies and shortgrass prairies. Suppression of fires, agriculture, urbanization and mineral exploration have all altered native grassland and reduced the occurrence of this community.
- **Riparian Habitats and Bottomland Hardwood:** Riparian and bottomland hardwood areas are important as wildlife habitat within the western United States as these areas provide wildlife with habitat for food, dens and nests.
- **Forest Communities:** Native wooded communities were once an integral component of the prairie landscape providing foraging, breeding and refuge habitats for many wildlife species. Many of these communities have been lost due to land conversion to agricultural uses, levee construction and urban development.

Figure 3.7-2 shows the occurrence of these communities along the MAR.

3.7.1.3 Wildlife and Fisheries

Sections 3.6 and 3.7 of the 2014 Keystone XL Final SEIS includes a detailed discussion of wildlife and fishery communities located in Nebraska. Similar species identified in the 2014 SEIS occurring in Nebraska would have the potential to occur within the MAR. This includes 5 species of big game animals (see Table 3.6-2 of the 2014 SEIS), 25 species of small and medium game animals (see Table 3.6-3 of the 2014 SEIS), 328 species of waterfowl and game birds, 27 species of non-game mammals, 27 bird species of conservation concern, 47 species of reptiles, 15 species of amphibians and tens of thousands of invertebrate species.

The MAR would cross new aquatic resources (streams). Table 3.7-2 includes information on new perennial stream crossings that may support aquatic life. The NDEQ classifies all 18 crossings as warmwater. Class A waters provide habitat for year-round maintenance of one or more identified key species, and Class B waters provide habitat where the variety of warmwater biota is limited by water volume or flow, water quality, substrate composition or other habitat conditions (NDEQ 2014). Section 3.6, Water Resources, includes details on all stream crossings associated with the MAR.



Source: NNHP 2011; Westech 2018

Figure 3.7-2. Biologically Unique Landscapes and Vegetation Communities of Conservation Concern

Table 3.7-2. MAR Perennial Stream Crossings

County	Milepost	Waterbody Name	State Classification	Key Species[a]	Construction Method
Antelope	712.5	Trueblood Creek	Class B Warmwater	–	Open Cut
Antelope	716.3	Elkhorn River	Class A Warmwater	northern pike, channel catfish, flathead catfish, largemouth bass	HDD
Antelope	716.4	Giles Creek	Class B Warmwater	–	Open Cut
Madison	723.7	Buffalo Creek	Class A Warmwater	Johnny darter [b]	Open Cut
Madison	731.7	Battle Creek	Class A Warmwater	grass pickerel [b]	Open Cut
Madison	737.5	Tributary to Taylor Creek	N/A	–	Open Cut
Madison	742.6	Tributary to Union Creek	N/A	–	Open Cut
Stanton	747.1	Union Creek	Class A Warmwater	channel catfish	HDD
Stanton	748.4	Tributary to Meridian Creek	N/A	–	Open Cut
Colfax	771.4	Shell Creek	Class A Warmwater	channel catfish	Open Cut
Colfax	778.7	Lost Creek	Class B Warmwater	–	Open Cut
Butler	781.1	Platte River	Class A Warmwater	channel catfish, flathead catfish	HDD
Butler	781.5	Tributary to Platte River	Class B Warmwater	–	Open Cut
Butler	783.5	Deer Creek	Class B Warmwater	–	Open Cut
Butler	786.3	Tributary to Deer Creek	N/A	–	Open Cut
Butler	788.1	Tributary to Deer Creek	N/A	–	Open Cut
Butler	790.0	Tributary to Little Blue River	N/A	–	Open Cut
Butler	793.7	Tributary to Little Blue River	N/A	–	Open Cut
Butler	798.7	Tributary to Little Blue River	N/A	–	Open Cut
Butler	800.2	Tributary to Little Blue River	N/A	–	Open Cut
Seward	807.7	Big Blue River	Class B Warmwater	channel catfish, flathead catfish	HDD
Seward	812.0	Lincoln Creek	Class B Warmwater	–	Open Cut

Table 3.7-2. MAR Perennial Stream Crossings

County	Milepost	Waterbody Name	State Classification	Key Species[a]	Construction Method
Saline	834.7	West Fork Big Blue River	Class A Warmwater	channel catfish	Open Cut
Saline	841.0	Turkey Creek	Class B Warmwater	–	Open Cut
Saline	842.5	Spring Creek	Class B Warmwater	–	Open Cut
Saline	849.3	Dry Creek	Class B Warmwater	–	Open Cut
Saline	849.4	Dry Creek	Class B Warmwater	–	Open Cut
Saline	856.6	Swan Creek	Class A Warmwater	channel catfish	Open Cut
Jefferson	866.0	Cub Creek	Class A Warmwater	channel catfish	Open Cut
Jefferson	867.8	Tributary to Cub Creek	N/A	–	Open Cut
Jefferson	867.8	Tributary to Cub Creek	N/A	–	Open Cut
Jefferson	872.8	Tributary to Big Indian Creek	N/A	–	Open Cut

Source: NDEQ 2014

a. NDEQ defines Key Species as those identified as endangered, threatened, sensitive or recreationally important aquatic species associated with a particular water body and its aquatic life use class.

b. Both the Johnny darter and grass pickerel are recognized by NDEQ as sensitive species, those aquatic species identified by the NDEQ which have a limited distribution in the state and is indigenous to stable, high quality aquatic environments.

HDD = horizontal directional drilling; N/A = not applicable (unnamed tributary does not have an aquatic life classification); NDEQ = Nebraska Department of Environmental Quality.

3.7.1.4 Migratory Birds

The MAR falls entirely within the Prairie Avifaunal Biome, the same biome discussed in Section 3.6 of the 2014 Keystone XL Final SEIS. Migratory birds use habitats crossed by the MAR for nesting, migration and overwintering. Review of the USFWS Information for Planning and Conservation database identified 18 species of migratory birds of conservation concern that have the potential to occur along the MAR (USFWS 2018d). The Migratory Bird Treaty Act (MBTA) (16 USC 703-712) prohibits the take (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct) of any migratory bird without authorization from the USFWS. All migratory birds (identified in 50 CFR 10.13) are protected under the MBTA. The U.S. Department of the Interior's Office of the Solicitor issued Memorandum M-37050 on December 22, 2017, which adopts the position that the MBTA prohibition on the "taking" or "killing" of migratory birds applies only to deliberate acts intended to take a migratory bird (U.S. Department of Interior 2017). The legal opinion reverses the position of prior administrations that the MBTA prohibits not only the intentional take of migratory birds but also the take of migratory birds that is incidental to otherwise lawful activity (i.e., unintentional). Unintentional take includes disturbance to species and nests during ground-clearing activities, such as ROW clearing, where unobserved nests of migratory birds could be located.

3.7.1.5 Threatened and Endangered Species

Table 3.7-3 contains the federally listed species potentially occurring along the MAR and summarizes each species' preferred habitats. Figure 3.7-3 shows available species ranges and critical habitat for these species in relation to the MAR.

Table 3.7-3. Summary of Federally Listed Species with the Potential to Occur in the MAR

Common Name	Scientific Name	Status	Habitat and Potential for Occurrence
Birds			
Interior least tern	*Sterna antillarum*	E	Nesting areas of interior least terns include sparsely vegetated sand and gravel bars within a wide, unobstructed river channel or salt flats along lake shorelines. In Nebraska, the terns predominately breed along the Platte, Niobrara and Missouri rivers. Isolated breeding colonies can also be found throughout the Elkhorn and Loup river systems. As shown in Figure 3.7-3, the MAR crosses the interior least tern's estimated current breeding range at the Platte River near the border between Colfax and Butler counties where sandbars and sand/gravel pits associated with this segment of the river could support least tern breeding and foraging populations. The MAR crossing of the Elkhorn River is west of the estimated current breeding range. Interior least terns would only potentially occur in the area during the breeding and nesting season.
Piping plover	*Charadrius melodus*	T	Nesting areas of piping plover include beaches and dry barren sandbars in wide, open channel beds. The MAR would cross the piping plover's estimated current breeding range at the Platte River. The MAR would cross the Platte River at the border between Colfax and Butler counties, which contain sandbars and sand/gravel pits that could support piping plover breeding and foraging populations. The MAR's crossing of the Elkhorn River is west of the estimated current breeding range (see Figure 3.7-3). Piping plovers would only potentially occur in the area of the MAR during the breeding and nesting season.
Rufa red knot	*Calidris canutus rufa*	T	The rufa red knot is generally restricted to ocean coasts during winter and occurs primarily along the coast during migration. However, small numbers of rufa red knots are reported annually across the interior United States during spring and fall migrations. There is no evidence that this species uses any non-coastal sites as traditional stopover locations, with the possible exception of a few lakes, primarily saline, in the northern-most portion of the Great Plains. In addition, although the rufa red knot occurs as a sporadic and somewhat uncommon migrant throughout the area of the MAR, it does not have a defined range in Nebraska. Lake McConaughy is the site in Nebraska where the species has been observed the most times. There is a total of 28 documented sightings for the period of record, which goes back more than a century.

Table 3.7-3. Summary of Federally Listed Species with the Potential to Occur in the MAR

Common Name	Scientific Name	Status	Habitat and Potential for Occurrence
Whooping crane	*Grus americana*	E	Each spring and fall, whooping cranes migrate through Nebraska along the Central Flyway. The whooping crane prefers shallow braided riverine habitat and wetlands for roosting and use agricultural fields, wet meadows, marsh habitats and shallow rivers for feeding. Overnight roosting requires shallow water over submerged sandbars, with the whooping crane preferring unobstructed channels isolated from human disturbance. While migrating through Nebraska, whooping cranes use the central Platte, Loup and Niobrara rivers and a variety of wetland habitats as stopover and resting spots. Whooping cranes typically select sites with wide, open views and areas isolated from human disturbance. Critical habitat has been designated in Nebraska for the whooping crane and includes a segment of the Platte River from Lexington to Denman, Nebraska, to the west of the MAR. The estimated current range of the whooping crane overlaps with the MAR in Antelope, Madison, Butler and Seward counties. One of the major river systems used by the whooping crane is the Platte River, which would be crossed by the MAR. However, the MAR would cross the Platte River at the border between Colfax and Butler counties, east of NGPC's estimated whooping crane migration use area. Figure 3.7-3 shows the primary occurrence area in relation to the MAR, which is located along the eastern boundary. USFWS fly-way sighting data (USFWS 2018e) and USGS telemetry data (USGS 2018) were also reviewed for recorded ground sightings of whooping cranes near the MAR. The sets of data confirm the species range depicted on Figure 3.7-3, as a majority of sightings and telemetry data indicate ground activity west of the MAR. Of the 9 years of telemetry data, only six recordings were detected within 5 miles of the MAR and only one fly-way sighting occurred within 5 miles of the MAR.
Fish			
Pallid sturgeon	*Scaphirhynchus albus*	E	Pallid sturgeons are adapted for living close to the bottom of large, shallow, silty rivers with sand and gravel bars and tend to select main channel areas with islands or sand bars. Pallid sturgeon has been captured in downstream reaches of several major tributaries of the Missouri River, including the Platte River. Pallid sturgeon have been documented in the Platte River during the spring, summer and fall periods, with limited data indicating that the lower Platte River is likely used for spawning. Thus, the lower Platte River appears to provide suitable habitat for multiple life stages of this species. The MAR crosses the pallid sturgeon's estimated current range in the lower Platte River. The crossing location would be at the border between Colfax and Butler counties where it would cross the main channel of the river (see Figure 3.7-3).

Table 3.7-3. Summary of Federally Listed Species with the Potential to Occur in the MAR

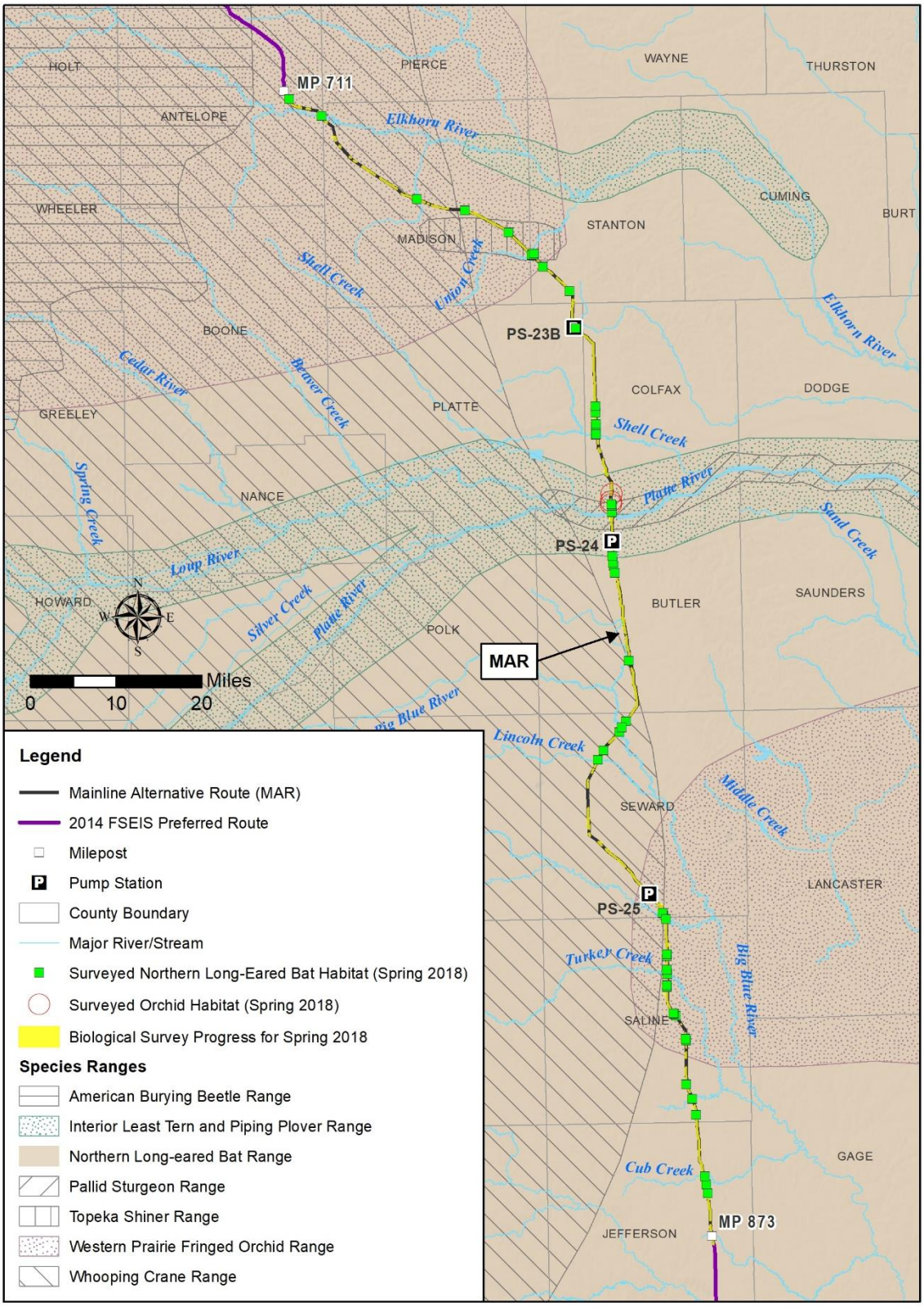
Common Name	Scientific Name	Status	Habitat and Potential for Occurrence
Topeka shiner	*Notropis topeka*	E	The Topeka shiner is normally found in slow-flowing, cool, clear, prairie creeks or spring-fed pools in larger streams. This species prefers pool-like areas that are outside the main channel courses, in contact with groundwater and that contain vegetation and areas of exposed gravel. Typical substrates utilized by the Topeka shiner include gravel, rubble, sand or bedrock with some silt. USFWS has designated critical habitat for Topeka shiner in five different watersheds, including the Elkhorn River watershed in Madison County, Nebraska. Areas designated as critical habitat for the Topeka shiner are either occupied by the species or provide critical links between occupied habitats. Within the Elkhorn River watershed, only one stream segment, a segment of Taylor Creek, was designated as critical habitat for Topeka shiner. In eastern Nebraska near the MAR, the estimated current range of the Topeka shiner is very localized, limited to portions of Madison and Stanton counties. The MAR would pass through the Union Creek system in this area (see Figure 3.7-3). Surveys for the Topeka shiner were conducted on June 19, 2018 and August 2, 2018 to determine the fish species present within the portion of Union Creek crossed by the MAR. The Topeka shiner was not observed during the surveys. The surveys noted the Union Creek within this location is a degraded stream system that experiences rapid changes in flow and turbidity as a result of a surrounding landscape dedicated to intensive row cropping. A review of fish community data over the decades indicates the community has become homogenized over time, and the possibility of species such as the Topeka Shiner residing in the stream at the pipeline crossing is highly remote.
Invertebrates			
American burying beetle	*Nicrophorus americanus*	E	The American burying beetle is listed as endangered in Nebraska, and its estimated current range includes portions of Antelope County, Nebraska. Although the proposed MAR initiates in Antelope County, the route would be located east of the estimated current range of this species (see Figure 3.7-3). In addition, tilling associated agricultural activities have diminished suitable habitat for the beetle throughout the MAR. All other counties along the MAR are located entirely outside the current range of the American burying beetle. Surveys conducted along the MAR did not detect any populations of the beetle.
Mammals			
Northern long-eared bat	*Myotis septentrionalis*	T	The northern long-eared bat hibernation period begins as early as August and continues through the winter months in high-humidity caves and mines. During the summer, forested areas, including riparian corridors, provide habitat (e.g., decaying trees, loose bark, tree snags and stumps) for roosting, feeding and maternity colonies. Roosting occurs primarily under the bark of trees or snags at least 3 inches diameter at breast height. The northern long-eared bat's range spans eastern Nebraska, including the area which would be crossed by the MAR. In addition, the area along the MAR is located within the White-Nose Syndrome Zone. Keystone surveyed the MAR for suitable northern long-eared bat habitat. The Spring 2018 surveys were performed in locations of approved access and covered approximately 75 percent of the MAR. Where access was not allowed, habitat was identified via photo-interpretation and, in some cases, from adjacent parcels where access was allowed. The

Table 3.7-3. Summary of Federally Listed Species with the Potential to Occur in the MAR

Common Name	Scientific Name	Status	Habitat and Potential for Occurrence
			surveys conservatively identified approximately 258.3 acres of potential northern long-eared bat habitat along the MAR. The estimate was conservative as most sites were relatively isolated, small fragments of wooded habitat along drainages or small wood lots and almost all sites were surrounded by large areas of cultivation or pasture that is less utilized by the species. The largest areas of more developed habitat with relatively extensive wooded acreage and larger trees with deeply fissured bark, snags, loose bark and/or cavities occurred at the larger river and stream crossings, particularly the Platte River (see Figure 3.7-3).
Plants			
Western prairie fringed orchid	*Platanthera praeclara*	T	The western prairie fringed orchid grows in wet to somewhat drier prairies in the eastern portion of Nebraska and its estimated current range overlaps with the MAR in Antelope, Madison, Stanton, Seward and Saline counties as shown in Figure 3.7-3. In central and northeast Nebraska, it occurs in wet prairies and meadows. It is most often found in unplowed, calcareous prairies and sedge meadows and may occur along ditches and roadsides. However, the majority of the lands crossed by the MAR are disturbed agricultural lands and are not likely to support this species. Keystone surveyed the MAR for potential habitat of the western prairie fringed orchid. The Spring 2018 surveys were performed in locations of approved access and covered approximately 75 percent of the MAR. The surveys identified very little suitable habitat along the MAR as the vast majority of the route (95 percent of the surveyed area) was either cultivated (plowed and extensively drained) or invaded by non-native species, primarily smooth brome (*Bromus inermis*) in uplands and reed canarygrass (*Phalaris arundinacea*) in wetlands. Surveys determined two fair and one good mosaic of wetland, riparian and wet prairie as suitable habitat along the MAR just north of the Platte River crossing (see Figure 3.7-3). An additional survey was completed in July 2018. The survey identified five areas of potentially suitable habitat along the MAR north of the Platte River. The areas were categorized as the following habitat quality ratings: two fair, two good and one excellent.

Source: 50 CFR 17; 43 FR 20938; 70 FR 15239; EcoCentrics and Westech 2018; Exp and Hoback Consulting, Inc. 2018; Exp and Westech 2018b, 2018c; Jorgensen 2015; NGPC 2018c, 2018d, 2018e, 2017a, 2017b, 2015, 2014, 2013a, 2013b, 2013c, 2012, 2011a, 2011b, 2011c; U.S. Department of State 2014; USFWS 2018f, 2018g, 2014a, 2014b, 1996

E = endangered; MAR = Mainline Alternative Route; T = threatened; U.S. = United States; NGPC = Nebraska Game and Parks Commission; USFWS = United States Fish and Wildlife Service



Source: Exp and Westech 2018b, 2018c; NGPC 2018d, 2017a, 2017b, 2015, 2014, 2011a, 2011b, 2011c
Note: The Topeka shiner habitat is associated with the Union Creek System (not displayed on figure) within Madison and Stanton counties

Figure 3.7-3. Federally Listed Species Ranges

The 2014 Keystone XL Final SEIS included a Biological Assessment prepared by the Department consistent with Section 7 of the Endangered Species Act (ESA) and the Biological Opinion (BiOp) prepared by the USFWS. The American burying beetle was the only species determined by USFWS as may affect, likely to be adversely affected, by the proposed Keystone XL Pipeline Project. Since the 2014 SEIS was published, the USFWS listed two additional species, the northern long-eared bat and the rufa red knot, as federally threatened. Table 3.7-4 summarizes changes to species listings and Department actions since the 2014 SEIS regarding the ESA.

Table 3.7-4. ESA Updates Pertaining to the MAR since the 2014 Keystone XL Final SEIS

Date	Activity
January 12, 2015	USFWS Final Rule listing the rufa red knot as federally threatened becomes effective.
July 9, 2015	The Department reinitiated consultation with USFWS regarding the rufa red knot determining the Keystone XL Project "may affect, but is not likely to adversely affect" the species (see Appendix A).
August 27, 2015	USFWS concurred in the "may affect, but is not likely to adversely affect" determination for the rufa red knot.
May 4, 2015	USFWS Final Rule listing the northern long-eared bat becomes effective.
March 15, 2017	The Department reinitiated consultation with USFWS regarding the northern long-eared bat determining the Keystone XL Project "may affect, but is not likely to adversely affect" the species (see Appendix A). The letter also re-evaluated the conclusions drawn during the 2014 Keystone XL Final SEIS consultation process.
March 16, 2017	USFWS concurred in the "may affect, but is not likely to adversely affect" determination for the northern long-eared bat providing conservation measures listed in the March 15, 2017 letter are implemented (see Appendix A). The USFWS also agreed with the Department that the conclusions for the species in the 2013 BiOp remain valid predicated on the completion of required pre-construction population surveys for the federally endangered American burying beetle to confirm the amount of take authorized in the Incidental Take Statement will not be exceeded for the species.
January 31, 2018	The Department reinitiated consultation with USFWS regarding the Keystone XL Project and analysis of the MAR, requesting any new information on potentially affected species along the MAR.
Present	The Department is revising the 2014 Keystone XL Biological Assessment to include the changes to the listing status of the northern long-eared bat and rufa red knot and to include additional data on the whooping crane and results of the MAR field surveys for Topeka shiner critical habitat, American burying beetle and the western prairie fringed orchid.

BiOp = Biological Opinion; Department = United States Department of State; MAR = Mainline Alternative Route; SEIS = Supplemental Environmental Impact Statement; USFWS = United States Fish and Wildlife Service

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3.8 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

This section discusses the socioeconomic conditions and the minority and low-income populations along the MAR. Socioeconomic conditions relate to the population, housing, economy, public services and traffic and transportation within a region, which are important aspects describing the human environment. The socioeconomic conditions of the region determine its ability to support a project and provide a baseline for assessing how the project may affect the human environment. Minority and low-income populations are the populations at risk of disproportionately high and adverse impacts from a project because they often lack the political and social resources to avoid, endure or mitigate potential effects.

The ROI includes Antelope, Madison, Stanton, Platte, Colfax, Butler, Seward, Saline and Jefferson counties. The environmental justice analysis considers census tracts and block groups within a 2-mile radius of the pipeline, which includes the ROI and a small portion of Pierce County, Nebraska.

This SEIS considers the following data sources for characterizing socioeconomic conditions and environmental justice populations:

- U.S. Census data from the 2012 to 2016 American Community Service and the 2010 decennial Census
- USACops data relating to police departments
- Community Network data relating to fire departments
- Nebraska Department of Revenue data relating to tax revenue
- U.S. Department of Health and Human Services Data Warehouse relating to Medically Underserved Areas/Populations and Health Professional Shortage Areas
- Current satellite imagery to identify characteristics of roadways (e.g., number of lanes, geometry)
- Government websites relating to transportation infrastructure (e.g., USDOT, Nebraska Department of Transportation)
- Department site visit, May 9, 2018
- IMPLAN Model data

3.8.1 Socioeconomic Overview

The MAR crosses nine counties in Nebraska, beginning in Antelope County and continuing approximately 162 miles south and southeast through Jefferson County. The nine counties in Nebraska along the pipeline route would likely experience the most direct socioeconomic impacts of constructing and operating the proposed pipeline within the MAR.

3.8.1.1 Population

Table 3.8-1 shows population data for the counties crossed by the MAR in 2010 and 2016. The counties along the MAR are predominantly rural and sparsely populated areas, with an estimated total population of 137,646 reported in 2016.

Table 3.8-1. Population Change in Project Area

County	Population 2010	Population 2016	Percent Change (2010-2016)
Antelope	6,685	6,421	-3.9
Madison	34,876	35,125	0.7
Stanton	6,129	6,022	-1.7
Platte	32,237	32,703	1.4
Colfax	10,515	10,499	0.2
Butler	8,395	8,053	-4.1
Seward	16,750	17,113	2.2
Saline	14,200	14,356	1.1
Jefferson	7,547	7,354	-2.6
Total	**137,334**	**137,646**	**0.2**

Source: U.S. Census Bureau 2017a

3.8.1.2 Housing

Table 3.8-2 provides a detailed summary of housing in the area of the MAR. Housing needs would be mostly during construction; therefore, the housing analysis focuses on temporary housing. Vacancy rates for rental units along the MAR range from a low of 1.1 percent in Butler County to a high of 7.9 percent in Jefferson County. The distribution of vacant housing units in each county through which the MAR traverses is highly variable, ranging from 303 vacant units in Stanton County to 1,045 vacant units in Madison County (U.S. Census Bureau 2017b). Similar to vacant rental units, the distribution of campgrounds and hotels in each county through which the MAR traverses is highly variable. Tourism is at its peak between the months of May to September, and the availability of short-term housing could be restricted during these times.

Table 3.8-2. Temporary Housing Stock in Project Area

County	Total Housing Units	Vacant Housing Units	Rental Vacancy Rate (Percent)	Hotels/Motels	Campgrounds
Antelope	3,284	537	6.5	–[a]	253
Madison	15,101	1,045	5.8	645	–[a]
Stanton	2,645	303	5.5	–[a]	–[a]
Platte	13,606	869	3.4	598	–
Colfax	4,121	462	1.4	68	85
Butler	4,059	580	1.1	–[a]	–[a]
Seward	6,993	645	4.9	105	–[a]
Saline	5,790	671	2.5	77	483
Jefferson	3,903	600	7.9	79	–[a]
Total	**59,502**	**5,712**	**4.3**	**1,572**	**821**

Source: Colfax County 2014; Exp 2018; U.S. Census Bureau 2017b

[a.] No facilities reported in county.

3.8.1.3 Economic Base

Employment and income patterns provide insight into local economic conditions, including the strength of the local economy and the well-being of the residents. Table 3.8-3 shows summary statistics covering these economic parameters. Median household income and per capita income vary from county to county. The per capita income ranges from a low of $21,880 in Saline County to a high of $29,282 in Stanton County. The median household income throughout the ROI ranges from a low of $44,616 in Jefferson County to a high of $61,563 in Seward County (U.S. Census Bureau 2017b).

Unemployment rates in 2016 ranged between 3 and 5 percent for most counties, with a low of 1.8 percent in Antelope County and a high of 5.4 percent in Colfax County.

Table 3.8-3. Existing Income and Employment Conditions in Project Area

County	Per Capita Income (2016)	Median Household Income (2016)	Labor Force (2016) (Persons)	Unemployment Rate (2016) (Percent)
Antelope	$27,048	$46,381	3,245	1.8
Madison	$24,458	$48,673	19,022	3.1
Stanton	$29,282	$58,553	3,253	3.3
Platte	$27,052	$58,473	18,314	4.6
Colfax	$23,619	$52,712	5,610	5.4
Butler	$28,045	$51,166	4,398	4.5
Seward	$28,491	$61,563	8,954	3.5
Saline	$21,880	$49,332	7,256	3.4
Jefferson	$26,305	$44,616	3,824	3.2

Source: U.S. Census Bureau 2017c

3.8.1.4 Tax Revenues

Table 3.8-4 shows property tax revenue in each county the MAR crosses. Annual property tax revenues are a function of property value assessed by local government units and effective property tax rates. Annual property tax rates are subject to fluctuations.

Property tax revenues vary widely across the counties located along the MAR from approximately $22 million in Stanton County to nearly $69 million in Platte County. The effective tax rate among the counties crossed by the MAR is generally similar, ranging from 1.0 percent in Antelope County to 1.6 percent in Madison County (Nebraska Department of Revenue 2018).

Table 3.8-4. Property Tax Revenues for Affected Counties in Project Area

County	Total Property Tax Revenue (2017)
Antelope	$26,159,146
Madison	$63,019,193
Stanton	$21,950,914
Platte	$68,863,997
Colfax	$28,231,996
Butler	$30,055,100
Seward	$41,739,172
Saline	$34,329,635
Jefferson	$26,951,526

Source: Nebraska Department of Revenue 2018

3.8.1.5 Public Services

Public services that the Proposed Action could affect include police, fire protection and medical facilities. Table 3.8-5 shows the number of police/sheriff departments and fire stations within the counties along the MAR, as well as the nearest critical access medical facility in each county. Critical Access Medical Facilities are designed to provide 24/7 emergency care, but have 25 or fewer acute care inpatient beds.

The Emergency Planning and Community Right-to-Know Act and the Superfund Amendments and Reauthorization Act of 1986 designate Local Emergency Planning Committees for a state's established planning area. Local Emergency Planning Committees plan for contingencies that may occur from hazardous or toxic materials contained within or transported across their borders. In the state of Nebraska, Local Emergency Planning Committees function at the county level.

Table 3.8-5. Public Service Facilities in Project Area

County	Police/Sheriff Departments	Fire Departments	Nearest Critical Access Medical Facilities to the MAR
Antelope	4	5	Antelope Memorial Hospital
Madison	8	6	–[a]
Stanton	1	2	–[a]
Platte	3	6	–[a]
Colfax	5	3	CHI Health Schuyler
Butler	2	8	Butler County Health Care Center
Seward	3	5	Memorial Hospital
Saline	4	6	Crete Area Medical Center
Jefferson	3	5	Jefferson Community Health Center

Source: Community Network 2018; USACops 2018

[a.] No Critical Access Medical Facility in county.

MAR = Mainline Alternative Route

3.8.1.6 Traffic and Transportation

The ROI for the Proposed Action includes the roadways within the 110-foot-wide construction ROW, which includes the 50-foot-wide operational ROW.

The MAR is located east of Lincoln, Nebraska, crossing primarily rural areas, with some low-density residential areas. The transportation network within the Project area is serviced by the major roadways indicated in Table 3.8-6. These roadways intersect with the proposed pipeline route a total of 14 times. Major roadways for this analysis are defined as Category III roads, primary U.S. and state highways and Category IV roads, Primary Limited Access roads or interstates. The MAR also intersects secondary and local roadways a total of 197 times.

Table 3.8-6. Major Roads in Project Area

Road	Counties	Intersections with Proposed MAR
State Highway 92	Butler	1
State Highway 64	Butler	1
U.S. Highway 30	Colfax	1[a]
U.S. Highway 136	Jefferson	1
U.S. Highway 81	Madison	1[a]
State Highway 275	Madison	1
State Highway 121	Madison	1
State Highway 32	Madison	1
State Highway 91	Platte, Saline	2
State Highway 33	Platte	1
Interstate 80	Seward	1[a]
U.S. Highway 34	Seward	1
State Highway 15	Seward	1
Total Intersections		14

[a.] Denotes pipeline crosses east-bound and west bound lanes of divided highway.
MAR = Mainline Alternative Route

3.8.2 Environmental Justice Overview

Based on CEQ guidance (CEQ 1997a), a minority or low-income population may exist where either:

- The minority or low-income population in the affected area exceeds 50 percent; or
- The minority or low-income population of the affected area is "meaningfully greater" than the minority or low-income composition of the general population. "Meaningfully greater" is defined as greater than 120 percent of the minority or low-income populations of the county in which the respective census unit of analysis is located.

3.8.2.1 Minority Populations

There are 34 census block groups encompassed by or intersecting a 2-mile radius of the proposed MAR across the nine counties. The Department calculated the percentage of each block group's population represented by each minority classification (each racial group, aggregate race minority population and Hispanic/Latino ethnic origin).

Of the 34 block groups, none of the block groups had individual racial group minority populations and aggregate minority populations that met the 50 percent criterion, and a total of five block groups met the meaningfully greater criterion for one or more racial groups. The following is a breakdown of these block groups:

- **Butler County** – There are two block groups within Butler County with total minority populations that exceed the meaningfully greater criterion for environmental justice populations. These two block groups include a total minority population of 172 persons.
- **Madison County** – There are two block groups within Madison County with total minority populations that exceed the meaningfully greater criterion for environmental justice populations. These two block groups include a total minority population of 1,267 persons.
- **Platte County** – There is one block group within Platte County with a total minority population that exceeds the meaningfully greater criterion for environmental justice populations. The block group includes a total minority population of 700 persons.

See Figure 3.8-1 for locations of these blocks groups meeting the meaningfully greater criterion for environmental justice minority populations.

3.8.2.2 Low-Income Populations

There are 20 census tracts encompassed by or intersecting with a 2-mile radius of the proposed MAR across the nine counties. As with the minority populations, low-income populations were evaluated using the absolute 50 percent and the relative 120 percent or greater criteria for potentially affected census tracts within the counties. If a census tract's percentage of low-income individuals was more than 120 percent of the low-income percentage of the corresponding county, then the area was identified as having a low-income population.

Of the 20 census tracts, none of the census tracts had low-income populations that exceeded the 50 percent criterion, and a total of two census tracts met the 120 percent criterion for low-income individuals. The following is a breakdown of theses census tracts:

- **Pierce County** – There is one census tract within Pierce County with a low-income population that exceeds the meaningfully greater criterion for environmental justice populations. The census tract includes a total low-income population of 3,084 persons.
- **Stanton County** – There is one census tract within Stanton County with a low-income population that exceeds the meaningfully greater criterion for environmental justice populations. The census tract includes a total low-income population of 1,601 persons.

See Figure 3.8-1 for locations of census tracts meeting the meaningfully greater criteria for environmental justice low-income populations.

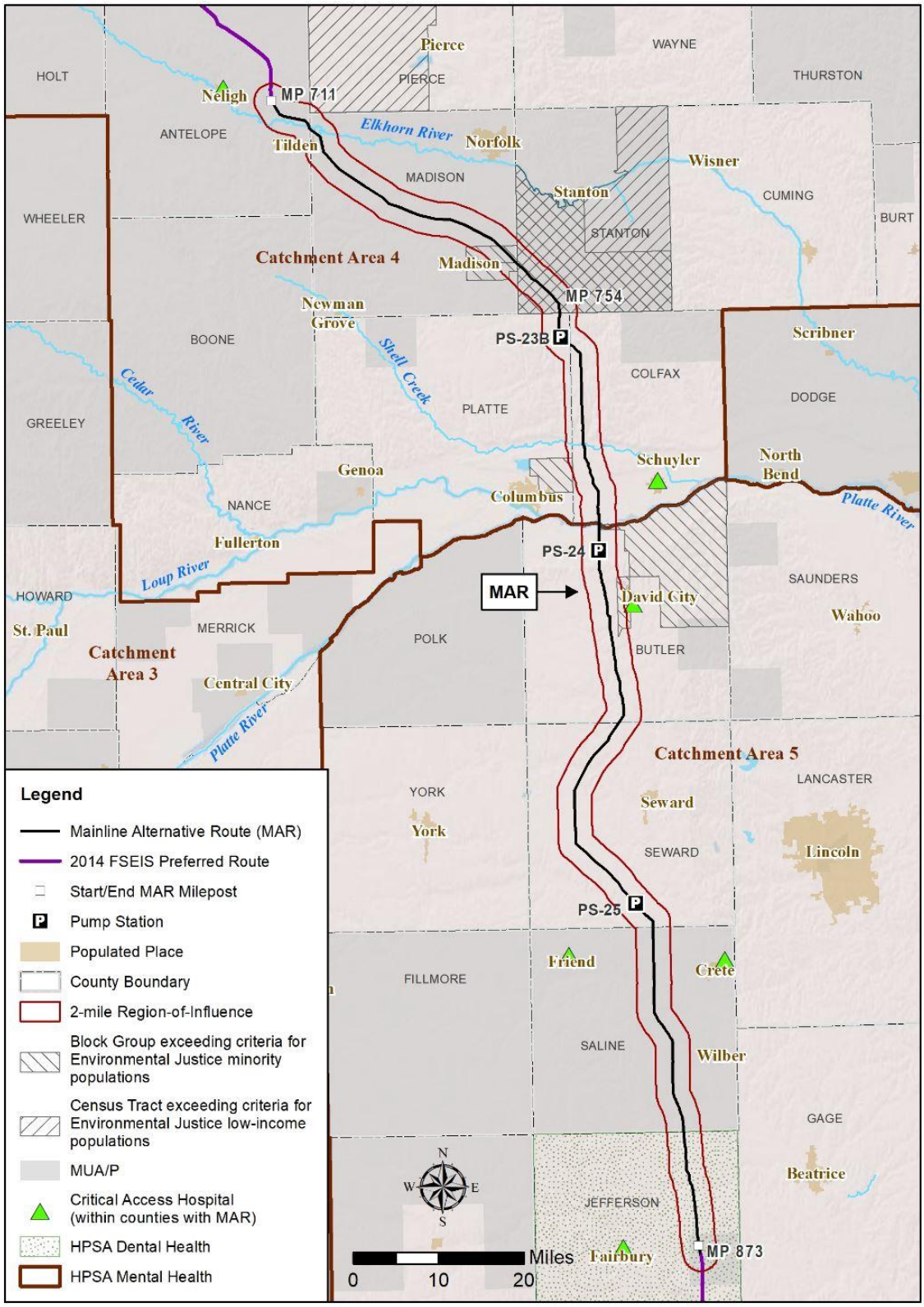

Figure 3.8-1. Environmental Justice Populations and Health Care Facilities

3.8.2.3 Medically Underserved Populations

The U.S. Department of Health and Human Services, Health Resources and Services Administration, designates Health Professional Shortage Areas and Medically Underserved Areas/Populations in an effort to identify areas that have shortages of medical services. The agency categorizes Health Professional Shortage Areas by shortages of primary medical care, dental care or mental health providers. Medically underserved areas/populations are areas or populations designated as meeting one or more of the following criteria: too few primary care providers, high infant mortality, high poverty and/or high elderly populations. Medically underserved populations may include groups of persons who face economic, cultural or linguistic barriers to health care. The area within which the majority of the medical facilities' patients reside is referred to as the "catchment area." Table 3.8-7 summarizes the Medically Underserved Areas/Populations within the ROI, and Figure 3.8-1 displays the locations of the Medically Underserved Areas/Populations and Health Professional Shortage Areas.

Table 3.8-7. Medically Underserved Areas/Populations in Project Area

County	Census Block Groups with Minority Populations	Census Tracts with Low-Income Populations	Health Professional Shortage Areas		Medically Underserved Areas/ Populations
			Designation Name/ Facility Location	Geographic Area or Facility Type	Designation Name
Antelope	0	0	Catchment Area 4 Antelope	Geographic Population(M) Single County (M)	Antelope Service Area
Madison	2	0	Midtown Health Center, Inc. Ponca Hills Health and Wellness Center/Ponca Tribe Madison County	Comprehensive Health Center (P, D, M) Native American Tribal Population (P, D, M) Single County (M)	Hispanic Population – Madison County
Stanton	0	1	Catchment Area 4 Stanton	Geographic Population (M) Single County (M)	Stanton Service Area
Platte	1	0	East Central District Health Department Platte County	Comprehensive Health Center (P, D, M) Single County (M)	St. Bernard Service Area
Colfax	0	0	Howells Family Practice CHI Health Schuyler Clinic CHI Health Clarkson Clinic Catchment Area 4 Colfax	Rural Health Clinic (P, D, M) Rural Health Clinic (P, D, M) Rural Health Clinic (P, D, M) Geographic Population (M) Single County (M)	Adams Prec Service Area Schuyler City – County
Butler	2	0	Catchment Area 5 Butler	Geographic Population (M) Single County (M)	David City Service Area
Seward	0	0	Catchment Area 5 Seward	Geographic Population (M) Single County (M)	No Medically Underserved Areas in this County
Saline	0	0	Catchment Area 5 Saline	Geographic Population (M) Single County (M)	Saline Service Area
Jefferson	0	0	Catchment Area 5 Jefferson	Geographic Population (M) Single County (M, D)	Fairbury City – County Pleasant Prec – County
Pierce	0	1	CHI Health Plainview Clinic Catchment Area 4 Pierce	Rural Health Clinic (P, D, M) Geographic Population (M) Single County (M)	No Medically Underserved Areas in this County

Source: U.S. Department of Health & Human Services 2018
D = dental; M = mental health; P = primary medical care

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3.9 CULTURAL RESOURCES

This section discusses the cultural resources within the potentially affected environment (i.e., area of potential effect [APE]) of the proposed MAR. The APE for the MAR analyzed within this SEIS generally includes a 300-foot-wide study area, centering 150 feet from the MAR centerline. This SEIS uses the following terms "heritage resources" and "cultural resources:"

- **Heritage resources** include historic properties, as defined under the National Historic Preservation Act (NHPA), as amended, as well as Traditional Cultural Properties, which are recognized for maintaining traditional ways of life among Indian tribes.
- **Cultural resources** include the remains and sites associated with human activities, such as prehistoric and ethno-historic Indian archaeological sites, historic archaeological sites, historic buildings and structures, and elements or areas of the natural landscape.

As a basis for the analysis of heritage and cultural resources, this SEIS considers federal and state regulations, standards and guidance. The Department invited 67 Indian tribes having geographic and/or ancestral ties to participate in the NEPA process (Section 1.3, Agency and Public Involvement, provides a list), as well as the Nebraska State Historical Society (NSHS), which acts as the SHPO (see Appendix A, Indian Tribe and Agency Coordination).

In addition, consistent with Section 106 of the NHPA, the Department has conducted government-to-government consultation with Indian tribes. Table 3.9-1 provides a brief timeline of coordination efforts with Indian tribes regarding the MAR.

Table 3.9-1. Department Coordination Efforts with Indian Tribes Regarding the MAR

Date	Activity
December 23, 2013	The Department executed a Programmatic Agreement to take into account the effects of the Keystone XL Pipeline project on historic properties listed in or eligible for listing in the NRHP resulting from construction, operations and maintenance of the Keystone XL Pipeline project (see Appendix E of the 2014 Keystone XL Final SEIS (Link to Appendix E).
April 10, 2018	The Department sent a letter to the 67 Indian tribes who expressed interest in the heritage resources potentially affected by the Keystone XL Pipeline project. The letter stated the Department is continuing government-to-government consultation with the tribes and in accordance with the Programmatic Agreement (see Appendix A, Indian Tribe and Agency Coordination).
May 1, 2018	In accordance with stipulation V.B.2 of the Programmatic Agreement, the Department sent letters to Indian tribe leaders and THPOs. In order to make a reasonable and good faith effort to complete the identification of historic properties before construction begins, the Department requested assistance in identifying Traditional Cultural Properties/properties of religious and cultural significance of the tribe that may be eligible for listing in the NRHP, and could be affected by construction of the MAR (see Appendix A, Indian Tribe and Agency Coordination).
May 24, 2018	The Department sent a letter to the 67 Indian tribes who expressed interest in the heritage resources potentially affected by the Keystone XL Pipeline project announcing the decision to prepare an EA on the MAR and to establish a direct point of contact for each tribe interested in participation on the Draft EA.
July 26, 2018	The Department sent a letter to tribes notifying them of the availability of the Draft EA and start of a 30-day comment period.

Department = United States Department of State; EA = Environmental Assessment; MAR = Mainline Alternative Route; NRHP = National Register of Historic Places; SEIS = Supplemental Environmental Impact Statement; THPO = Tribal Historic Preservation Officer

This SEIS considers the information obtained from the cultural resource survey work conducted along the MAR and information provided by Indian tribes.

3.9.1 Cultural Resources Overview

Federal regulations, including the NHPA, the Native American Graves Protection and Repatriation Act and the Archaeological Resources Protection Act, address the impact of federal agency actions with the potential to affect heritage and cultural resources.

3.9.1.1 Section 106 of the National Historic Preservation Act

Consistent with Section 106 of the NHPA, as amended (54 USC 306108), this SEIS considers potential effects on historic properties present within the APE. The Department has also coordinated with the Advisory Council on Historic Preservation, SHPO and federally recognized Indian tribes regarding the MAR and its potential effects on historic properties.

The NHPA uses the term "historic properties" to define significant resources. Under the NHPA, "historic properties" means "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places [NRHP] maintained by the Secretary of the Interior. This term includes artifacts, records and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet National Register criteria" (36 CFR 800.16.l.1). To be listed within the NRHP, a historic property must meet at least one of the following criteria (36 CFR 60.4):

A. That are associated with events that have made a significant contribution to the broad patterns of our history; or

B. That are associated with the lives of significant persons in our past; or

C. That embody the distinctive characteristics of a type, period or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. That have yielded or may be likely to yield, information important in history or prehistory.

For this analysis, historic properties and heritage resources are used interchangeably.

3.9.1.2 Traditional Cultural Properties

Under the NHPA, Traditional Cultural Properties also may be considered. According to the National Park Service's National Register Bulletin 38, "traditional" in the context of Traditional Cultural Properties "refers to those beliefs, customs, and practices of a living community of people that have been passed down through the generations, usually orally or through practice. The traditional cultural significance of a historic property, then, is significance derived from the role the property plays in a community's historically rooted beliefs, customs, and practices" (NPS 1998).

Traditional Cultural Properties may include the following:

- A location associated with traditional beliefs of an Indian tribe
- A rural community whose organization, buildings and structures, or patterns of land use represent cultural traditions valued by long-term residents
- An urban neighborhood that is the traditional home of a particular cultural group

- A location where Indian tribe religious practitioners have historically gone or are known or thought to go today to perform ceremonial activities
- A location where a community has traditionally carried out economic, artistic or other cultural practices

3.9.1.3 Native American Graves Protection and Repatriation Act

The Native American Graves Protection and Repatriation Act (25 USC 3001-3013; Public Law 101-161) describes the rights of American Indian lineal descendants and tribes (including Native Hawaiian organizations) with respect to the treatment, repatriation and disposition of human remains, funerary objects, sacred objects and objects of cultural patrimony. These are referred to collectively in the statute as cultural items and are those for which Indian tribes can show a relationship of lineal descent or cultural affiliation.

The two primary purposes of the Native American Graves Protection and Repatriation Act are:

- Provide protection for Native American burial sites and careful control over the removal of Native American human remains, funerary objects, sacred objects and items of cultural patrimony on federal and Tribal lands; this includes coordination with Indian tribes whenever archaeological investigations encounter, or are expected to encounter, Native American cultural items, or when projects unexpectedly discover such items on federal or Tribal lands; and
- Require federal agencies and museums receiving federal funds to inventory holdings of Native American human remains and funerary objects and to provide written summaries of other cultural items.

In addition, Nebraska Revised Statute 12-1201 through 12-1212, et seq. and 28-13 governs the inadvertent discovery and/or excavation of unmarked burials and human remains as well as associated artifacts on private lands in the state of Nebraska. The statute provides legal protection to all unmarked burials and human remains regardless of age, ethnic origin or religious affiliation by preventing unnecessary disturbance, and outlines the steps for protecting and final deposition of unmarked burials and human remains, including notification of local law enforcement, involvement of interested parties and the penalties for their disturbance.

While the MAR would not be located on federal or Tribal lands, the Department would consult with Indian tribes in the event of a discovery of potential remains. If unanticipated cultural materials or human remains were encountered during the construction phase of the MAR, Keystone would implement the Unanticipated Discoveries Plan pursuant to the Programmatic Agreement.

3.9.1.4 Archaeological Resources Protection Act

The Archaeological Resources Protection Act (16 USC 470aa-470mm; Public Law 96-95, as amended) was enacted to protect archaeological resources and sites that are on public lands and Tribal lands, and to foster increased cooperation and exchange of information between governmental authorities, professional archaeologists and private individuals.

The Archaeological Resources Protection Act describes the requirements that must be met before federal authorities can issue a permit to excavate or remove any archaeological resource on federal or Tribal lands and to coordinate the curation requirements of artifacts, other materials excavated or removed, and the records related to the artifacts and materials. Although the primary purpose of the Archaeological Resources Protection Act is to provide more effective law enforcement to protect archaeological sites on public lands, this statute also governs the removal and curation requirements of artifacts, including those resources protected under Native American Graves Protection and Repatriation Act.

3.9.1.5 Cultural Resources Investigations within the MAR

On November 28, 2017, Keystone performed a site file search and literature review within 1 mile on either side of the MAR centerline at the NSHS in Lincoln, Nebraska. The records search and literature review provided the nature and extent of archaeological investigations conducted to date in the portions of east-central Nebraska that the MAR traverses and identified the number and nature of previously recorded sites located within the 2-mile-wide corridor. Keystone also examined county histories, General Land Office plats and historic maps and atlases to identify potential historic sites within or adjacent (up to 2 miles) to the MAR APE. The records search indicated the following (Exp 2018):

- Along the length of the MAR, 42 archaeological surveys have been previously conducted within 1 mile on either side of the proposed centerline. The overwhelming majority of the surveys (71 percent) are small highway projects, most of which resulted in negative findings.
- Sixty-two archaeological sites have been previously identified and recorded. Of these, 21 are prehistoric sites, 35 are historic sites and 5 contain both prehistoric and historic components. It is not known whether one site contains prehistoric and/or historic components.
- A minimum of 36 potential historic sites are within or adjacent to the current MAR 2-mile-wide corridor, the majority of which are farmsteads/rural households.
- A total of 274 properties, including three NRHP-listed structures, have been previously surveyed and documented within the 2-mile-wide study corridor. Only 12 of the 274 properties are located within or adjacent to the MAR APE. Ten of the properties have either “unknown” or “more info needed” with respect to NRHP status, while the other two have been formally evaluated against NRHP criteria and are not eligible for NRHP listing in Nebraska Historic Buildings Survey (NE HBS) reports.

Table 3.9-2 lists all sites identified by literature review that are located within the 300-foot MAR APE. Keystone also performed archaeological field investigations and architectural surveys along the MAR in Spring of 2018. Table 3.9-3 lists all sites identified along the MAR during the field investigations.

The National Park Service’s National Trails System Map also indicates the MAR crosses two NHTs located primarily along major river courses that served as primary overland routes spurring the earliest settlement in the areas where they crossed (see Section 3.2, Land Use, Recreation and Visual Resources, for additional information regarding these trails).

Although the Department is waiting to hear from Indian tribes regarding sites of interest along the MAR, no known villages or reported activity areas have been located within the 2-mile-wide study corridor. A review of recorded Ponca archaeological sites within 25 miles of the MAR indicate only two sites that have clear Ponca associations have been recorded in this vicinity - one is the grave of Standing Bear and the other is the Ponca Agency; both are located along the Niobrara River (north of the Elkhorn River) in Knox County (Exp 2018).

The Ponca Trail of Tears crosses the MAR study corridor somewhere near the Big Blue River in Seward County. This route was used for the forced removal of the Ponca Tribe from northern Nebraska in 1877. Although no evidence exists pointing to the exact location of the trail in this area, evidence of an old trail has been documented at a nearby archaeological site, which refers to an extant portion of an old trail at the site as the Ulysses to Seward Settlement Trail (Exp 2018). Since completion of the 2014 Keystone XL Final SEIS, the Tanderup Family whose farm is located along the Ponca Trail of Tears, deeded land to the Ponca Tribe of Nebraska and the Ponca Nation of Oklahoma along the Preferred Route, approximately 11 miles northwest of the start of the MAR. Sacred Ponca Corn has been planted on the Tanderup Farm and deeded land.

Table 3.9-2. Cultural Resources Identified within the MAR APE by Literature Review

Site Number	Description	Notes
25AP0060	Historic Farm/Ranch	Historic site situated on the bluffs lining the northern wall of the Elkhorn River valley in southeastern Antelope County, approximately 1.2 miles north of the current channel of the river. As previously mapped, the site straddles the Project survey corridor at approximately MP 712.5–712.63. The Nebraska SHPO site-file data base currently lists the NRHP eligibility status of site as unknown.
25BU0003	Precontact Unknown	Prehistoric site situated on the bluffs lining the southern wall of the Platte River valley in north-central Butler County, approximately 5.25 miles south of the current channel of the river. As previously mapped (from a 1936 site form), the site is located somewhere within a 160-acre parcel that extends into the Project survey corridor at approximately MP 787.75–787.8.
25BU0059	Historic Farmstead	Near MP 786. No additional information.
25BU0060	Historic Farmstead	Near MP 796. No additional information.
25BU0067	Historic Farmstead	Near MP 783. No additional information.
25JF0037	Precontact Lithic Scatter	Between MP 875 and 876. No additional information.
25JF0038	Precontact Lithic Scatter	Near MP 873. No additional information.
25JF0039	Precontact Lithic Scatter	Near MP 871. No additional information.
25JF0040	Historic Farmstead	Between MP 868 and 869. No additional information.
25PT0114	Precontact Lithic Scatter	Between MP 758 and 759. No additional information.
25SA0078	Historic Farmstead	Near MP 852. No additional information.
25SA0081	Historic Farmstead	Between MP 843 and 844. No additional information.
25SA0082	Historic Farmstead	Near MP 858. No additional information.
25SA0083	Historic Farmstead	Near MP 857. No additional information.
25SA0084	Historic Farmstead	Near MP 845. No additional information.
25SA0085	Historic Dump Site	Near MP 853. No additional information.
25ST0020	Precontact Village	A multicomponent village site containing components representing “Upper Republican, Woodland, and possibly an earlier occupation”. Near MP 748. The NSHS database currently lists the NRHP eligibility status of site as unknown.
25ST0041	Historic Farmstead	Near MP 755. No additional information.
C801HT002FS	Historic Artifact Shelter	4- by 4-meter displaced concrete and brick scatter to fill marshy area. Previously determined “not eligible”. Near MP 676.
C801HT004FS	Historic Tractor Part	Ferrous metal tractor part. Previously determined “not eligible”. Near MP 672.
C801HT005FS	Precontact Isolate	Petrified wood angular fragment. Previously determined “not eligible”. Between MP 658 and 659.
CX00-033	Historic Farmstead	Habitation, Central Plains Tradition. Previously determined “potentially eligible”. Near MP 772.
CX00-051	Historic Road (Lincoln Highway)	Lincoln Highway. Near MP 778.
MD00-103	Historic Farmstead	2S frame clapboard cube hip roof front porch with double porch columns. Large barn garage two smaller outbuildings. Near MP 719.
ST00-093	Historic Farmstead	Non Cont House; New House Frame; Original House. Near MP 749.

Source: Exp 2018

MP = milepost; NRHP = National Register of Historic Places; NSHS = Nebraska State Historical Society; SHPO = State Historic Preservation Office

Table 3.9-3. Cultural Resources Identified within the MAR APE by Field Survey

Site Number	Description	Notes
C802AT001	Historic Farmstead/ Rural Household	Historic site situated on the bluffs lining the northern wall of the Elkhorn River valley in southeastern Antelope County, approximately 1.2 miles north of the current channel of the river. The Nebraska SHPO site-file database currently lists the NRHP eligibility status of the site as unknown. Same as site 25AP0060 in Table 3.7-2. As previously mapped, the site straddles the Project survey corridor at approximately MP 713 and is within the construction and permanent ROW.
C804CO001	Historic Farmstead/ Rural Household	Near MP 772 within temporary work space and access road. No additional information.
C802AT002	Prehistoric Lithic Scatter	Near MP 713 within the construction and permanent ROW. No additional information.
C802AT003	Prehistoric Lithic Scatter	Near MP 716 within the construction and permanent ROW. No additional information.
C802AT004	Prehistoric Lithic Scatter	Near MP 716 outside of limits of disturbance. No additional information.
C802AT005	Historic Farmstead/ Rural Household	Near MP 717 within the construction and permanent ROW. No additional information.
C801MA001	Historic Artifact Scatter	Near MP 726 outside of limits of disturbance. No additional information.
C802MA001	Prehistoric Lithic Scatter	Near MP 732 within the construction and permanent ROW. No additional information.
C801MA002	Historic Artifact Scatter	Near MP 740 outside of limits of disturbance. No additional information.
C801MA003	Historic Artifact Scatter	Near MP 742 within the construction and permanent ROW. No additional information.
C801ST001	Prehistoric Lithic Scatter	Near MP 747 within the construction ROW, access road footprint and temporary work space. No additional information.
C801ST002	Historic Artifact Scatter	Near MP 748 outside of limits of disturbance. No additional information.
C802ST001	Historic Farmstead/ Rural Household	Near MP 754 within temporary work space. No additional information.
C802ST002	Historic Artifact Scatter	Near MP 754 outside of limits of disturbance. No additional information.
C801PL001	Historic Farmstead/ Rural Household	Near MP 758 within the construction and permanent ROW. No additional information.
C804PL002-AP	Historic Farmstead/ Rural Household	Near MP 759 within the access road footprint. No additional information.
C804PL001	Prehistoric Isolate	Near MP 759 outside of limits of disturbance. No additional information.
C802CO001-AP	Historic Farmstead/ Architectural Property	Near MP 769 outside of limits of disturbance. No additional information.
C802CO002	Historic Farmstead/ Rural Household	Near MP 770 outside of limits of disturbance. No additional information.
C804CO002-AP	Historic Farmstead/ Architectural Property	Near MP 776 within the construction ROW and access road footprint. No additional information.
C802BU001	Prehistoric Limited Activity	Near MP 782 outside of limits of disturbance. No additional information.
C802BU002	Historic Road Cut	Near MP 786 within the construction ROW. No additional information.

Table 3.9-3. Cultural Resources Identified within the MAR APE by Field Survey

Site Number	Description	Notes
C804BU001-AP	Historic Farmstead/ Architectural Property	Near MP 788 outside of limits of disturbance. No additional information.
C804BU002	Historic Farmstead/ Rural Household	Near MP 798 within the access road footprint. No additional information.
C804SE001	Historic Farmstead/ Rural Household	Near MP 812 within the construction and permanent ROW, access road footprint and temporary work space. No additional information.
C804SE003	Historic Farmstead/ Rural Household	Near MP 821 within the construction and permanent ROW and temporary work space. No additional information.
C801SE001	20th Century Artifact Scatter	Near MP 823 within access road footprint. No additional information.
C802SE002	Historic Farmstead/ Rural Household	Near MP 824 within the construction and permanent ROW and temporary work space. No additional information.
C802SE001	Historic Farmstead/ Rural Household	Near MP 824 outside of limits of disturbance. No additional information.
C804SE002	Historic Farmstead/ Rural Household	Near MP 831 within the construction ROW and pump station 12-acre parcel. No additional information.
C805SA003	Historic Farmstead/ Rural Household	Near MP 843 within the construction and permanent ROW. No additional information.
C805SA001	Historic Artifact Scatter	Near MP 843 outside of limits of disturbance. No additional information.
C805SA002	Historic Farmstead/ Rural Household w/Prehistoric Component	Near MP 851 outside of limits of disturbance. No additional information.
C804SA001-AP	Historic Farmstead/ Rural Household	Near MP 854 within the construction and permanent ROW and temporary work space. No additional information.

Source: Exp and American Resources Group 2018

MP = milepost; NRHP = National Register of Historic Places; NSHS = Nebraska State Historical Society; ROW = right-of-way; SHPO = State Historic Preservation Office

As shown in Table 3.9-3, the survey identified 29 archaeological sites and 5 architectural properties. The archaeological sites consist of 7 prehistoric sites, 20 historic sites and 2 sites containing both historic and prehistoric components. One of the sites containing prehistoric components is interpreted as a base camp/village, two are field camps, and the remaining six are limited activity sites. The sites containing historic components include the remains of 19 farmsteads/rural households, 2 dump/discard areas, and a road cut segment. Four of the archaeological sites are previously recorded sites that were revisited during the 2018 investigation (Exp and American Resources Group 2018).

The survey also reported two locations where NPS National Historic Trails (Mormon Pioneer Trail and California Trail) cross the MAR in Colfax and Butler counties, along the north and south sides of the Platte River, respectively. These areas that potentially could contain historic trail segments were surveyed, but no visible surface evidence of the trails was identified. These former routes of the historic trails were likely superseded by the construction of the road, railroad grade and tracks, or destroyed through plowing and cultivation. An east-west road cut was identified in the vicinity of the southern historic trail segment; however, it was interpreted to not represent a segment of the California Trail (Exp and American Resources Group 2018).

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4 ENVIRONMENTAL CONSEQUENCES FROM CONSTRUCTION AND NORMAL OPERATIONS

4.1 INTRODUCTION

This chapter presents the potential direct and indirect impacts of the Proposed Action and No Action Alternative from construction and during normal operations and maintenance based on information presented in Chapter 3, Affected Environment. As stated in Section 1.1, Background, the focus of this SEIS is to supplement the 2014 Final SEIS to include the MAR. This chapter considers the direct, indirect and cumulative impacts related to the MAR and identifies any potential mitigation measures to minimize adverse effects. For analysis of potential impacts that could occur from an accidental release of petroleum product related to the Proposed Action, see Chapter 5, Environmental Consequences from Accidental Releases. Chapter 6, Cumulative Impacts, discusses the potential for adverse cumulative effects.

4.1.1 Characterization of Potential Impacts

The analyses presented in this section quantify the potential impacts associated with the Proposed Action and No Action Alternative, wherever possible. Where impacts cannot be quantified, the analyses present a qualitative assessment of the potential impacts. The following descriptors qualitatively characterize impacts on the respective resources:

- **Beneficial** – Impacts would improve or enhance the resource.
- **Negligible** – No apparent or measurable impacts are expected, and may also be described as "none," if appropriate.
- **Minor** – The action would have a barely noticeable or measurable adverse impact on the resource.
- **Moderate** – The action would have a noticeable or measurable adverse impact on the resource. This category could include potentially significant impacts that could be reduced by the implementation of mitigation measures.
- **Significant** – The action would have obvious and extensive adverse impacts that could result in potentially significant impacts on a resource despite mitigation measures.

Additionally, impacts may consist of direct or indirect impacts defined as follows:

- **Direct impa**cts – Those caused by the Proposed Action and occurring at the same time and place (e.g., habitat destruction, wetland disturbance, air emissions and water use)
- **Indirect impacts** – Those caused by the Proposed Action, but occurring later in time or farther removed in distance from the action (e.g., changes in surface water quality resulting from runoff).

This SEIS generally describes impacts as either "temporary" or "permanent." In addition, a subset of temporary impacts would include areas that would be disturbed intermittently for shorter periods during a construction or maintenance phase. The following terms describe these impact areas:

- **Temporary, short-term impacts** generally occur during construction with the resource returning to its preconstruction condition almost immediately afterward. A short-term impact could continue for up to 3 years following construction. An impact is considered long-term if the resource would require more than 3 years to recover. Areas subject to temporary impacts would

also occur in off-ROW locations, such as equipment laydown areas, and areas for trailers and worker parking. For the MAR, the 110-foot- wide construction ROW includes the 50-foot-wide permanent, operational ROW centered on the pipeline.

- **Permanent, long-term impacts** could occur as a result of any activity that modifies a resource to the extent that it would not return to preconstruction conditions during the life of the portion of the Keystone XL Pipeline within the MAR, such as with the construction of a pump station.

4.2 LAND USE, RECREATION AND VISUAL RESOURCES

4.2.1 Environmental Consequences

To evaluate the impacts on land use, recreation and visual resources, the Department reviewed the Proposed Action and No Action Alternative to determine whether any activities have the potential to cause the following:

- Changes in land use or zoning
- Changes in land ownership
- Changes in or reduction of public use of recreational areas or special interest areas
- Incompatible change to the visual character of the region

Adverse impacts would occur if the action were incompatible with adjacent land uses along the pipeline ROW. The following analysis estimates and assesses the impact to land use, recreation and visual resources during construction, normal operations and maintenance activities. Chapter 5, Environmental Consequences from Accidental Releases, discusses potential impacts to these resources in the event of an accidental release.

4.2.2 No Action Alternative

Under the No Action Alternative, construction of the MAR would not occur. No impacts to land use, recreation and visual resources would occur.

4.2.3 Proposed Action Alternative

This SEIS quantifies potential direct and indirect impacts to land use, recreation and visual resources using an assessment of data sources presented in Section 3.2. Potential construction- and operations-related impacts would include:

- Changes to vegetative cover, including potential loss of forest cover.
- Temporary loss of agricultural productivity within the ROW.
- Potential damage to agricultural features such as drain tiles and fences during construction.
- Temporary impacts such as construction noise and dust to nearby residences, as well as longer-term impacts due to restrictions on construction within the permanent ROW.
- Temporary restrictions on access to recreational resources, as well as noise and visual impacts, in the vicinity of ongoing construction activity.
- Visual impacts from construction and vegetation clearing, and from the construction of pump stations and other aboveground facilities.

Keystone would implement measures within the 2014 Keystone XL Final SEIS CMRP to reduce impacts on land use, recreation and visual resources within the construction and permanent ROW (U.S. Department of State 2014). Keystone would implement general best management practices, including worksite appearance, maintenance and noise and dust control. Other applicable measures to reduce construction and operations impacts to various types of land use are described below. These measures would also help mitigate impacts to recreational and visual resources. Section 4.5, Noise and Vibration, discusses potential impacts from noise and vibration.

Agricultural Land:

- Segregating the upper 12 inches of agricultural topsoil during construction and replacing it during site restoration (Section 4.3, Geology and Soils, describes the topsoil segregation methods that would be used);
- Avoiding functional loss (stopping or obstructing) of active irrigation ditches during construction or providing alternate sources of water; and
- Avoiding or minimizing potential damage to drain tile systems and repairing damaged drain tiles using original or new material.

Rangeland:

- Restoring disturbed areas as per the Con/Rec units and landowner agreements;
- Minimizing construction noise in the immediate vicinity of herds of livestock;
- Installing temporary fences with gates around construction areas to prevent injury to livestock or workers;
- Leaving hard plugs (short lengths of unexcavated trench) or installing soft plugs (areas where the trench is excavated and replaced with minimally compacted material) to allow livestock and wildlife to cross the trench safely where required by the landowner; and
- Maintaining all existing improvements such as fences, gates, irrigation ditches, cattle guards and reservoirs to the degree practicable where required by the landowner agreement.

Forest:

- Routing the proposed pipeline along existing ROWs in forest lands, when practicable; and
- Felling trees toward the pipeline centerline to minimize additional tree disturbance.

Developed Land:

- Providing construction shielding for certain land improvements (e.g., fences and sheds) and to preserve landscaping and mature trees; and
- Restoring all fences, landscaping improvements, shrubs, lawn areas and other structures to landowner- agreed requirements following construction.

4.2.3.1 Construction

Land Use

Construction of the MAR would have temporary and minor adverse effects on land uses. Temporary impacts within the construction ROW could include:

- Potential damage to agricultural features such as irrigation systems or drain tiles;
- Loss of the agricultural productivity of the land;
- Disruption to livestock during construction;
- Loss of forested and wetland areas;
- Increased dust and noise to neighboring residential and commercial areas (which could limit the landowner's ability to use their land as desired and permitted).

As shown in Table 3.2-2, agricultural land and rangelands are the predominant land uses along the MAR, together accounting for approximately 94 percent of the total land area. Uses within these locations would be temporarily affected during construction, primarily from the potential for loss of agricultural productivity, potential damage to tile and irrigation ditches and impacts to livestock from construction noise. It is estimated that disturbed pastures, croplands and grassy rangelands may take 1 to 5 years to recover to pre-construction levels (U.S. Department of State 2014). The level of effects would be minimized through implementation of the conservation measures identified at the beginning of this section and through implementation of the CMRP.

Forested areas account for approximately 1 percent of the MAR (see acreages in Table 3.2.2). During construction, trees would be removed from the ROW. Landowners would be consulted to determine if timber within the ROW has a commercial or salvage value, and timber with commercial or salvage value would be salvaged according to landowner wishes. Tree removal and disposal would be accomplished in accordance with all local, state and federal permit requirements. Trees would be allowed to regrow in the temporary ROW after construction; however, the impact would be considered long-term as forest lands take a long time to recover to pre-construction state.

Wetlands account for approximately 1 percent of the MAR (see acreages in Table 3.2.2). Where possible, these locations would be avoided using HDD. Impacts of wetlands in locations requiring disturbance would be mitigated and restored through measures described in Section 4.6, Water Resources. Construction of the MAR and associated facilities would not impact any special management areas or land under conservation easements.

Construction would require the acquisition of temporary easements from landowners and land managers along the pipeline ROW and at the locations of proposed temporary ancillary facilities (e.g., laydown areas and TWAs). As discussed in the 2014 Keystone XL Final SEIS, easement agreements would typically include monetary compensation to landowners for long-term land use losses (e.g., property use during construction, operation and maintenance), and for temporary land use losses (e.g., crop production impairment and private road damage or obstruction) (U.S. Department of State 2014). Easements would also address restoration of land or compensation to landowners for any unavoidable construction-related damage to property. Construction of permanent aboveground facilities (e.g., MLVs, pump stations) would require leasing or acquiring land. The nearest residence to the MAR is located approximately 140 feet from the construction ROW. Homeowners located close to the construction ROW would likely experience frequent inconveniences during the construction period (typically 7 to 30 days), including disruptions to privacy and restrictions on ingress and egress from their property. Homes located further away from the ROW could experience minor inconveniences such as increased noise levels and dust from construction (also see Section 4.4 for air quality impacts and Section 4.5 for noise impacts).

In some locations, TWAs may be needed outside the construction ROW. Existing commercial or industrial sites with public or private road access would be used for temporary workspace needs where practical, and TWAs would be restored to preconstruction levels.

Recreation

Construction of the MAR would have temporary and minor adverse effects on recreation. Temporary impacts within the construction ROW could include restricted access to recreational resources within and adjacent to the construction ROW. The construction ROW would not directly affect recreational activity on any federal lands and the MAR does not cross any river reaches that have been designated by federal, state or local authorities as Wild, Scenic and/or Recreational. Construction activities would only potentially affect NHT usage on private property during installation of the pipeline across the trail. Similar to irrigation ditch crossing, it is anticipated that impacts to the affected areas would be 1 day (or less) in duration.

The MAR would also cross one scenic byway (U.S. Route 30). The crossing would utilize boring beneath the roadway and there would be minimal to no disruption to traffic (U.S. Department of State 2014). U.S. Route 30 is a divided four-lane highway in the vicinity of the MAR crossing, and completing the road crossing could take up to 10 days.

Waterbodies with recreationally and/or commercially valuable fish species would be crossed using site-specific waterbody crossing plans designed to reduce impacts to these important resources. As discussed in Section 3.2.1.2, the Project would cross five waterbodies with recreational use designations. Impacts to recreational use on waterbodies due to construction would generally be temporary and could include temporary restrictions on access to certain portions of the waterbody upstream and downstream of HDD activity and/or other ongoing construction work. Impacts to water quality and fisheries are discussed in greater detail in Sections 4.6 and 4.7, respectively.

Visual Resources

Construction of the MAR would have temporary and minor to moderate adverse effects on visual resources. Visual impacts associated with construction would include construction activities (e.g., clearing and removal of existing vegetation, exposure of bare soils, earthwork and grading scars, trenching and rock formation alteration) and the presence of ancillary facilities (e.g., machinery and pipe yards and new aboveground structures such as pump stations and pipeline markers). Some of these visual effects, particularly those associated with ROW disturbance in agricultural areas, would endure beyond the construction period. Most of these longer-term effects would likely be substantially reduced with the first crop growth. During the final stages of construction, backfilling and grading would restore the construction ROW to its approximate previous contours, and restoration and revegetation would ultimately return the ROW to its approximate previous condition except in currently forested areas along the permanent ROW. Landowners would be consulted to address visual aesthetic issues that arise as a result of construction activities.

Construction of the MAR would have minor to moderate visual impacts to the NHTs in the vicinity of the ROW due to the presence of active construction sites, construction vehicles and traffic and nighttime lighting of pipeline work sites. To the degree that pipeline construction activities take place within sight of portions of the California and Mormon Pioneer NHTs, the proposed Project's construction impacts on visual resources for these NHTs could be minor to moderate; however, these impacts would be temporary. Similarly, recreational users and visitors on U.S. Route 30 would experience temporary visual impacts during periods of construction activity in the vicinity of the roadway.

4.2.3.2 Operations and Maintenance

Land Use

Overall impacts to land use during operations and maintenance of the MAR would be negligible to minor. The pipeline would require the establishment of a permanent (for the lifetime of the Project, typically 50 years) 50-foot wide ROW. The permanent pipeline ROW would require occasional trimming to remove woody vegetation and trees from the permanent easement/ROW to facilitate aerial inspection. Forested areas within the permanent ROW would be permanently converted to other uses agreed to with the landowner.

Negligible effects are anticipated for agricultural and range lands. The top of the proposed pipeline would be buried at least 48 inches below the ground surface in cultivated agricultural areas (and at least 42 inches in all other areas) (U.S. Department of State 2014, Appendix B). Therefore, agricultural land and rangeland use would be able to continue for the most part across the permanent ROW. Landowners would be permitted to cultivate crops and graze livestock within the permanent easement.

Operation of the MAR and associated facilities would not impact any special management areas or land under conservation easements.

Minor effects to land use would occur from restrictions placed on activities within the permanent ROW. Improvements including landscaping, catch basins, leaching fields, garages, guy-wires, houses, utility poles, septic tanks, sheds, swimming pools or any other structures that are not easily removed would be prohibited from the permanent ROW. Land within pump station and MLV fencelines (approximately 36 acres in total) would be converted to long-term utility use.

As discussed above, easement agreements would typically include monetary compensation to landowners for long-term land use losses (e.g., property use during construction, operation and maintenance), and for temporary land use losses (e.g., crop production impairment). In some cases, land for aboveground facilities would be purchased rather than acquired through easements.

Recreation

Impacts of operation of the pipeline within the MAR on recreation would be negligible. Noise impacts from operating pump stations are not expected to extent into recreational areas. Recreational use access would not be affected by MAR operations within special management areas or on private land.

Operation of permanent aboveground facilities associated with the MAR would not be expected to impact recreational land use. Pump Station 24 is located approximately 0.4 mile from the California NHT and, as discussed in Section 4.5, Noise and Vibration, effects of pump station noise would be minimal at this distance. Visual effects of pump station operations on NHT recreational users are discussed below.

Visual Resources

Minor impacts would occur to visual resources. Where restoration and revegetation result in returning the ROW to visual conditions similar to existing conditions, there would be either no impact or only minor impacts to visual resources during operation. The primary impact would occur in the locations of the pump stations and MLVs; however, as these locations are in remote and rural areas, effects to visual resources would be minor. Aboveground facilities would be painted in accordance with standard industry painting practices to reduce visual impacts. In addition, as requested by the landowner, vegetative buffers would be planted around pump stations to reduce the visual impacts of

these facilities. The actual pipeline within the permanent ROW would be buried and, with the exception of forested areas, land cover would be restored to pre-construction conditions.

The MAR pump stations would include exterior lighting, with intensities of 1 foot-candle in general areas, and 5 foot-candles in areas where active work would occur (U.S. Department of State 2014). For comparison, emergency egress lighting from a building is typically required to be at least 1 foot-candle, while a lighting intensity of 10 foot-candles is consistent with an indoor work environment. However, exterior lighting would only be used during periods of active nighttime maintenance. Overall, nighttime visual impacts associated with pump stations would be intermittent and localized to the area surrounding each facility.

Lighting from Pump Station 24 may be visible from segments of the California NHT. However, given the low intensity and intermittent duration of pump station lighting, the low likelihood that visitors explore the NHTs at night and the presence of vehicle headlights and lights from surrounding buildings (for users on the NHT driving route), pump station lighting would have minimal impact on the visual resources of the NHTs.

4.3 GEOLOGY AND SOILS

4.3.1 Environmental Consequences

To evaluate the impacts on geology, the Department reviewed the Proposed Action and No Action Alternative to determine whether any activities have the potential to cause the following:

- Alter surficial geology or lithology;
- Alter the availability of mineral resources for current or future uses; or
- Increase the probability of geologic hazards (e.g., seismic activity, landslides and subsidence).

To evaluate the impacts on soil resources, the Department reviewed activities associated with the Proposed Action and No Action Alternative to determine whether any activities have the potential to cause the following:

- Affect the soil's ability to support plant growth (e.g., resulting from decreased soil porosity through compaction, or degraded soil structure consistency and integrity);
- Modify soils such that they no longer meet the criteria for prime farmland soils;
- Change the availability of soil resources, including prime farmland soils, for current or future uses (this is also a potential land use concern); or
- Accelerate erosion of soil by wind or water resulting from loss of vegetative cover.

The following analysis estimates and assesses the impact to geology and soil during construction, normal operations and maintenance activities. Chapter 5, Environmental Consequences from Accidental Releases, discusses potential impacts to geology and soils in the event of an accidental release.

4.3.2 No Action Alternative

Under the No Action Alternative, construction of the MAR would not occur. No impacts to geology and soils would occur.

4.3.3 Proposed Action Alternative

This SEIS quantifies potential direct and indirect impacts to geology and soil resources using an assessment of data sources presented in Section 3.3. Impacts to soils would occur a result of construction activities, including vegetation clearing, topsoil segregation, grading, excavation, operation of construction equipment, alteration of surface drainage patterns and long-term loss of soil productivity. Impacts to soils could also occur during operations due to the operation of vehicles for pipeline inspections, as well as integrity digs and other maintenance activities. Potential construction- and operations-related impacts would include:

- Soil erosion, loss of topsoil, soil compaction and damage to wet soils and soils with poor drainage (hydric), an increase in the proportion of large rocks in the topsoil, soil mixing, soil contamination and related reductions in the productivity of desirable vegetation or crops.
- Increased potential for landslides.
- Prime farmland soil may be degraded by construction, grading and heavy equipment traffic which could compact soil, reduce porosity and percolation rates and increase the potential for runoff.

Operation and maintenance activities could result in accelerated erosion, soil compaction and related reductions in the productivity of desirable vegetation or crops. Keystone would implement measures within the 2014 Keystone XL Final SEIS CMRP to reduce impacts on soils within the construction and permanent ROW (U.S. Department of State 2014). Keystone would implement general best management practice measures including worksite appearance, maintenance and noise and dust control. Applicable measures to reduce construction and operations impacts to soils include:

- Installation of sediment barriers (e.g., silt fencing, straw or hay bales and sand bags), trench plugs, temporary slope breakers, drainage channels or ditches and use of mulching in areas of high erosion potential as outlined in the CMRP.
- Restoration and revegetation of areas disturbed by construction along the pipeline ROW consistent with the CMRP and specific landowner requirements.
- Implementation of compaction control measures, including ripping (loosening of compacted soils with a dozer equipped with a ripper blade or deep plow) to relieve compaction, particularly in areas where topsoil has been removed.
- Monitoring the ROW following construction for erosion, settling and landslide activity, and, in areas of prime farmland, monitoring for any degradation in soil productivity.
- Removal and segregation of the top 8 to 12 inches of topsoil in non-forested agricultural areas located within prime farmland during excavation to a windrow along the edge of the ROW, with care taken to minimize the potential for mixing topsoil and subsoil.
- Implementation of erosion and sediment control and reclamation (including revegetation) procedures similar to those described for construction activities and also as described in the CMRP for operations wherever soil is exposed and steep slopes are present or erosion potential is high.

4.3.3.1 Construction

Geology

Overall impacts to geology from construction would be negligible. Construction of the MAR would not increase geological hazards or hinder development of any mineral resources. Construction activities

would likely affect surficial geology and could potentially harm paleontological resources. Keystone would develop a Paleontological Monitoring and Mitigation Plan prior to construction on federal as well as certain state and local government lands.

The risk of pipeline rupture from a seismic event is considered to be minimal. The proposed route would not cross any known active faults and is located outside known zones of high seismic hazard, including the New Madrid Fault Zone, which is located approximately 500 miles from the pipeline end point in Steele City, Nebraska. The proposed pipeline would be constructed to withstand probable seismic events within the seismic risk zones crossed by the proposed pipeline and in accordance with USDOT regulations (49 CFR 195, Transportation of Hazardous Liquids by Pipeline) and all other applicable federal and state regulations, which are designed to help prevent crude oil pipeline accidents and to provide adequate protection for the public. In accordance with the USDOT regulations, internal inspection of the proposed pipeline would occur if an earthquake, landslide or soil liquefaction event were suspected of causing abnormal pipeline movement or rupture. In addition, as the MAR has a low potential for sinkhole formation, risk of subsidence along the proposed pipeline route is negligible.

The MAR does not cross any active surface mines or quarries or any oil or gas wells; however, it would cross deposits of sand, gravel, clay and stone. As such, construction (and operation) of the proposed Project would limit access to sand, gravel, clay and stone resources that are located within the permanent ROW. The total area of deposits crossed by the proposed ROW is minimal when compared to the amounts of available deposits for extraction throughout the region.

Rock ripping and the pipeline installations at some locations (e.g., certain river crossings) would involve some disturbance and modification of the surficial geology, but the impacts are anticipated to be minor. River crossings using the HDD method would require depths greater than 8 feet and thereby could potentially affect additional bedrock, if it is encountered. At other stream crossings, Keystone has indicated that burial depth would be a minimum of 60 inches. Excavation activities, erosion of fossil beds exposed due to grading and unauthorized collection could damage or destroy paleontological resources during construction. A Paleontological Monitoring and Mitigation Plan would be prepared by Keystone prior to construction on federal as well as certain state and local government lands.

Soils

Overall impacts to soil resources from construction would be minor. Clearing of the temporary and permanent ROW would remove protective vegetative cover and potentially increase soil erosion. Soil erosion could also occur from open-cut trenching and during spoil storage. Soil erosion could result in the loss of valuable topsoil from its original location through wind and/or water erosion and increase the sedimentation of surface water through runoff. Soil erosion can also impair revegetation which is crucial for soil stabilization and restoration. The majority of construction-related soil impacts would include soil erosion, loss of topsoil, soil compaction and damage to wet soils and soils with poor drainage (hydric), an increase in the proportion of large rocks in the topsoil, soil mixing, soil contamination and related reductions in the productivity of desirable vegetation or crops. Construction also could result in damage to existing tile drainage systems (an agricultural practice that removes excess water from soil subsurface), irrigation systems and shelterbelts. Measures identified at the beginning of this section and contained within the CMRP would reduce potential adverse effects to minor.

With respect to landslides, the proposed pipeline would be designed and constructed in accordance with 49 CFR 192 and 193, which require pipeline facilities to be designed and constructed in a manner to provide adequate protection from washouts, floods, unstable soils, landslides or other hazards that could cause the proposed pipeline facilities to move or sustain abnormal loads. Keystone also proposes to use

specialized pipeline installation techniques, such as padding and the use of rock-free backfill, which are designed to effectively insulate the proposed pipeline from minor earth movements.

A small portion (6 percent) of the MAR would cross drought-prone soils, which would be relatively more prone to wind erosion during construction and be more difficult to stabilize and revegetate after construction. Erosion control measures as described in the CMRP include construction procedures designed to reduce the likelihood and severity of proposed Project impacts.

Approximately 23 percent (655 acres) of the overall MAR would affect soils characterized as highly erodible by either wind (3 percent) or water (20 percent). Areas of more highly erodible soils are found north and south of the Platte River crossing. These areas would require mitigation and reclamation procedures to minimize soil loss and retain crop productivity. Best management construction methods to reduce soil erosion include installation of sediment barriers (e.g., silt fencing, straw or hay bales and sand bags), trench plugs, temporary slope breakers, drainage channels or ditches and mulching. Such measures would be implemented wherever soil is exposed, steep slopes are present or erosion potential is high. An Environmental Inspector would be assigned to each construction spread to enforce the use of these methods and ensure corrective action is taken in the event that construction activities deviate from the measures outlined in the CMRP, agreed landowner requirements or conditions of applicable permits. Additional sediment control measures would be implemented if heavy precipitation or snowmelt events create erosion channels where soil is exposed along the MAR. In addition, areas disturbed by construction along the pipeline ROW would be revegetated and restored consistent with the CMRP and specific landowner or land manager requirements. Following construction, areas of erosion or settling would be monitored.

A high portion of the proposed MAR contains soils that are compaction prone (86 percent or nearly 2,446 acres). Soil compaction may result from the movement of construction vehicles along the construction ROW, within TWAs and on temporary access roads. The extent of compaction would depend on the moisture content and texture of the soils at the time of construction, with compaction occurring most severely on moist to wet soils with high clay content. Compaction control measures would reduce adverse effects to minor and include ripping (loosening of compacted soils with a dozer equipped with a ripper blade or deep plow) to relieve compaction, particularly in areas where topsoil has been removed.

The proposed MAR also contains a high percentage of prime farmland (nearly 2,050 acres or 72 percent of the route), which would be directly affected by MAR construction. The existing structure of prime farmland soil may be degraded by construction, where grading and heavy equipment traffic could compact soil, reduce porosity and percolation rates, and therefore increase the potential for runoff. Depending on the amount of topsoil actually present, in non-forested agricultural areas along the route, the top 8 to 12 inches of topsoil would be removed and segregated during excavation to a windrow along the edge of the ROW, with care taken to minimize the potential for mixing topsoil and subsoil. In addition, other measures identified at the beginning of this section and contained within the CMRP would reduce potential adverse effects to minor.

4.3.3.2 Operations and Maintenance

Overall impacts to geology during operations and maintenance would be negligible, and impacts to soils would be minor. During the operational phase of the proposed Project, small-scale isolated surface disturbance impacts could occur from pipeline maintenance traffic and incidental repairs. Routine pipeline operation and maintenance activities would not be expected to affect physiography or bedrock geology. The depth to the bottom of the pipeline is, on average, 7 feet below ground surface, which is below the frost line.

Operation and maintenance activities could result in accelerated erosion, soil compaction and related reductions in the productivity of desirable vegetation or crops. However, they would be very localized in nature, limited to small areas where pipeline maintenance activities occur, and the impacts are expected to be minor. During operation, these types of impacts would be addressed with the affected landowner or land management agency and a mutually agreeable resolution reached. In the event that agricultural productivity is impaired by vehicular compaction, landowners and land managers would be compensated for demonstrated losses associated with decreased productivity.

4.4 AIR QUALITY AND GREENHOUSE GASES

4.4.1 Environmental Consequences

To evaluate the impacts on air quality, the Department reviewed the Proposed Action and No Action Alternative to determine whether any activities have the potential to cause any of the following:

- Emissions of criteria pollutants that could exceed relevant air quality or health standards
- An adverse change in air quality attainment status related to the NAAQS or Nebraska standards
- A violation of any federal or state permits
- Effects on visibility and regional haze in Class I areas
- Conflicts with local or regional air quality management plans to attain or maintain compliance with federal or state air quality regulations
- Impacts to human health from the inhalation of fugitive vapors from the petroleum product.

To evaluate the impacts on air quality and greenhouse gas emissions, the Department reviewed activities associated with the Proposed Action and No Action Alternative to determine whether any activities have the potential to cause any of the following:

- An increase of fugitive emissions of VOCs from pipeline and pump station operations
- An increase of indirect emissions for mobile sources, such as construction equipment, worker vehicles and associated maintenance equipment
- An increase of indirect offsite emissions associated with the generation of electricity used to power the pumping stations.

The following analysis estimates and assesses the impact to air quality and greenhouse gas emissions during construction, normal operations and maintenance activities. Chapter 5, Environmental Consequences from Accidental Releases, discusses potential impacts to air quality and potential for greenhouse gas emissions in the event of an accidental release.

4.4.2 No Action Alternative

Under the No Action Alternative, construction of the MAR would not occur. No impacts to air quality or greenhouse gases would occur.

4.4.3 Proposed Action Alternative

This SEIS quantifies direct and indirect impacts to air quality and quantifies the increase in greenhouse gas emissions from the construction and operation of the MAR, in consideration of the affected environment for air quality and greenhouse gases discussed in Section 3.4. A short-term, minor increase in air pollutant and greenhouse gas emissions would occur during construction of the MAR and

associated facilities. Emissions during operations would not be expected to have an adverse effect on regional air quality. Operation of the MAR pipeline and associated facilities would cause a long-term, minor increase in greenhouse gas emissions.

Keystone would implement measures within the 2014 Keystone XL Final SEIS CMRP to reduce impacts on air quality and greenhouse gas emissions during construction of the MAR (U.S. Department of State 2014). As described in the CMRP, mitigation measures would be employed and enforced by an environmental inspector assigned to each construction spread. Construction mitigation measures applicable to air quality and greenhouse gas emissions would include:

- Control dust levels during construction activities by employing water trucks, sprinklers or calcium chloride (limited to roads).
- Control speed of all contractor vehicles in work areas and on roads.
- Control emissions from construction equipment combustion, open burning and temporary fuel transfer systems and associated tanks to the extent required by state and local agencies through the permit process.
- Place curtains of suitable material, as necessary, to prevent wind-blown particles from sand blasting operations from reaching any residence or public building.
- Comply with all applicable state regulations and local ordinances with respect to truck transportation and fugitive dust emissions.

4.4.3.1 Construction

As discussed in Section 2.4.8, Construction Procedures, Keystone would design, construct, test and operate the MAR facilities in accordance with all applicable requirements included in the USDOT regulations at 49 CFR 195, Transportation of Hazardous Liquids by Pipeline, and other applicable regulations. The 2014 Keystone XL Final SEIS contains detailed descriptions of procedures Keystone would use for pipeline construction. Construction would involve ground-disturbing activities such as land clearing and open burning, pipeline trenching and installation and equipment staging.

Air Quality

A short-term, minor increase in air pollutant emissions would occur during construction of the MAR and associated facilities. Table 4.4-1 presents the estimated criteria air pollutant emissions generated from construction of the MAR pipeline and associated facilities. Table 4.4-2 presents estimates of hazardous air pollutant (HAP) emissions. Estimates of criteria pollutants and HAPs from construction of the MAR pipeline are based on emissions estimates for the full Keystone XL pipeline presented in the 2014 Final SEIS, after adjusting for pipeline length, acres disturbed and the number of pump stations. Construction emissions would not change attainment status or violate federal or state ambient air quality standards.

Table 4.4-1. Estimated Construction Emissions of Criteria Air Pollutants

Activity/Source	Criteria Air Pollutant Emissions (tons)[a]							
	HC/VOC	CO	NO_x	SO_2	PM	PM_{10}	$PM_{2.5}$	Pb
Pipeline construction	17.5	271.8	199.1	8.2	8.4	8.4	8.4	0.0
Pump station construction	5.1	157.1	19.9	0.9	0.9	0.9	0.9	0.0
Open burning	0.3	1.9	0.0	0.0	0.2	0.2	0.2	0.0
Fugitive dust	0.0	0.0	0.0	0.0	3,560.1	1,245.8	249.1	0.0
Total	**22.9**	**430.8**	**219.0**	**9.1**	**3,569.6**	**1,255.2**	**258.5**	**0.0**

a. Developed from estimates presented in the 2014 Keystone XL Final SEIS, Table 4.14-1, adjusting for construction of 162 miles of pipeline and 3 pump stations and 2,832 acres of land disturbance (assuming 0.5% of that land would be open burned). Final SEIS estimates were based on 875 pipeline miles, 20 pump stations and 15,296 acres of land disturbance.

% = percent; CO = carbon monoxide; HC = hydrocarbons; NO_x = nitrogen oxides; Pb = lead; PM = particulate matter; PM_{10} = particulate matter of diameter 10 microns or less; $PM_{2.5}$ = particulate matter of diameter 2.5 microns or less; SEIS = Supplemental Environmental Impact Statement; SO_2 = sulfur dioxide; VOC = volatile organic compound

Table 4.4-2. Estimated Construction Emissions of Hazardous Air Pollutants

Activity/ Source	Hazardous Air Pollutant Emissions (tons)[a]								
	Benzene	Toluene	Xylenes	Acrolein	PAHs	1,3-Buta-diene	Formal-dehyde	Acetal-dehyde	Total HAPs
Pipeline construction	0.29	0.11	0.08	0.03	0.05	0.01	0.33	0.22	1.12
Pump station construction	0.03	0.01	0.01	0.00	0.00	0.00	0.04	0.02	0.12
Total	**0.3**	**0.1**	**0.1**	**<0.1**	**0.1**	**<0.1**	**0.4**	**0.2**	**1.2**

a. Developed from estimates presented in the 2014 Keystone XL Final SEIS, Table 4.14-1, adjusting for construction of 162 miles of pipeline and 3 pump stations. Final SEIS estimates were based on 875 pipeline miles and 20 pump stations.

< = less than; HAP = hazardous air pollutant; PAH = polycyclic aromatic hydrocarbon

Greenhouse Gases

A short-term, minor increase in greenhouse gases would occur during construction of the MAR and associated facilities. Table 4.4-3 presents the estimated greenhouse gas emissions generated from construction of the MAR pipeline and associated facilities. Estimates of greenhouse gas emissions from construction of the MAR pipeline are based on emissions estimates for the full Keystone XL pipeline presented in the 2014 Keystone XL Final SEIS, after adjusting for pipeline length, acres disturbed and the number of pump stations. Under the Proposed Action, construction of the MAR would lead to one-time emissions of approximately 28,970 metric tons CO_2-eq of greenhouse gases.

Table 4.4-3. Estimated Construction Emissions of Greenhouse Gases

Activity/Source	Greenhouse Gas Emissions (metric tons) [a]			
	CO_2	CH_4	N_2O	Total (CO_2-eq)
Pipeline construction	25,643	2	1	26,052
Pump station construction	2,856	0	0	2,905
Open burning	9	0	0	10
Total	**28,508**	**2**	**1**	**28,967**

a. Developed from estimates presented in the 2014 Keystone XL Final SEIS, Table 4.14-1, adjusting for construction of 162 miles of pipeline, 3 pump stations and 2,832 acres of land disturbance (assuming 0.5% of that land would be open burned). Final SEIS estimates were based on 875 pipeline miles, 20 pump stations and 15,296 acres of land disturbance.

CH_4 = methane; CO_2 = carbon dioxide; CO_2-eq = carbon dioxide equivalent; N_2O = nitrous oxide

4.4.3.2 Operations and Maintenance

Operations of the MAR would not result in direct stationary source emissions of air pollutants and greenhouse gases because the pump stations would be operated by electricity generated offsite. Indirect emissions would occur from generation of electrical power at grid-connected power plants needed to operate the pump stations.

In addition, operation of the MAR and associated facilities would produce fugitive (i.e., unintended) emissions from the pipeline, pump station components and MLVs, as well as infrequent direct emissions from the operation of emergency generators located at pump stations and MLVs, in the event of a power failure. The pipeline and pump stations would have valves, flanges, connectors and other components as described in the 2014 Keystone XL Final SEIS.

Air Quality

Operation of the MAR pipeline and associated facilities would cause a long-term, negligible direct impact on air quality and minor indirect impact from generation of electrical power used to power the pump stations. Estimates of fugitive emissions and criteria air pollutant emissions from emergency generators are based on emissions estimates for the full Keystone XL pipeline presented in the 2014 Keystone XL Final SEIS, after adjusting for pipeline length and the number of pump stations and MLVs. Indirect criteria air pollutant emissions from electricity generation to operate the pump stations were estimated using the USEPA eGRID 2016 database (USEPA 2018c). Table 4.4-4 presents estimated criteria air pollutant emissions generated from operation of the MAR pipeline and associated facilities. Operational emissions would not change attainment status or violate federal or state ambient air quality standards.

Table 4.4-4. Estimated Operational Emissions of Criteria Air Pollutants

Activity/Source	Criteria Air Pollutant Emissions (tons)							
	HC/VOC	CO	NO_x	SO_2	PM	PM_{10}	$PM_{2.5}$	Pb
Fugitive emissions[a]	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Emergency generators[a]	0.01	0.11	0.10	0.00	0.01	0.01	0.01	0.00
Electricity generation[b]	38	ND	348	464	ND	ND	ND	ND
Total	**38.1**	**0.1**	**348.0**	**464.0**	**<0.1**	**<0.1**	**<0.1**	**0.0**

a. Developed from estimates presented in the 2014 Keystone XL Final SEIS, Table 4.14-1, adjusting for operation of 162 miles of pipeline and 3 pump stations. The 2014 Final SEIS estimates were based on 875 pipeline miles and 20 pump stations.

b. Estimated using eGRID 2016 and pump station electricity usage data provided in the 2014 Final SEIS for three pump stations, assuming 4.5% distribution loss.

< = less than; % = percent; CO = carbon monoxide; HC = hydrocarbons; ND = no data; NO_x = nitrogen oxides; Pb = lead; PM = particulate matter; PM_{10} = particulate matter of diameter 10 microns or less; $PM_{2.5}$ = particulate matter of diameter 2.5 microns or less; SO_2 = sulfur dioxide; VOC = volatile organic compound

Emissions of HAPs from operations of the MAR and associated facilities would be negligible. In addition, maintenance activities would include pipeline inspections, integrity surveys and periodic clearing of vegetation along the pipeline ROW to maintain accessibility. Air pollutants would be emitted from the operation of vehicles and equipment during these activities. However, it is expected that the amount of air pollutants emitted during ongoing maintenance activities on the MAR would be negligible.

In addition, air emissions would occur during ongoing maintenance activities, which would include pipeline inspections, integrity surveys and periodic clearing of vegetation along the pipeline ROW to maintain accessibility. Air pollutants would be emitted from the operation of vehicles and equipment

during these activities, as well as due to the generation of fugitive dust. However, it is expected that the amount of air emissions due to ongoing maintenance activities on the MAR would be minor.

Greenhouse Gases

Operation of the MAR pipeline and associated facilities would cause a long-term, minor increase in greenhouse gas emissions. Operation of the MAR and associated facilities would produce direct fugitive emissions from the pipeline, pump station components and MLVs, as well as indirect emissions from generation of electrical power at grid-connected power plants, needed to operate the pump stations.

Estimates of greenhouse gas emissions from operations of the MAR pipeline are based on emissions estimates for the full Keystone XL pipeline presented in the 2014 Keystone XL Final SEIS, after adjusting for pipeline length and the number of pump stations. Table 4.4-5 presents the estimated greenhouse gas emissions generated from operation of the MAR pipeline and associated facilities. Ongoing operations and maintenance of the MAR would lead to annual emissions of approximately 216,960 metric tons CO_2-eq of greenhouse gases.

Table 4.4-5. Estimated Operational Emissions of Greenhouse Gases

Activity/Source	Greenhouse Gas Emissions (metric tons)[a]			
	CO_2	CH_4	N_2O	Total (CO_2-eq)
Fugitive emissions[b]	Negligible	0.01	Negligible	0.27
Electricity generation	215,769	4	4	216,956
Total	215,769	4	4	216,956

a. Developed from estimates presented in the 2014 Keystone XL Final SEIS, Table 4.14-1, adjusting for operation of 162 miles of pipeline and 3 pump stations. Final SEIS estimates were based on 875 pipeline miles and 20 pump stations.

b. Fugitive emissions include emissions from the pipeline, mainline valves and pump stations.

CH_4 = methane; CO_2 = carbon dioxide; CO_2-eq = carbon dioxide equivalent; N_2O = nitrous oxide

In addition, greenhouse gas emissions would occur during ongoing maintenance activities, which would include pipeline inspections, integrity surveys and periodic clearing of vegetation along the pipeline ROW to maintain accessibility. Greenhouse gases would be emitted from the operation of vehicles and equipment during these activities. However, it is expected that the amount of greenhouse gases emitted during ongoing maintenance activities on the MAR would be minor.

4.5 NOISE AND VIBRATION

4.5.1 Environmental Consequences

To evaluate impacts from noise and vibration, the Department considered the potential for noise and vibration levels to change as a result of the Proposed Action and No Action Alternative. Considerations of the potential for changes in noise and vibration include new mobile and stationary sources from activities associated with construction and operation of the pipeline, pump stations, valves and associated infrastructure. For the purposes of this environmental consequences analysis the Proposed Action and No Action Alternative would result in adverse noise and vibration effects if the Project were to cause any of the following:

- Addition of new mobile and stationary noise sources from activities associated with the pipeline, pump stations and valves;
- Conflict with any federal, state or local noise ordinances;

- Long-term perceptible increase in ambient noise levels above regulatory thresholds at sensitive receptors during operations; or
- Excessive ground-borne vibration to persons or property.

Adverse impacts would occur if noise and vibration from construction or operation were to cause harm or injury to adjacent communities or sensitive receptors (i.e., residences, schools, hospitals), or exceed applicable environmental noise limit guidelines.

This SEIS uses aerial mapping to identify the closest noise and vibration sensitive receptors within the ROI. The analysis estimates and assesses the impact of noise and vibrations at these receptors during construction, normal operations and maintenance activities.

4.5.2 No Action Alternative

Under the No Action Alternative, construction of the MAR would not occur. No impacts to noise or vibration would occur.

4.5.3 Proposed Action Alternative

Implementation of the proposed Project would result in minor to moderate short-term impacts to noise and vibration from construction of the MAR and negligible to minor operational noise and vibration impacts as described below.

4.5.3.1 Construction

Minor to moderate, short-term, adverse noise and vibration impacts would be expected along the pipeline ROW during construction. Construction activities would cause temporary increases in ambient noise levels in the immediate vicinity of the construction sites. Construction noise levels are rarely steady in nature, but instead fluctuate depending on the number and type of equipment in use at any given time. There would be times when no large equipment is operating and noise would be at or near ambient levels. In addition, construction-related sound levels would vary by distance.

Pipeline construction generally proceeds at a rate of approximately 20 completed miles per calendar month per spread. However, due to the assembly-line method of construction, pipeline construction activities in any one area within a construction spread or sequence could last from 30 days to 7 weeks (U.S. Department of State 2014). Construction of each pump station would take approximately 18 to 24 months to complete. The total duration of construction at each pump station would vary somewhat depending on site conditions and environmental restrictions specific to each site. Keystone generally anticipates a total duration of 11 months for major construction activities (e.g., foundations, structures). This duration is not necessarily continuous as there may be breaks required for such factors as harsh winter conditions, environmental restrictions or optimization of construction efforts. Construction-related noise impacts typically would be localized, intermittent and short term since construction spreads move relatively quickly (several hundred feet to roughly 1.5 miles per day) (U.S. Department of State 2014).

Onsite construction noise would mainly occur from site preparations, clearing and grading, construction of new pipeline, vehicle traffic and other associated construction activities including the use of heavy-duty construction equipment (e.g., trucks, backhoes, front end loaders, cranes, etc.). Table 4.5-1 presents typical pipeline construction equipment (mobile and stationary) and the corresponding noise emissions levels.

Table 4.5-1. Estimated Construction Noise from Pipeline Construction Activities

Equipment[a]	Typical Noise Level at 50 feet (dBA)	Typical Noise Level at 500 feet (dBA)	Typical Noise Level at 1,000 feet (dBA)	Typical Noise Level at 1,500 feet (dBA)
Front Loaders	85	65	59	55
Backhoes, excavators	80	60	54	50
Tractors, dozers	85	65	59	55
Graders, scrapers	89	69	63	59
Trucks	88	68	62	58
Concrete pumps, mixers	85	65	59	55
Cranes (movable)	83	63	57	53
Cranes (derrick)	88	68	62	58
Pumps	76	56	50	46
Generators	81	61	55	51
Compressors	81	61	55	51
Pneumatic tools	85	65	59	55
Jack hammers	88	68	62	58
Pavers Compactors	89	69	63	59
Compactors	82	62	56	52

Source: Lamancusa 2009; USDOT 2012

dBA = A-weighted decibel

[a.] Keystone does not anticipate the need for blasting during construction of the MAR. Section 4.12.3.2 of the 2014 Keystone XL Final SEIS discusses the potential impacts from blasting and measures to reduce impacts.

In general, average equivalent noise levels from typical construction sites range from 79 to 89 dBA at 50 feet (Bolt et al. 1971). Construction noise levels fluctuate depending on the type, number and duration of use of heavy equipment for construction activities, and differ by the type of activity, distance to noise-sensitive uses, existing site conditions (vegetation to buffer sound) and ambient noise levels. With multiple items of construction equipment operating concurrently, noise levels could be relatively high during daytime periods at locations within several hundred feet of active construction sites. Accounting for the concurrent use of the construction equipment, it is conservatively estimated that noise levels could be up to approximately 86 dBA at 100 feet. Combined construction noise reduces to approximately 66 dBA at 1,000 feet. The closest noise-sensitive receptor is located approximately 140 feet from the pipeline construction ROW. Using typical noise reductions over a distance, this analysis conservatively estimated a combined pipeline construction level of approximately 92 dBA at 50 feet would reduce to approximately 83 dBA at 140 feet (closest receptor).

During some time periods, pipeline construction noise levels would likely exceed the USEPA threshold of 55 dBA (L_{dn}). Section 3.5.1.2 details the USEPA thresholds that state that noise levels above 55 dBA outdoors can cause interference or annoyance. The noise levels due to construction could occur at noise-sensitive areas located in the immediate vicinity of the pipeline route, but the construction noise would be short-term and would diminish as the pipeline construction activity moves along the route and away from the noise-sensitive areas. Typically, there would not be nighttime construction. Nighttime construction would only occur under specific conditions, such as when an HDD project is required to be completed.

The closest state park is the Blue River State Recreational Area in Seward County, which is 0.9-mile (4,689 feet) west of the construction ROW. During pipeline construction activities, noise levels could reach approximately 46 dBA at that location. The closest federal park is the De Soto National Wildlife Refuge, which is approximately 78 miles from the construction ROW, at which construction noise from this Project would not be audible. The closest recreational area is the Oxbow Trail, which is 0.4-mile (2,112 feet) south of pump station 24 in Butler County, and which the pipeline crosses on private property. Noise levels at this location on the Oxbow Trail could reach up to approximately 53 dBA during construction activities.

In addition to conventional pipeline construction techniques, current Project plans anticipate four stream crossings (Elkhorn River, Platte River, Big Blue River and Union Creek) and a roadway crossing that would require HDD techniques to install the pipeline. HDD operations could generate relatively high noise levels for long periods compared to conventional pipeline construction, in that HDD operations may occur 24 hours per day and on a 7-day-per-week basis for 8 weeks at each location. Aerial photography was used to estimate the closest noise receptor distances and direction to the HDD activity sites. Table 4.5-2 presents the closest noise receptors to the entrance and exit locations of HDD activity. Noise impacts from HDD operations were estimated at the closest noise receptors using sound level data of typical HDD operations of 77 dBA at entrance location and 68 dBA at exit location at 300 feet (U.S. Department of State 2014). Without installing noise barriers or controls, HDD activities plus existing levels would be as high as 67 dBA at 909 feet (closest receptor located northwest of Platte River entrance location), 66 dBA at 1,017 feet (closest receptor located east of Elkhorn River entrance location and northwest of the Big Blue River entrance location). Therefore, L_{dn} levels associated with the 24-hour continuous HDD activities are expected to be below the USDOT's recommended 30-day average L_{dn} criterion of 75 dBA at nearest residential areas (see Section 3.5.1.2). HDD activities would be conducted consistent with any applicable local noise ordinances.

Table 4.5-2. Estimated Construction Noise from Pipeline HDD Activities

Location	Closest Noise Receptor (feet)	Typical Noise Level of HDD Activity at 300 feet (dBA)	Typical Noise Level at Closest Receptor from HDD Activity (dBA)	Typical Noise Level at Closest Receptor from HDD Activity plus Baseline Levels (dBA)[a]
Elkhorn River (entrance)	1,017	77	66	66
Elkhorn River (exit)	1,160	68	56	56
Platte River (entrance)	909	77	67	67
Platte River (exit)	1,671	68	53	53
Big Blue River (entrance)	1,020	77	66	66
Big Blue River (exit)	2,684	68	49	49
Union Creek (entrance)	6,711	77	50	50
Union Creek (exit)	5,997	68	42	42
I-80 (entrance)	1,973	77	61	61
I-80 (exit)	790	68	60	60

Source: Lamancusa 2009; USDOT 2012; U.S. Department of State 2014

a. Baseline noise levels are assumed to be 35 dBA (see Section 3.5.1.1). Combined noise levels at the closest nearby receptor was estimated using logarithmic addition.

dBA = A-weighted decibel

There are approximately 16 sensitive noise receptors (i.e., homes, dwellings) within 0.5 mile of the proposed MAR pump stations. The closest receptor is located approximately 0.15 mile (798 feet) southwest of pump station 23B. Considering typical noise reductions over distance, the combined pump station construction noise level of 92 dBA at 50 feet from the construction site would be reduced to approximately 68 dBA at 798 feet. Similar to pipeline construction noise, noise associated with construction of the proposed aboveground facilities (pump stations) would be intermittent during the construction period, but the overall impact would be temporary and is not expected to be significant. Daytime L_{eq} associated with the construction of the pump stations are expected to be below the USDOT's recommended daytime 8-hour L_{eq} criterion of 80 dBA at residential areas. Further, nighttime noise levels would normally be unaffected because most construction activities would be limited to daylight hours. Potential exceptions include: completion of critical tie-ins on the ROW; HDD operations if determined by the contractor to be necessary; and other work if determined necessary based on weather conditions, safety or other Project requirements.

A detailed description of Keystone's proposed mitigation measures during Project construction are provided in Section 2.12 of the CMRP. Measures relevant to construction of the pipeline within the MAR include (U.S. Department of State 2014):

- In areas near residences and businesses where construction activities or noise levels may be considered disruptive, pipeline work schedules would be coordinated to minimize disruption.
- The contractor would minimize noise during non-daylight hours and within 1 mile of residences or other noise-sensitive areas such as hospitals, motels, campgrounds or state and federal parks.
- Keystone would give advance notice to landowners within 500 feet of the ROW prior to construction, limit the hours during which construction activities with high decibel noise levels are conducted, coordinate work schedules and ensure that construction proceeds quickly through such areas.
- Using the noise control measures identified above, the contractor would minimize noise in the immediate vicinity of herds of livestock or poultry operations, which are particularly sensitive to noise.
- Keystone would set up a toll-free telephone line for landowners to report any construction noise-related issues and follow-up on appropriate mitigation measures, as necessary.

Additional analysis on potential impacts from construction noise indicated that although the construction noise would be temporary (lasting no more than 10 to 14 days in any one area), there is a possibility that due to the unusual nature of the noise in otherwise relatively quiet farmland, members of the public might experience a lingering annoyance effect for up to a few days when the construction work reaches a new area. But any effects would be temporary and reduced by the mitigation measures described above.

Groundborne vibration would be present along the ROW during construction from site preparations, HDD, construction of new pipeline, vehicle traffic and other associated construction activities. Construction vibration would be temporary during construction and could be transient (e.g., single impact equipment), random (e.g., heavy construction equipment) or continuous (e.g., HDD). However, due to the distance to the nearest sensitive noise receptors along the pipeline, pump stations and HDD locations, groundborne vibration is expected to be below the threshold of human perception (refer to Section 3.5.1). As a result, less than significant impacts would be expected.

4.5.3.2 Operations and Maintenance

Negligible to minor adverse noise and vibration impacts would result from operation and maintenance considering implementation of noise reduction measures. Noise impacts from operations would be limited to the pump stations. Crude oil traveling through the buried pipeline would not emit audible noise above the surface, nor would there be perceptible levels of vibration associated with crude oil movement through the pipeline. MLVs would have backup emergency generators, which would only be used during times of power interruption and routine maintenance operation; however, noise impacts would be infrequent and negligible. Aerial inspection of the pipeline would be done at least 26 times per year (at least once every 2 weeks), and MLVs would be inspected at least twice per year. Noise from infrequent use of aircraft for maintenance purposes would be localized, intermittent and short term. Since, as presented in Table 2-2, 88.7 miles of the ROW are co-located with the existing Keystone Mainline ROW, the receptors within that portion of the ROW would already experience aerial inspections. Residences along the portion of new ROW along the MAR would experience the aerial inspections as a change in conditions. As a result, the few residences within the proposed pipeline ROW could experience temporary inconvenience from noise associated with low-level aircraft overflights (U.S. Department of State 2014).

During operation of the proposed pipeline, the noise associated with the electrically driven pump stations would be limited to the vicinity of the facilities. The major source of noise at the pump stations are the pumps (each rated at 6,500 horse power), followed by motor noise. Other sources such as piping noise are expected to be less dominant and were excluded from the analysis. Refer to Section 6.3.5 for discussion of cumulative noise impacts associated with the electrical power lines and substation at the pump stations.

Each pump station could have up to five pumps and motors. The 2014 Keystone XL Final SEIS details the noise emissions produced by the pump stations. According to the manufacturer's specification for each pump and associated motor, the overall octave band sound power level (Lw) for one pump plus its associated motor is approximately 112 dBA (U.S. Department of State 2014). Using logarithmic addition, the MAR pump stations (assuming each has five pumps and motors operating concurrently) would generate an overall Lw of approximately 119 dBA.

There are approximately 16 residences (i.e., homes, mobile homes, cabins) within 0.5 mile (2,640 feet) of the proposed pump stations (see Table 3.5-3). Table 4.5-3 presents the estimated noise contribution of the MAR pump stations (uncontrolled) at the closest sensitive receptors. The noise estimates consider the existing estimated ambient noise level of 35 dBA (the baseline L_{dn} levels were estimated from population density; actual sound level measurements were not taken).

Table 4.5-3. Estimated Noise Contribution of the MAR Pump Stations at Nearby Receptors

Pump Station	County	Distance from Pump Station to Sensitive Receptor (feet)	Estimated Noise Contribution (dBA)[a]
Pump Station 23B	Platte	798	63
Pump Station 24	Butler	1,520	58
Pump Station 25	Seward	2,031	55

Source: U.S. Census Bureau 2010; USDOT 2012; U.S. Department of State 2014

[a.] Estimated noise levels from the pump stations include the combined noise levels from the pumping units, motors and existing ambient noise levels; along with noise reductions associated with geometric divergence (hemispherical spreading loss) and atmospheric absorption (USDOT 2012).

dBA = A-weighted decibel

The closest recreational area is the Oxbow Trail, which is 0.4-mile (2,112 feet) south of pump station 24 in Butler County, and which the pipeline crosses on private property. During operation of the pump station, noise levels in the recreational area could reach approximately 55 dBA.

Noise generated from the pump stations may be a source of long-term impacts to nearby sensitive receptors. Keystone would consider the following noise abatement options: aboveground pipe lagging, pump blankets, motor air intake enclosures and engineering sound barriers (U.S. Department of State 2014). To the extent practicable, Keystone would not site pump stations close to noise-sensitive receptors. For all pump stations, Keystone would observe the USEPA noise standard of 55 decibels on the A-weighted scale (day-night sound level) for each pump station, as measured from the closest receptor. Vibrations could occur because of the industrial nature of the facilities; however, design of pump station equipment minimizes vibrations, such that vibrations would not likely be perceptible outside of the facilities. As a result, the Proposed Action should have negligible impacts associated with vibration.

Noise modeling results indicate that noise reductions of approximately 10 to 18 dBA could be required for Pump Station 23B, Pump Station 24 and Pump Station 25 (located 798 to 2,031 miles away from receptors) to ensure they do not exceed the recommended criterion for each affected state, the USEPA L_{dn} criterion of 55 dBA, and the recommended 10 dBA increase above baseline limit. These noise reductions are expected to be achieved by applying Keystone's three-step noise control plan for pump station operations described below and installing the sound barriers as necessary. Keystone would implement a three-step noise control plan in a progressive order: (1) install pipe lagging for all pipe suction pipes and discharge pipes; (2) install acoustic blankets for all pumps; and (3) upgrade enclosures for all motors, which would provide 3 dB noise attenuation for each motor compared with a standard motor enclosure. Each step produces an incremental reduction in the overall noise emission level. If the three-step noise control plan is insufficient to bring the stations into compliance, then Keystone would install sound barriers, which could take the form of freestanding walls or earth berms. The location and dimensions of the proposed sound barriers/earth berm would vary with site specification (i.e., relative elevation and distance between the proposed pump stations and nearest receptors). The barrier wall panel would have sufficient transmission loss such that sound passing through it would not contribute to the noise level at the receptor (U.S. Department of State 2014).

After implementation of Keystone's planned noise control measures, the controlled pump stations would be expected to have a potentially minor impact on nearby residences and businesses (i.e., pump station noise at nearest receptors would be reduced to an acceptable level).

Similar to human sensitive receptors, wildlife can experience noise and vibration impacts from human activities. Stress, avoidance of feeding and loss of breeding success can result from elevated noise and vibration exposure to species. Section 4.7 considers these noise effects on wildlife species within the MAR.

4.6 WATER RESOURCES

4.6.1 Environmental Consequences

For the purposes of this environmental consequences analysis, the Proposed Action and No Action Alternative would result in adverse effects to water resources if activities were to cause any of the following:

- Alteration of stormwater discharges or infiltration rates, which could adversely affect drainage patterns, flooding, erosion and sedimentation

- Violation of any federal, state or regional water quality standards or discharge limitations
- Modification of surface waters such that water quality no longer meets water quality criteria or standards established in accordance with the Clean Water Act, state regulations or permits (including downgrades of surface water use classification or listing on the Nationwide Rivers Inventory)
- Changes to the availability of surface water resources for current or future uses
- Change in stream channel morphology – slope and stability
- Loss of wetlands from the placement of dredge or fill material
- Alteration or conversion of wetland function caused by the removal of vegetation or contamination from a spill
- Increased flooding (flooding risk to nearby properties) through altered land uses (e.g., development in floodplain areas) that change current flooding levels or patterns

The following analysis estimates and assesses the impact to these water resources during construction, normal operations and maintenance activities. Chapter 5, Environmental Consequences from Accidental Releases, discusses potential impacts to water resources in the event of an accidental release.

4.6.2 No Action Alternative

Under the No Action Alternative, construction of the MAR would not occur. No impacts to water resources would occur.

4.6.3 Proposed Action Alternative

This SEIS quantifies potential direct and indirect impacts to water resources using an assessment of data sources presented in Section 3.6. Potential construction- and operations-related impacts would include:

- Temporary increases in total suspended solids concentrations, increased sedimentation and turbidity within surface waters streams or wetlands.
- Temporary to long-term changes in channel morphology and stability caused by channel and bank modifications or changes to floodplain characteristics.
- 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.
- Temporary reductions in stream flow and potential other adverse effects during hydrostatic testing activities and stream crossing construction.
- Impacts to water resources associated with hazardous liquids spills and leaks (see Chapter 5).
- Construction and pipeline testing withdrawals from water resources.
- Permanent loss of wetlands as a result of permanent fill (e.g., backfilling at permanent ancillary facility locations or improper removal of temporarily staged soils in wetlands adjacent to the pipeline trench) or placement of fill in a floodplain.
- Disturbances that result in permanent wetland loss or reduced productivity as a result of improperly maintained wetland integrity (hydrology, hydric soil strata or hydrophytic vegetation).

- Temporary to permanent modification of wetland vegetation community composition and structure from clearing and operational maintenance (e.g., conversion of scrub-shrub and forested wetlands to herbaceous wetlands within the permanent ROW).
- Loss or alteration of wetland soil integrity as a result of improperly restored hydric soil strata (topsoil and root stock, clays and gravels/cobbles), rutting and compaction that could result in altered biological activities and chemical conditions that could affect re-establishment and natural recruitment of native wetland vegetation after restoration.
- Introduction of invasive species to wetlands, degrading wetland habitat and negatively impacting wetland functions such as native plant richness, wildlife habitat quality, water quality and shoreline stabilization.
- Permanent alteration in vegetation productivity and life-stage timing to wetlands located directly over the pipeline due to increased soil temperatures associated with heat generation of the pipeline.

Keystone would implement measures within the 2014 Keystone XL Final SEIS CMRP to reduce impacts on water resources within the construction and permanent ROW (U.S. Department of State 2014). Applicable measures considered within this analysis to reduce impact water resources in the MAR in Nebraska include:

- Implementation of the Project's Spill Prevention, Control and Countermeasure (SPCC) Plan to avoid or minimize the potential impact of harmful spills and leaks during construction.
- Compliance with requirements of all permits issued for the waterbody and wetland crossings by federal, state or local agencies.
- Installation of sediment barriers immediately after initial disturbance of the waterbody, wetland or adjacent upland per the CMRP.
- Selection of most appropriate method at each crossing based on site-specific conditions (i.e., environmental sensitivity of the waterbody, depth, rate of flow, subsurface soil conditions and the expected time and duration of construction) at the time of crossing.
- Use of non-toxic drilling fluids and additives during HDD activities.
- Development of a contingency to address a frac-out during a HDD. The plan shall include instructions for monitoring during the directional drill and mitigation in the event that there is a release of drilling fluids. Additionally, the waterbody shall be monitored downstream for any signs of drilling fluid.
- Re-establishment of the stream bank contour and stabilization of stream banks and installation of temporary sediment barriers following the measures provided in the CMRP and applicable permits.
- Reduction of construction ROW crossing widths to 85 feet or less in standard wetlands unless non-cohesive soil conditions require utilization of a greater width and unless the USACE or other regulatory authority authorizes a greater width.
- Limit the duration of construction-related disturbance within wetlands in accordance with USACE Nationwide Permit requirements.
- Perform all equipment maintenance and repairs upland locations at least 100 feet from waterbodies and wetlands.
- As much as is feasible, replace topsoil and restore original contours with no crown over the trench. Remove excess spoil and stabilize wetland edges and adjacent upland areas by establishing permanent erosion control measures and revegetation, as applicable, during final clean up.

4.6.3.1 Construction

Groundwater

Negligible impacts to groundwater are anticipated from construction activities. The primary impact to groundwater resources during construction would result from incidental spills of fuels and other hazardous materials from construction equipment. Impacts, however, would be avoided through the Project's SPCC Plan. Spills of fuel and other hazardous materials would be cleaned-up immediately in accordance with the plan and hazardous wastes associated with spills and leaks would be disposed of in accordance with applicable laws and regulations.

During construction, groundwater withdrawals could have a short-term and minor impact to groundwater. The primary need for water would be during hydrostatic testing, which would be obtained from three surface waters (see Surface Water discussion below). Additional water sources for smaller water volume needs if deemed necessary could consist of private sources located in proximity to the pipeline route. Agreements would be executed with the respective landowners prior to extraction of water for Project use.

Surface Water

Overall impacts to surface waters are anticipated to be minor with the implementation of the mitigation measures highlighted at the beginning of the section. Construction of the pipeline within the MAR would result in minor temporary impacts such as short term increases in turbidity and sedimentation (locally and downstream) and temporary reduction in stream flow during waterbody crossings. In general, the magnitude of impact would depend on the type, location, physical dimensions, stream bottom composition, streamflow (seasonal condition of the waterbody) and water quality of the waterbody at the time of construction. Potential impacts could occur from activities such as clearing and grading adjacent to waterbodies and wetlands, and during trenching, trench dewatering, backfilling and hydrostatic testing. These activities could result in temporary impacts such as short-term increases in turbidity and sedimentation (locally and downstream) and temporary reduction in stream flow during waterbody crossings. In general, the magnitude of impact would depend on the type, location, physical dimensions, stream bottom composition, streamflow (seasonal condition of the waterbody) and water quality of the waterbody at the time of construction. Table 3.6-3 identifies the type of construction method for each perennial stream within the MAR; 4 out of the 31 crossings would use HDD, including three major rivers (Elkhorn, Platte and Big Blue) as well as perennial Union Creek. Other perennial waterbody crossings would use variations of pipeline installations to protect habitat and aquatic species that depend on the flowing water. Yet still others would require site specific design and permitting based on protected conditions or areas determined to be of high consequence. The crossing method for each waterbody would also depend on permit conditions from the USACE, but ultimately be determined based on site-specific conditions at the time of crossing.

Generally, open-cut crossing impacts would include alteration of the streambed and bank structure, habitat reduction or alteration, increased sediment, riparian vegetation loss and introduction of non-native vegetation. Implementation of various best management practices and mitigation measures outlined in the CMRP and described at the beginning of this section would help reduce adverse impacts resulting from open cut wet crossings. All contractors would be required to follow the identified procedures to limit erosion and other land disturbances. The CMRP describes the use of buffer strips, drainage diversion structures, sediment barrier installations and clearing limits, as well as procedures for waterbody restoration at crossings. Measures to minimize bed and bank impact include temporary vehicle bridges and minimizing in-stream use of equipment. Other potential bank protection measures could include installing rock, wood or other materials keyed into the bank to provide protection from

further erosion or re-grading the banks to reduce bank slope. Following completion of waterbody crossings, waterbody banks would be restored to preconstruction contours or a stable slope. Seeding (with native vegetation and mulch), erosion control fabric and other erosion control measures would be installed, as specified in the CMRP and permit documents. Prior to commencing any stream-crossing construction activities, at a minimum, permits would be required under Section 404 of the Clean Water Act through USACE, and Section 401 Water Quality Certification, per state regulations. Additional erosion control measures would be installed, if necessary, in accordance with permit requirements.

Water withdrawal from surface water resources by the proposed Project would be used for construction processes and would consist of hydrostatic testing, HDD make-up water (drilling mud) and dust control. Three primary sources would be used for hydrostatic testing: the Elkhorn River (37 million gallons), the Platte River (47 million gallons) and the Big Blue River (40 million gallons). As a basis for comparison of water withdrawals, the USGS estimated the annual surface water withdrawals in Nebraska as 3,320 million gallons per day (USGS 2010). Total withdrawal requirements during hydrostatic testing would represent 1 percent of daily surface water withdrawal in Nebraska. Additional water sources for smaller water volume needs if deemed necessary could consist of private sources located in proximity to the pipeline route. Agreements would be executed with the respective landowners prior to extraction of water for Project use. The proposed Project may temporarily impact surface water volume in locations designated for proposed Project water withdrawals. During withdrawals, minimal disruption of the normal access to and use of surface water resources would be anticipated in the proposed Project ROW and adjacent areas. The water resources affected by the proposed Project construction, as well as landowner and recreational access, would be restored in accordance with the CMRP following construction.

Hydrostatic testing, construction stormwater and dewatering activities during construction would require National Pollutant Discharge Elimination System permits that would include measures to protect Nebraska's surface water quality. Planned withdrawal rates for each water resource would be evaluated and approved by these agencies prior to testing. No resource would be utilized for hydrostatic testing without receipt of applicable permits. As stated in Keystone's CMRP, Keystone would be responsible for obtaining required water analyses prior to any filling and discharging operations associated with hydrostatic testing. Keystone has developed an HDD contingency plan defining specific responsibilities, procedures and actions necessary to manage the detection of and response to drilling fluid releases or frac-outs during pipeline installations using HDD techniques. The HDD contractor would be responsible for execution of the HDD operation, including actions for detecting and controlling the inadvertent release of drilling fluid.

The NDEQ has indicated Keystone would in many cases need to secure a surface water right from Nebraska Department of Natural Resources (NDNR) to withdraw water for construction from sources along the pipeline alignment. These permits or water rights for specific use locations, purposes and/or quantity and may include seasonal stipulations. In instances where a river identified by NDNR as being either fully appropriated or over-appropriated would be affected, Keystone would need to comply with any plan or program implemented to protect existing water uses in the affected basins. In an effort to avoid or minimize impacts to sensitive waterbodies, Keystone has conducted consultations with the cooperating agencies during the proposed Project's planning phase. Additional consultation may be required in accordance with additional regulatory and permitting review during the final design and permitting phases.

Wetlands

Overall impacts to wetlands are anticipated to be minor with the implementation of the mitigation measures highlighted at the beginning of this section. Section 404 of the Clean Water Act requires that wetland impacts are avoided, minimized and mitigated to the greatest practicable extent possible. In

general, co-location of the MAR within existing utility corridors and use of HDD along riparian crossings containing larger wetland complexes have helped minimize the total wetland acreage that would be affected the project.

Construction of the pipeline is expected to impact approximately 0.6 acre of forested and 24.4 acres of emergent wetlands. No wetlands were observed in the construction footprints of the pump stations and ancillary facilities during the Spring 2018 field survey.

Construction across wetlands would be similar to typical conventional upland cross-country construction, with modifications to reduce the potential for effects to wetland hydrology and soil structure. The wetland crossing methods used would depend largely on the stability of the soils at the crossing location at the time of construction. Potential impacts to wetlands during the construction phase of the proposed Project include cutting, clearing or removing wetland vegetation within the construction work area. These activities would result in impacts to wetland flow patterns, composition, function and value; the conversion of one wetland type to another (e.g., conversion of forested wetland to herbaceous wetland); and the permanent loss of wetlands due to fill for permanent project-related facilities (e.g., access roads). HDD crossings would avoid impacts to approximately 0.4 acre of forested and 0.2 acre of emergent wetlands.

Following construction, 0.6 acre of forested wetland would be converted to and permanently maintained in an herbaceous scrub-shrub state on the permanent ROW. The herbaceous wetlands temporarily affected by construction would be restored and allowed to revert to their previous condition. Generally, the wetland vegetation community eventually would transition back into a community functionally similar to that of the wetland prior to construction, if pre-construction conditions such as elevation, grade and soil structure are successfully restored. In emergent wetlands, the herbaceous vegetation would regenerate quickly (typically within 3 to 5 years). In forested wetlands, the effects of construction would be extended due to the longer period needed to regenerate a mature forest or shrub community.

The USACE's Regulatory Program regulates discharges of dredged or fill material into waters of the United States and structures or work in navigable waters of the United States, under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899 (33 CFR Parts 320-332). A proposed project's impacts to these regulated areas determines what permit type is required. A general permit is issued for structures, work or discharges that would result in only minimal adverse effects. General permits are issued on a nationwide, regional or state basis for particular categories of activities. There are three types of general permits: Nationwide Permits, Regional General Permits, and Programmatic General Permits. General permits are usually valid for 5 years and may be re-authorized by USACE.

The proposed MAR activities may require permits from the USACE. Non-reporting general permit authorization for some minor activities would not require applying or reporting to USACE. Where required by the terms of Nationwide Permit Number 12, *Utility Line Activities*, Keystone must notify the USACE District Engineer by submitting a pre- construction notification to USACE. Nationwide Permit 12 was reissued in the *Federal Register* on January 6, 2017 (82 FR 1860) and contains general permit conditions that the applicant must adhere to for the minimization or avoidance of impacts, including impacts to navigation, aquatic life, migratory bird breeding areas, public water supply intakes, wild and scenic rivers, tribal rights, federally protected species, and protected cultural sites.

In addition, Keystone has prepared a CMRP that summarizes the proposed wetland avoidance, minimization and mitigation measures. These measures include staging, maintaining and refueling equipment outside of wetlands to the greatest extent possible; employing special construction techniques for wetlands depending on how wet conditions are; and reclaiming impacted wetlands to near preconstruction conditions following pipeline installation.

Floodplains

Overall impacts to floodplains are anticipated to be negligible. Construction work within the floodplain could result in construction equipment, supplies or fill materials placed within the floodplain. During construction, staging areas and storage of equipment would be outside of floodplain areas, and all facilities would be cited outside of flood-prone locations. Following construction, contours would be restored to as close to previously existing contours as practical, preserving local flood elevations.

Wild and Scenic Rivers

The proposed MAR would not cross any wild and scenic rivers, so there would be no adverse impacts to this resource.

4.6.3.2 Operations and Maintenance

Groundwater

Negligible impacts to groundwater are anticipated from normal operation and maintenance activities. The primary impact to groundwater resources would result from incidental spills of fuels and other hazardous materials from construction equipment used for maintenance. Impacts, however, would be avoided through the Project's SPCC Plan. Spills of fuel and other hazardous materials would be cleaned-up immediately in accordance with the plan, and hazardous wastes associated with spills and leaks would be disposed of in accordance with applicable laws and regulations.

Surface Water

Potential impacts to surface water resources during routine maintenance and ROW inspections are anticipated to be infrequent and minor. Types of impacts would be similar to those described for construction where maintenance activities requiring digging are located in proximity to streams. Measures to avoid or minimize maintenance and repair induced surface water impacts would include aerial and ground surveillance, maintenance of non-forested vegetation and restoration and revegetation measures conducted in accordance with the CMRP. The permit requirements of federal, state and local regulatory agencies would further reduce potential impacts to surface water resources from construction, maintenance and operational activities.

Wetlands

Potential impacts to wetland resources during routine maintenance and ROW inspections are anticipated to be infrequent and minor. Types of impacts from pipeline maintenance would be similar to those described for construction where maintenance activities requiring digging are located in proximity to wetland areas. Keystone would implement impact minimization and restoration efforts described in the CMRP for maintenance activities involving wetlands or located in the vicinity of wetlands.

During ROW maintenance, there would be little impacts on emergent wetland vegetation because these areas naturally consist of, and would remain as, an herbaceous community. Herbaceous wetland vegetation in the pipeline ROW generally would not be mowed or otherwise maintained, although Keystone's CMRP allows for annual maintenance of a 20- to 30-foot-wide strip centered over the pipeline. Trees would not be allowed to regenerate within the maintained ROW; therefore, the removal of approximately 0.6 acre of forested wetland habitats due to pipeline construction would be long term, and the maintained ROW would represent a permanent conversion of forested wetlands to herbaceous wetlands.

Floodplains

Routine maintenance activities would have no impact to the floodplain elevations or the floodplain functioning. During operations, the temporary placement of equipment, vehicles and materials could occur within the floodplain as part of routine maintenance and inspection activities. These disturbances would be negligible and temporary. Such activities would have no effect on floodplain contours or elevations. With revegetation and restoration, the pipeline would not obstruct flows over floodplains and have minimal impact on topography or flood elevation.

Wild and Scenic Rivers

The proposed MAR would not cross any wild and scenic rivers, so there would be no adverse impacts to this resource.

4.7 BIOLOGICAL RESOURCES

4.7.1 Environmental Consequences

To evaluate the impacts on biological resources, the Department reviewed the Proposed Action and No Action Alternative to determine whether any activities have the potential to cause the following:

- Displacement of terrestrial or aquatic communities or loss of habitat
- Diminished value of habitat for wildlife, plants or aquatic species
- Interference with the movement of native resident or migratory wildlife species
- Conflicts with applicable management plans for terrestrial, avian and aquatic species and their habitat
- Introduction of noxious or invasive plant species
- Decline in native fish populations
- Impacts on or displacement of endangered, threatened or other protected status species
- Encroachment or impacts on designated critical habitat for a federally listed species

A significant adverse impact to biological resources would occur if the action would result in:

- Long-term loss, degradation or loss of diversity within unique or high-quality (e.g., riparian) plant communities
- Unpermitted “take” of federally listed species
- Local extirpation of rare or sensitive species not currently listed under the ESA
- Unacceptable loss of critical habitat, as determined by the USFWS
- Violation of the MBTA or Bald and Golden Eagle Protection Act

The following analysis estimates and assesses the impact to biological resources during construction, normal operations and maintenance activities. Chapter 5, Environmental Consequences from Accidental Releases, discusses potential impacts to biological resources in the event of an accidental release.

4.7.2 No Action Alternative

Under the No Action Alternative, construction of the MAR would not occur. No impacts to biological resources would occur.

4.7.3 Proposed Action Alternative

This SEIS quantifies potential direct and indirect impacts to biological resources using an assessment of data sources presented in Section 3.7. Impacts to biological resources from construction and operation of the MAR would result from cutting, clearing and removal of the existing vegetation within the construction work area, potential invasion by noxious weeds and maintenance activities associated with the proposed MAR and ancillary facilities (e.g., access roads and pump stations). Potential construction- and operations-related impacts would include:

Vegetation

- Temporary and permanent modification of vegetation community composition and structure from clearing and operational maintenance;
- Increased risk of soil erosion due to lack of vegetative cover;
- Expansion of invasive and noxious weed populations along the proposed pipeline route as a result of construction and operational vegetation maintenance;
- Soil and sod disturbance (mixing of topsoil with subsoil with altered biological activities and chemical conditions that could affect re-establishment and natural recruitment of native vegetation after restoration);
- Compaction and rutting of soils from movement of heavy machinery and transport of pipe sections, altering natural hydrologic patterns and inhibiting water infiltration, which could affect seed germination;
- Alteration in vegetation productivity and the timing of lifecycle stages due to increased soil temperatures associated with heat emanating from the pipeline; and
- Loss of vegetation due to exposure from a crude oil release incident (see Chapter 5).

Wildlife and Fisheries

- Habitat loss, alteration and fragmentation;
- Direct mortality during construction and operation (e.g., vehicle collisions, power line/power pole collisions);
- Indirect mortality because of stress or avoidance of feeding due to exposure to construction and operations noise (e.g., low-level helicopter or airplane monitoring overflights), and from increased human activity;
- Reduced breeding success from exposure to construction and operations noise and from increased human activity;
- Reduced survival or reproduction due to decreased availability of edible plants, reduced cover and increased exotics and invasives;
- Increased predation (e.g., nest parasitism, creation of predator travel corridors and poaching) from fragmentation;

- Increase of temporary elevated suspended sediment levels and excessive suspended sediment which can interfere with respiration in fish and invertebrates and cause mortality or reduced productivity in rearing and spawning;
- Short-term impairment of foraging efficiency in streams impaired with suspended sediments for species that are visual predators;
- Increased mortality and reduced recruitment to the aquatic species populations from sediment cover on spawning gravels, preventing water exchange and oxygen to developing eggs or young fish;
- Loss of riparian vegetation which reduces shading and can cause an increase in water temperature and a reduction in dissolved oxygen, nutrient input, food input and hiding cover;
- Alteration of benthic communities and change in food availability from loss of riparian vegetation and disturbance to the bank and substrate; and
- Local increase in water temperature due to increased turbidity and a temporary reduction in water quality and short-term impacts to fish and macroinvertebrates.

Keystone would implement measures within the 2014 Keystone XL Final SEIS CMRP to reduce impacts on vegetation within the construction and permanent ROW and to improve the probability of successful revegetation of disturbed areas (U.S. Department of State 2014). Applicable measures considered within this analysis to reduce general impacts to biological resources in the MAR in Nebraska include:

- Limit construction traffic to construction of the ROW, existing roads, newly constructed roads and approved private roads; and
- Clearly stake construction ROW boundaries, including pre-approved TWAs, to prevent disturbance to unauthorized areas.

Measures to restore disturbed areas to pre-construction use and vegetation cover include:

- Implement reclamation and revegetation measures as described in the proposed CMRP, Con/Rec units, and Biological Opinion;
- Use certified seed mixes to limit the introduction of noxious weeds within 12 months of seed germination testing, and adjust seeding rates based on test results per the Con/Rec unit; and
- Seed at a rate appropriate for the region and for the stability of the reclaimed surface based on pure live seed.

Measures to control the introduction and spread of noxious weeds following construction and restoration procedures include:

- Develop and adhere to a weed control plan for Nebraska in consultation with County Weed Boards;
- Use pre-construction treatment such as mowing prior to seed development or herbicide application (in consultation with county or state regulatory agencies and landowners) for areas of noxious weed infestations prior to clearing grading, trenching or other soil disturbing work to weed infestation locations identified on construction drawings;
- Strip and store topsoil contaminated with weed populations separately from clean topsoil and subsoil;

- Use mulch and straw or hay bales that are free of noxious weeds for temporary erosion and sediment control;
- Clean all construction equipment, including timber mats, with air or high-pressure washing equipment prior to moving equipment to the next job site; clean the tracks, tires and blades of equipment by hand or compressed air to remove excess soil prior to movement of equipment out of weed infested areas; or use cleaning stations to remove vegetative materials with high pressure washing equipment; and
- Implement weed control measures as required by any applicable plan and in conjunction with the landowner.

Measures to reduce potential construction- and operations-related effects to wildlife and habitat include:

- Reseed disturbed native range with native seed mixes after topsoil replacement consistent with applicable Con/Rec and landowner requirements;
- Develop and implement a conservation plan, in consultation with the USFWS, consistent with the MBTA and the Bald and Golden Eagle Protection Act and consistent with provisions of Executive Order 13186 by providing avoidance and mitigation measures for migratory birds and bald and golden eagles and their habitats where the pipeline would be constructed, operated and maintained;
- Develop construction timing restrictions and buffer zones through consultation with regulatory agencies; and
- If construction would occur during the raptor nesting season during January to August, complete pre-construction surveys to locate active nest sites to allow for appropriate construction scheduling and buffer restrictions.

Measures to minimize the amount of sediment from stream bank and upland erosion entering waterbodies and protect aquatic habitat include:

- Installation of sediment barriers immediately after initial disturbance of waterbodies or adjacent uplands;
- Maintaining the ROW width and limiting the extent of riparian vegetation loss;
- Minimization of grading and grubbing along stream banks;
- Minimizing in-stream use of equipment, locating workspaces at least 10 feet from waterbodies to the extent practicable; and
- Using dry-ditch techniques at crossings where the timing of construction does not adequately protect environmentally sensitive waterbodies, as determined by the appropriate regulatory authority.

4.7.3.1 Construction

Vegetation Communities

Construction of the pipeline within the MAR would result in minor to moderate impacts on vegetation. Table 4.7-1 provides an estimate of the types of vegetation disturbance using land cover types along the MAR. Keystone would restore vegetation communities within the 60-foot temporary ROW and temporary construction and staging areas following construction. Keystone would perform maintenance to vegetation cover and periodic pipeline maintenance within the permanent ROW (discussed in Section 4.7.3.2). Permanent facility construction (e.g., pump station and permanent access roads) would constitute a permanent impact (loss) of the resource (discussed in Section 4.7.3.2).

Table 4.7-1. Land Cover Types Crossed by the MAR

Land Cover Type	Temporary ROW[a] and Construction Areas	Permanent Pipeline ROW [a]	Permanent Facilities
Cultivated Cropland	2,319.1	798.5	33.8
Pasture/Hay	10.1	3.3	0
Grassland Herbaceous	335.1	124.6	0.8
Forest	34.5	11.6	0
Emergent Herbaceous Wetlands[b]	7.7	0.26	0
Woody Wetlands	5.9	2.3	0
Open Water	3.7	0.3	0
Developed	115.7	38.1	1.8

Source: USGS 2011

a. The temporary and permanent ROW values do not include acreages for vegetation communities that would be avoided through use of HDD. This includes approximately 5 acres of cultivated cropland, 0.1-acre grassland, 1.3 acres forest, 2 acres woody wetlands and 3.4 acres of open water.

b. Acreage within this table based on USGS 2011 data. See Section 3.6, Water Resources, for field delineated wetland values.

HDD = horizontal directional drilling; MAR = Mainline Alternative Route; ROW = right-of-way

Table 4.7-1 indicates the greatest impact to vegetation communities would occur to cultivated cropland, followed by grassland (of which 65.3 acres consist of native grasslands with the remainder dominated primarily by smooth brome). Impacts to these communities would be short- to long-term, with vegetation typically re-establishing within 1 to 3 years in non-native grasslands, and 3 to 5 years in native grasslands. Grasslands may require as long as 5 to 8 years to establish cover similar to adjacent undisturbed lands, especially when drought conditions or livestock grazing interfere with re-establishment. Approximately 34.6 acres, predominantly consisting of cultivated cropland, would be permanently lost to accommodate permanent pipeline facilities (e.g., pump stations and permanent access roads).

As shown in Table 4.7-1, construction would require clearing of approximately 34.5 acres of forest and 5.9 acres of woody wetlands. (As discussed in Section 4.6, approximately 0.6 acre of forested wetland would be disturbed based on field delineation). Clearing of deciduous forest and woody wetland vegetation within the temporary ROW would result in moderate long-term impacts on these communities given the length of time needed for the community to mature to pre-construction conditions. In addition, approximately 13.2 acres of these communities within the permanent ROW would be permanently converted from forest to herbaceous cover. In these areas, trees would be removed and would not be allowed to re-establish due to periodic mowing and brush clearing during pipeline operation. Routine maintenance vegetation clearing would occur no more than every 1 to 3 years.

Following construction, re-establishment of native vegetation communities could be delayed or prevented by infestations of noxious weeds and invasive plants. Vegetation removal and soil disturbance during construction could create optimal conditions for the establishment of many weeds. Construction equipment traveling from weed-infested areas into weed-free areas could disperse noxious weed seeds or propagules (such as buds or spores), resulting in the establishment of noxious weeds in previously weed-free areas. Common noxious weeds in Nebraska include Canada thistle, leafy spurge, musk thistle, plumeless thistle, purple loosestrife, spotted and diffuse knapweeds, saltcedar, phragmites, sericea lespedeza, Chinese bush-clover, Japanese knotweed, bohemian knotweed and giant knotweed (Nebraska Department of Agriculture 2018). Keystone would implement measures discussed at the beginning of this section to aid in the restoration of pre-construction communities following construction to include

preservation of soil integrity, management for invasive species and reseeding and site restoration to community compositions prior to construction. Impacts of invasive species are anticipated to be minor provided measures to identify and control these species are implemented.

Biologically Unique Landscapes and Vegetation Communities of Conservation Concern

Construction of the pipeline would result in minor to moderate impacts to biologically unique landscapes and vegetation communities of concern. Table 4.7-2 provides an estimate of potential disturbance to biologically unique landscapes and vegetation communities of conservation concern from construction, operations and normal maintenance of the pipeline along the MAR. Overall impacts to these communities have been reduced as the MAR maximizes use of existing ROW and predominately crosses cultivated cropland.

Table 4.7-2. Biologically Unique Landscapes and Vegetation Communities of Concern Crossed by the MAR

Feature Name	Temporary ROW and Construction Areas	Permanent Pipeline ROW	Permanent Facilities
Rainwater Basin Wetland Management District	296.9	80.7	0
Deciduous Forests and Woods	21.4	7.0	0
Native Grasslands	47.0	18.3	0
Riparian Woodlands	19.9	14.4	0

Source: NNHP 2011; Westech 2018

The MAR crosses approximately 296.9 acres in the rainwater basin management district. As discussed in Section 3.7, this landscape is of management concern due to the unique habitat it provides for migrating bird species and historical losses due to cultivation. A review of wetland crossings by the MAR within this district indicates that wetland areas have been highly influenced by agricultural production and provide minimal habitat to migrating bird species. None of the wetlands crossed by the MAR within this district meet the definition of a traditional rainwater basin wetland. Section 4.6 discusses impacts to wetlands from construction and operations along with mitigation measures to restore areas following disturbance.

As shown in Table 4.7-2, construction would require clearing of approximately 41.3 acres of forest and riparian woodlands. As discussed in Section 3.7, native grasslands were once prevalent in Nebraska; however, suppression of fires, agriculture, urbanization and mineral exploration have considerably reduced this community's occurrence. Clearing of forested vegetation within the temporary ROW would result in moderate long-term impacts on these communities given the length of time needed for the community to mature to pre-construction conditions. In addition, approximately 21.4 acres of these communities within the permanent ROW would be permanently converted from forest to herbaceous cover. In these areas, trees would be removed and would not be allowed to re-establish due to periodic mowing and brush clearing during pipeline operation. Routine maintenance vegetation clearing would occur no more than every 1 to 3 years. As stated in Table 4.7-1, Keystone has reduced the amount of riparian forest clearing through use of HDD; avoiding impacts to 3.3 acres of riparian forest located along the Elkhorn River, Union Creek, Platte River and Big Blue River. Keystone would also implement measures identified in the CMRP and Con/Rec units as described at the beginning of this section to minimize impacts to forested uplands and wetlands. Keystone has developed native seed mixes with input from the local Natural Resources Conservation Service offices and collaboration with regional experts for each Con/Rec unit.

The MAR would cross an estimated 47 acres of native grassland. As discussed in Section 3.7, these communities are of management concern due to the unique habitat provided and due to losses from agricultural uses, levee construction and urban development. Although native grasslands would be reseeded with native seed in the proposed ROW, impacts would be minor to moderate as construction effects on previously untilled native prairies could be long term. Typically, shortgrass prairie and mixed-grass prairie areas may take 5 to 8 or more years to re-establish if there are poor soil conditions and low moisture levels. In addition, destruction of the prairie sod during trenching may require more than 100 years for complete recovery. Construction through native grasslands would expose the fragile soils to erosion by wind and water; re-establishing cover of native grasses is expected to be successful based on the fertile soils that are present and adequate rainfall as evidenced by native grass establishment on the original Keystone pipeline. Native vegetation is expected to establish within 3 to 5 years. Also, as discussed in the 2014 Keystone XL Final SEIS, heat dissipated from the pipeline could potentially lead to early germination and increased productivity of native prairie grasses, but may also lead to decreased soil water content, which could be detrimental to native prairie plants (U.S. Department of State 2014). Invasion of non-native plants as well as altered land management (e.g., suppression of wildfires) also may prevent recovery of prairie grasslands; wildfires help to maintain prairie sod.

Keystone would implement the following measures identified in the CMRP and Con/Rec units implemented to minimize impacts specifically to native grasslands (U.S. Department of State 2014):

- Keystone has developed noxious-weed-free native seed mixes with input from the local Natural Resources Conservation Service offices and through collaboration with regional experts and outlined in their Con/Rec units.
- Reseed native grasslands with a native seed mix per the Con/Rec units.
- Mulch and crimp into the soil noxious-weed-free straw or native prairie hay to prevent wind erosion.
- Monitor the ROW to determine the success of revegetation after the first growing season, and for areas in which vegetation has not been successfully re-established, reseed the area.
- Strive to reduce width of disturbance to the native prairie landscape by adopting trench-line or blade-width stripping procedures where practicable.

Wildlife and Fisheries

Construction of the pipeline would result in minor impacts to wildlife and fisheries. Potential impacts to habitat and species can be inferred by the types of vegetation communities potentially affected from construction of the MAR in Table 4.7-1. Construction of the MAR would result in disturbance of about 2,712 acres of various habitat types, a majority of which, approximately 2,319.1 acres (including the approximately 34.6 acres permanently lost to accommodate permanent pipeline facilities) consists of cultivated cropland which provides marginal habitat for wildlife.

Wildlife

The 2014 Keystone XL Final SEIS details the potential effects of pipeline construction, operations and routine maintenance on wildlife. Pipeline construction would remove vegetation, including native grasses, shrubs and trees, creating an unvegetated strip over the proposed pipeline trench and the adjacent construction areas. Direct and indirect as well as temporary (short-term) and permanent (long-term) impacts on wildlife resources would occur due to vegetation removal or conversion, obstructions to movement patterns or the removal of native habitats that may be used for foraging, nesting, roosting or other wildlife uses. Construction activities and noise could cause indirect mortality of species from stress

or avoidance of feeding during construction due to exposure from increased human activity. Increased noise levels from construction and human activity during the breeding season could also reduce breeding success. Short-term impacts on wildlife would occur during construction and may extend beyond construction activities. Temporarily disturbed habitats may not be returned to former levels of functionality for up to 3 years following restoration efforts, but long-term impacts on wildlife could extend through the life of a project and possibly longer for those habitats (e.g., forested, wetland and native grassland) that require many decades to be restored (U.S. Department of State 2014). These potential effects would be similar to those along the MAR. Overall impacts on wildlife due to the predominately cultivated landscape are anticipated to be minor.

Construction of the pipeline would require clearing of approximately 34.5 acres of forest and 5.9 acres of woody wetlands, of which approximately 13.2 acres would be permanently converted. Removal of forested areas would constitute a long-term impact for this type of habitat given the length of time needed for the community to mature to pre-construction conditions. The proposed pipeline ROW would be maintained free of trees, resulting in long-term alteration of wildlife habitat structure and value. Subsequent revegetation may not provide habitat features comparable to pre-MAR habitats, and restoration of wetlands in semi-arid regions is not always successful. Removal of vegetation also increases the potential for the establishment and spread of noxious weeds and other invasive plants that have little use or value for wildlife and that displace native plants, resulting in degraded wildlife habitat (U.S. Department of State 2014).

Pipeline construction within the MAR would also create habitat fragmentation (splitting of a large continuous expanse of habitat into numerous smaller patches of habitat). The 2014 Keystone XL Final SEIS also details the potential effects of habitat fragmentation that would result from the clearing of native vegetation to accommodate the pipeline. A review of aerial photography along the MAR for forest and shrubland communities greater than 250 feet in width indicates the following areas susceptible to fragmentation:

- The crossing of the Elkhorn River near MP 716 contains approximately 300 feet of riparian woodland on either side of the crossing. Impacts to the vegetation along this area, however, would be avoided as Keystone would use the HDD method to install the pipeline underneath the river and bordering riparian areas.
- The crossing of an approximate 21-acre forested/shrubland community right before MP 739. The MAR would fragment the eastern third of this community. The area, however, is not contiguous with other forested/shrubland communities and represents a fragment of forest in agriculturally-dominated landscape. Keystone would use the open cut crossing method here.
- The crossing of Union Creek near MP 747 contains approximately 250 feet of riparian woodland on either side of the crossing. Impacts to the vegetation along this area, however, would be avoided as Keystone would use the HDD method to install the pipeline underneath the river and bordering riparian areas.
- The crossing of the Platte River near MP 781 contains approximately 1,750 feet of riparian woodland on the south side of the river. Impacts to the vegetation along this area, however, would be avoided as Keystone would use the HDD method to install the pipeline underneath the river and bordering riparian areas.
- The crossing of the Big Blue River near MP 808 contains approximately 400 feet of riparian woodland, primarily concentrated on the south side of the river. Impacts to the vegetation along this area, however, would be avoided as Keystone would use the HDD method to install the pipeline underneath the river and bordering riparian areas.

Fragmentation of native grasslands would generally be considered short term until sufficient herbaceous cover is re-established to allow small mammals, amphibians and reptiles to cross without exposure. Overall effects of habitat fragmentation from the MAR have been minimized through the use of HDD in forested riparian areas and due to the collocation of the MAR with the existing Keystone Mainline.

Total habitat loss due to pipeline construction would likely be small in the context of available habitat, both because of the linear nature of the proposed Project and because restoration would follow construction. During restoration, the area would be reseeded as directed by the landowner or land management agency, such that in some instances areas of native vegetation could be converted to non-native species. Such conversion could reduce suitable or preferred habitat for wildlife.

Fisheries

Direct impacts to aquatic habitat and fisheries from construction would occur at stream crossings. The pipeline would cross waterbodies along the MAR using one of the following methods: non-flowing open cut, flowing open-cut, dry flume open-cut, dry dam-and-pump or HDD. Keystone proposes to use HDD techniques at 4 of the perennial waterbody crossings and various open-cut methods at the remaining 27 perennial stream crossings (see Table 3.7-2). Potential direct impacts to fisheries and aquatic resources from open cut construction trenching activities would include alteration of the streambed and bank structure, reduction or alteration of habitat and increased sediment. Indirect impacts would include increased water temperature from loss of riparian vegetation and increased sedimentation. Construction activities within the streambed could also result in mortality, behavioral modifications, delays in movement and introduction of non-native aquatic species (either plant or animal). Implementation of measures discussed at the beginning of this section and within the CMRP would result in minor short term and temporary impacts to fisheries resources (U.S. Department of State 2014).

Impacts to aquatic habitat could occur if there is an unintended release of drilling fluids (i.e., a frac out) during HDD operations. A frac out could release bentonitic drilling mud into the aquatic environment which would readily disperse in flowing water or eventually settle in standing water. Although bentonite is non-toxic, suspended bentonite may produce short-term impacts to the respiration of fish and aquatic invertebrates due to fouled gills. Longer-term effects could result if larval fish are covered and suffocate due to fouled gills and/or lack of oxygen. If the frac out occurred during a spawning period, egg masses of fish could be covered, thus inhibiting the flow of dissolved oxygen to the egg masses. Benthic invertebrates and the larval stages of pelagic organisms could also be covered and suffocate (U.S. Department of State 2014). To minimize the potential for these impacts to occur, a contingency plan would be implemented to address a HDD frac out. This plan would include preventive and response measures to control the inadvertent release of drilling fluids. The contingency plan would also include instructions for downstream monitoring for any signs of drilling fluid during drilling operations, and would describe the response plan and impact reduction measures in the event a release of drilling fluids occurred. Drill cuttings and drilling mud would be disposed of according to applicable regulations; disposal/management options may include spreading over the construction ROW in an upland location with landowner permission or hauling to an approved offsite, licensed landfill or other approved sites.

Water withdrawal and discharge for hydrostatic testing, HDD operations (drilling mud) and dust control could also potentially impact fisheries and aquatic resources through reduced streamflow, which may result in reduced habitat quantity and quality including increased water temperature; entrainment of fish, eggs and invertebrates; transfer of aquatic invasive species; and increased sediment. The potential for increased water temperature may result from reduced streamflow, as flow rates may have a direct effect on water temperatures. As flow decreases, the amount of energy required to change water temperature also decreases. In addition, discharged and augmented flows may further entrain sediment, leading to increased turbidity, which may result in increased temperature due to greater solar radiation absorption by

the darker sediments in the water column. Measures to minimize or avoid these impacts include controlling water withdrawal rates, using alternative water sources (wells or municipal sources), use of fine mesh screens at intakes, discharge in upland locations and energy dissipating structures (U.S. Department of State 2014).

Migratory Birds

Impacts to migratory birds would be minor. Keystone has committed to developing and implementing a conservation plan, in consultation with the USFWS. This conservation plan discussed in the 2014 Keystone XL Final SEIS would provide avoidance and mitigation measures for migratory birds and bald and golden eagles and their habitats. Keystone would implement this plan for the MAR where construction, operation and maintenance could result in the destruction or disturbance of a migratory bird nest.

Threatened and Endangered Species

Overall impacts to protected species and their habitats from construction would be minor. Table 4.7-3 summarizes potential impacts to each species and species-specific conservation measures contained within the 2014 Keystone Final SEIS that Keystone would implement to prevent adverse effects. The following are general conservation measures which Keystone would implement to protect sensitive habitats during construction:

- All equipment maintenance and repairs including refueling, lubrication and washing would be performed in upland locations at least 100 feet from all water bodies and wetlands.
- Spills of fuel and other hazardous materials would be cleaned-up immediately in accordance with the Project's SPCC Plan and hazardous wastes associated with spills and leaks would be disposed of in accordance with applicable laws and regulations.
- Each construction and cleanup crew would have on site, sufficient tools and materials to stop leaks including supplies of absorbent and barrier materials that would allow for rapid containment and recovery of spilled materials.
- Keystone would mark and maintain a 100-foot area from river crossings, free from all hazardous materials, fuel storage and vehicle fuel transfers. These buffers would be maintained during construction except when fueling and refueling the water pump near the river edge that is required for the HDD crossing and hydrostatic test water withdrawal. Water pump fueling would be completed by trained personnel, secondary containment would be used and a spill kit would be onsite.
- Keystone would implement the best management practices described within the CMRP to prevent and minimize sediment runoff entering wetlands and streams.
- Keystone would use low-ground-pressure equipment and temporary matting or other measures to cross wetlands and sub-irrigated meadows where necessary to avoid or minimize impacts and removing the equipment upon completion of construction.
- Keystone would require all personnel including contractors to complete the Worker Educational Awareness Program regarding federally protected species.

Table 4.7-3. Potential Construction Impacts and Species Conservation Measures

Species	Potential Impacts	Conservation Measures
Interior least tern (*Sterna antillarum)*	Direct impacts to individuals or habitat from construction clearing and pipeline installation activities. Temporary indirect impacts to foraging behavior or migration patterns from noise during construction. Indirect impacts to nesting from human presence at work site locations if nesting interior least terns are located within 0.25 mile of the proposed construction activities. Exposure to small fuel spills and leaks from construction machinery. Disturbance from a frac-out of pressurized fluids and drilling lubricants used in the HDD process. Fluids and lubricants could escape the active HDD bore, migrate through the soils and come to the surface at or near the crossing construction site. Indirect impacts to habitat from temporary water reductions during hydrostatic testing in the lower Platte River Basin.	• Direct impacts to habitat and individuals would be avoided through crossing the Platte River (preferred range of species) using the HDD method with a pipeline burial depth of 25 feet or greater below the river bed. • Pre-construction surveys would be conducted within 0.25 mile of suitable breeding habitat at the Platte River during the nesting season (from May 1 through September 1) to ensure that there are no nesting terns. Daily surveys for nesting terns would be conducted during the nesting season when construction activities occur within 0.25 mile of potential nesting habitat. If interior least tern nests are found at the crossings, Keystone would: (1) adhere to a 0.25-mile buffer of no pipeline construction activity and (2) to monitor nests if any are within 0.25 mile of the construction footprint until young have fledged. • Keystone would make minor adjustments to the pipeline corridor, if practicable, to avoid impacts to nesting interior least terns in coordination with USFWS. This may involve shifting the pipeline corridor away from nests to avoid disturbances to interior least tern nests or other modifications depending on the circumstances. • Down shielding of lights would be used should HDD work occur at night if the HDD site lacks vegetative screening and an active interior tern nest is located within 0.25 mile from the HDD site. • The NPPD agrees to complete nest surveys for interior least tern within an area 0.25 mile upstream and downstream of the proposed river crossing location if pipeline construction is expected to take place during the nesting period. Construction would halt if active nests are identified within 0.25 mile of the Platte River crossing area until such time that chicks and adults leave the nest area. The NPPD would install spiral BFDs on the shield wire on the line span between the banks at the Platte River crossing and one span on each side of the crossing. • Power provider to use BFDs, according to APLIC and NPPD standards, on the overhead shield wire at river crossings in areas of known habitat. • Measures identified in a required HDD contingency plan would be implemented, including monitoring of the directional drill bore, monitoring downstream for evidence of drilling fluids, and mitigation measures to address a frac-out should one occur. • Temporary water reductions would be avoided based on Keystone's plan to withdraw the volume needed at a rate less than 10 percent of the baseline daily flow and to return water back to its source within a 30-day period.

Table 4.7-3. Potential Construction Impacts and Species Conservation Measures

Species	Potential Impacts	Conservation Measures
Piping plover (*Charadrius melodus)*	Direct impacts to individuals or habitat from construction clearing and pipeline installation activities. Temporary indirect impacts to foraging behavior or migration patterns from noise during construction. Indirect impacts to nesting from human presence at work site locations if nesting piping plovers are located within 0.25 mile of the proposed construction activities. Exposure to small fuel spills and leaks from construction machinery. Disturbance from a frac-out of pressurized fluids and drilling lubricants used in the HDD process. Fluids and lubricants could escape the active HDD bore, migrate through the soils and come to the surface at or near the crossing construction site. Indirect impacts to habitat from temporary water reductions during hydrostatic testing in the lower Platte River Basin.	• Conservation measures would be similar to those described as the least tern as these species share similar habitats. • If construction were to occur during the piping plover nesting season (April 15 to September 1), Keystone would conduct pre-construction surveys within 0.25 mile of suitable nesting habitat at the Platte River to ensure that there are no nesting pairs within 0.25 mile of the construction area. Daily surveys for nesting piping plovers would be conducted when construction activities occur within 0.25 mile of potential nesting habitat during the nesting season. If a piping plover nest(s) is found at the crossings, Keystone would: (1) adhere to 0.25-mile buffer of no construction activity and (2) continue to monitor the nest(s) if it is within 0.25 mile of the construction footprint until the young have fledged.
Rufa red knot (*Calidris canutus rufa)*	Direct impacts to individuals from construction clearing and pipeline installation. Temporary indirect impacts to foraging behavior from noise during construction. Exposure to small fuel spills and leaks from construction machinery.	As the rufa red knot is rarely observed in Nebraska, it is unlikely the Project would adversely this species. General conservation measures used for listed species would be applicable to the rufa red knot.
Whooping crane (*Grus americana)*	Direct impacts to individuals or habitat from construction clearing and pipeline installation activities. Temporary indirect impacts from migrating individuals being disturbed and displaced due to noise, lighting from nighttime operations and human presence during construction, if construction were to occur during spring or fall migrations. Exposure to small fuel spills and leaks from construction machinery. Disturbance from a frac-out of pressurized fluids and drilling lubricants used in the HDD process. Fluids and lubricants could escape the active HDD bore, migrate through the soils and come to the surface at or near the crossing construction site. Indirect impacts to habitat from temporary water reductions during hydrostatic testing in the lower Platte River Basin.	• The use of the HDD method with a pipeline burial depth of 25 feet or greater below the river bed at major river crossings (Platte and Elkhorn rivers) would prevent potential roosting and feeding habitat loss or alteration. • Revegetation (particularly within riparian zones and in wetland habitats) in accordance with the CMRP, Con/Rec units, and Nationwide Permit 12 requirements would reduce habitat impacts. • During spring and fall whooping crane migration periods, environmental monitors would complete a brief survey of any wetland or riverine habitat areas potentially used by whooping cranes in the morning before starting equipment and following the Whooping Crane Survey Protocol previously developed by the USFWS and NGPC. If whooping cranes were sighted within 0.5 mile of active construction during the morning survey or at any time of the day, the environmental monitor would immediately contact the USFWS and NGPC for further instruction and require that all human activity and equipment start-up be delayed or immediately cease. Work could proceed if whooping crane(s) leave the area. The environmental monitor would record the sighting, bird departure time and work start time on the survey form. The USFWS would notify the environmental compliance manager of whooping crane migration locations during the spring and fall migrations through information gathered from the whooping crane tracking program.

Table 4.7-3. Potential Construction Impacts and Species Conservation Measures

Species	Potential Impacts	Conservation Measures
Whooping crane (*Grus americana)* *(continued)*		• Lights would be down-shielded should HDD occur at night during the spring and fall whooping crane migrations in areas that provide suitable habitat. • Prohibiting the use of helicopters within 0.5 mile of any whooping crane(s) observed during the daily preconstruction surveys. • Temporary water reductions would be avoided based on Keystone's plan to withdraw the volume needed at a rate less than 10 percent of the baseline daily flow and to return water back to its source within a 30-day period. • The NPPD would complete a field review with USFWS and NGPC to determine if any areas are present with a higher probability of whooping crane use (i.e., wetlands or large ponded areas [stock ponds], meadows and obvious flight corridors to and from such areas to feeding habitats). Power providers to use spiral BFDs, consistent with APLIC standards, in appropriate areas as identified in the field review. • The NPPD would complete daily presence/absence whooping crane surveys according to the Project's protocol described above if construction occurs during the spring and fall migration periods in areas where such surveys are agreed to be appropriate and necessary to avoid disturbance. Should a whooping crane be sighted within 0.5 mile of a work area, all work would cease until the whooping crane leaves that immediate area. USFWS and NGPC would be contacted immediately and notified of the presence of whooping crane
Pallid sturgeon (*Scaphirhy-nchus albus)*	Construction could affect the pallid sturgeon through disturbance of individuals, modification to spawning and foraging habitats or the entrainment/impingement of younger life stages. Exposure to small fuel spills and leaks from construction machinery. Disturbance from a frac-out of pressurized fluids and drilling lubricants used in the HDD process. Fluids and lubricants could escape the active HDD bore, migrate through the soils and come to the surface at or near the crossing construction site. Indirect impacts to habitat from temporary water reductions during hydrostatic testing in the lower Platte River Basin.	• Direct impacts to habitat would be avoided through crossing the Platte River using the HDD method with a pipeline burial depth of 25 feet or greater below the river bed. • During construction of the HDD and hydrostatic testing, Keystone would ensure that the intake end of any pump for water withdrawal would be screened to prevent entrainment of larval fish or debris and the intake screens would be periodically checked for fish entrainment when pumping from the Platte River. Mesh size of the screen would be 0.125 inch and have an intake velocity of less than 0.5 foot/second to avoid larval entrainment and juvenile fish impingement and entrapment. Should a sturgeon become entrained, impinged or entrapped, all pumping operations would immediately cease, and Keystone would contact USFWS to determine if additional protection measures would be required. • Indirect impacts would be reduced by maintaining at least a 100-foot setback from the water's edge for the HDD drill pads at the HDD crossings of the Platte River.

Table 4.7-3. Potential Construction Impacts and Species Conservation Measures

Species	Potential Impacts	Conservation Measures
Pallid sturgeon (*Scaphirhy-nchus albus)* *(continued)*		• Measures identified in a required HDD contingency plan would be implemented, including monitoring of the directional drill bore, monitoring downstream for evidence of drilling fluids and mitigation measures to address a frac-out should one occur. • Avoiding broadcast applications of pesticides or herbicides near aquatic habitat. • Ensuring that upstream and downstream fish passage is maintained in any areas where stream habitat disturbance occurs. • Temporary water reductions would be avoided based on Keystone's plan to withdraw the volume needed at a rate less than 10 percent of the baseline daily flow and to return water back to its source within a 30-day period for the Platte River.
Topeka shiner (*Notropis topeka)*	Construction could affect the Topeka shiner through disturbance of individuals, modification to spawning and foraging habitats or the entrainment/impingement of younger life stages. Exposure to small fuel spills and leaks from construction machinery. Disturbance from a frac-out of pressurized fluids and drilling lubricants used in the HDD process. Fluids and lubricants could escape the active HDD bore, migrate through the soils and come to the surface at or near the crossing construction site. Indirect impacts to habitat from temporary water reductions during hydrostatic testing in the perennial streams containing suitable habitat.	• Direct impacts to habitat would be avoided through crossing Union Creek using the HDD method. • For smaller tributaries, an isolation flow dry crossing method would be employed if the species or suitable habitat is found. • Indirect impacts would be reduced by maintaining at least a 100-foot setback from the water's edge for the HDD drill pads at the HDD crossings of streams containing suitable habitat. • Measures identified in a required HDD contingency plan would be implemented, including monitoring of the directional drill bore, monitoring downstream for evidence of drilling fluids and mitigation measures to address a frac-out should one occur. • Avoiding broadcast applications of pesticides or herbicides near aquatic habitat. • Ensuring that upstream and downstream fish passage is maintained in any areas where stream habitat disturbance occurs. • For HDD crossings, water would be sourced outside of the creek to make up drilling mud and for hydrotesting.
American burying beetle (*Nicrophorus americanus)*	Direct impacts to American burying beetles could occur as a result of proposed Project construction during vegetation clearing, site grading and trench excavation, which could result in temporary habitat loss, potential alteration of suitable habitat to unsuitable habitat, temporary habitat fragmentation where the pipeline is not already located next to other utilities and potential mortality to eggs, larvae and adults through construction vehicle traffic and exposure during excavation. Artificial lighting has the potential to disrupt American burying beetle feeding behavior and increase mortality through predation.	• Surveys conducted during the spring of 2018 did not identify any populations within the MAR and determined suitable habitat has been diminished due to the prevalence of pivot irrigation and agriculture. The following measures would apply during construction: • When working in suitable American burying beetle habitat, confine vehicle traffic used in support of preconstruction activities to approved access roads. • Use construction methods involving sequential replacement of topsoil and re-establishment of natural vegetation to restore natural soil hydrology within the construction ROW and avoid long-term impacts to American burying beetle habitat.

Table 4.7-3. Potential Construction Impacts and Species Conservation Measures

Species	Potential Impacts	Conservation Measures
American burying beetle (*Nicrophorus americanus*) *(continued)*		• Prior to construction disturbance and grading for the ROW in known American burying beetle habitat, implement trapping and relocating of American burying beetles where access is available to remove adult beetles from the construction ROW in accordance with the Nebraska American Burying Beetle Trapping Protocol. • Keystone would train all workers operating in American burying beetle habitat and would include discussion of American burying beetle habitat, biology, reasons for their decline and responsibilities of all workers for the protection of the American burying beetle (including removing food wastes from the ROW each day, reporting any American burying beetle sightings to an environmental inspector and avoiding bringing dogs and cats to the ROW). • Post signs at all access points to the ROW highlighting the areas as American burying beetle habitat and reminding workers to follow special restrictions in the area. • Keystone would reseed disturbed areas in prime, good, fair and marginal American burying beetle habitats with a seed mix that corresponds to the appropriate Construction/Reclamation unit for that property.
Northern long-eared bat *(Myotis septentrionalis)*	Direct impacts could occur from the removal of roosting habitat during construction clearing.	• Keystone would use the HDD method to cross major and sensitive rivers, thereby avoiding most riparian vegetation used by the northern long-eared bat. • Tree removal near known hibernacula would not occur. Keystone and any associated utilities (i.e., power lines) would not remove any tree within a 0.25-mile buffer around known or areas with potential habitat for northern long-eared bat hibernacula (see Table 3.7-3 regarding Spring 2018 surveys) or would remove them in the winter prior to construction. Known hibernacula would be determined using the Nebraska Natural Heritage Inventory database, field surveys and/or coordination with subject matter experts knowledgeable about the species. • Maternity roosts would be protected, and tree removal near known maternity roosts would not occur during the pup season (June 1 through July 31). Keystone and any associated utilities (i.e., power lines) would protect known roosts and avoid cutting or destroying of any trees within 150-foot radius from known, occupied maternity roost trees during the pup season and only remove trees outside the pup season. Habitat would be removed in the fall/winter prior to construction. Known roosts would be determined through use of the Nebraska Natural Heritage Inventory database, field surveys and/or coordination with subject matter experts knowledgeable about the species.

Table 4.7-3. Potential Construction Impacts and Species Conservation Measures

Species	Potential Impacts	Conservation Measures
Western prairie fringed orchid *(Platanthera praeclara)*	Direct impacts to individuals from construction clearing and pipeline installation activities. Indirect impacts would include degraded habitat from the introduction of invasive species in disturbed locations. Indirect impacts to habitat from temporary water reductions during hydrostatic testing could affect individuals or suitable habitats by reducing soil moisture in areas adjacent to streams.	• Keystone would conduct surveys for the western prairie fringed orchid and suitable habitat prior to construction (see Table 3.7-3 regarding Spring 2018 surveys). If present, either the MAR would be realigned around any identified populations or identified individuals would be transplanted out of the ROW prior to any clearing and grading, if possible • Keystone would salvage and segregate topsoil appropriately where populations have been identified to preserve native seed sources in the soil for use in revegetation efforts in the ROW. • Keystone would implement a noxious and invasive weed control program consistent with the CMRP and Con/Rec units to reduce the potential for spread or invasion by weeds. • No herbicides would be used within 100 feet of areas where the species occurs. • Keystone would minimize the potential for altered hydrology (e.g., surface water flow, infiltration and groundwater levels) in suitable habitat in accordance with BMPs in the CMRP. • Keystone would provide compensation for impacts to suitable habitat in a Habitat Conservation Trust per Appendix G of the 2013 Biological Opinion. Funds would be used to acquire land though purchase by fee title or through perpetual conservation easements. Funds could also be used for habitat restoration projects. • Keystone would restore and monitor construction-related impacts to wet meadow habitats identified as suitable habitat consistent with USACE guidelines • The NPPD would complete field surveys during the appropriate bloom periods only in areas along the final line routes that are considered suitable. The NPPD would delineate and mark areas where habitat is present as “avoidance areas” where placement of structures and construction traffic would not occur. • Temporary water reductions would be avoided based on Keystone’s plan to withdraw the volume needed at a rate less than 10 percent of the baseline daily flow and to return water back to its source within a 30-day period.

APLIC = Avian Power Line Interaction Committee; BFD = bird flight diverter; CMRP = Construction, Mitigation and Reclamation Plan; HDD = horizontal directional drilling; MAR = Mainline Alternative Route; NGPC = Nebraska Game and Parks Commission; NPPD = Nebraska Public Power District; ROW = right-of-way; USFWS = United States Fish and Wildlife Service

Table 4.7-4 provides the Department’s assessment of potential for adverse effects on species protected under the ESA from the MAR (including construction, normal operations and maintenance). As noted in the table, the conclusions are based on implementation of conservation measures by Keystone within the MAR. Table 4.7-5 in Section 4.7.3.2 evaluates potential impacts from normal operations and maintenance which is considered in Table 4.7-4 conclusions.

Table 4.7-4. Potential for Adverse Effects to Federally Protected Species from MAR Construction, Normal Operations and Maintenance

Common Name	Scientific Name	Status	Conclusion	Justification
Interior least tern	*Sterna antillarum*	E	May Affect, Not Likely to Adversely Affect	Although the MAR crosses the interior least tern's estimated current breeding range at the Platte River near the border between Colfax and Butler counties, the pipeline at this location would be constructed using HDD and impacts would occur outside of the sandbars and sand/gravel pits which could support least tern breeding and foraging populations. In addition, conservation measures included in the 2014 Keystone XL Final SEIS would further reduce potential for adverse effects on this species.
Piping plover	*Charadrius melodus*	T	May Affect, Not Likely to Adversely Affect	Although the MAR crosses the piping plover's estimated current breeding range at the Platte River near the border between Colfax and Butler counties, the pipeline at this location would be constructed using HDD and impacts would occur outside of the sandbars and sand/gravel pits which could support piping plover breeding and foraging populations. In addition, conservation measures included in the 2014 Keystone XL Final SEIS would further reduce potential for adverse effects on this species.
Rufa red knot	*Calidris canutus rufa*	T	May Affect, Not Likely to Adversely Affect	The species is rarely observed in Nebraska due to lack of preferred habitat (coastal sites). It is a sporadic and somewhat uncommon migrant throughout the area of the MAR. Conservation measures established for the interior least tern, whooping crane and piping plover would be applicable to the rufa red knot which further reduces potential for adverse effects on this species.
Whooping crane	*Grus americana*	E	May Affect, Not Likely to Adversely Affect.	Although the MAR crosses the eastern edge of the whooping crane's current breeding range, conservation measures included in the 2014 Keystone XL Final SEIS would further reduce potential for adverse effects on this species.
Pallid sturgeon	*Scaphirhy-nchus albus*	E	May Affect, Not Likely to Adversely Affect.	Although the MAR crosses the pallid sturgeon's estimated current range in the lower Platte River, the pipeline at this location would be constructed using HDD. Direct impacts to the river and habitat would be avoided. Indirect impacts would be avoided through conservation measures included in the 2014 Keystone XL Final SEIS.
Topeka shiner	*Notropis topeka*	E	May Affect, Not Likely to Adversely Affect.	Although the MAR would pass through the current range of the Topeka shiner associated with the Union Creek system, the pipeline at this location would be constructed using HDD. Direct impacts to the river and habitat would be avoided. Direct impacts to the species and habitat in smaller tributary streams would be minimized by limiting construction activities in streams with identified or potential habitat through use of an isolation flow dry crossing method. Indirect impacts would be avoided through conservation measures included in the 2014 Keystone XL Final SEIS. Topeka shiner was not observed during surveys conducted in Summer 2018 along the portion of the MAR that passes through Union Creek.

Table 4.7-4. Potential for Adverse Effects to Federally Protected Species from MAR Construction, Normal Operations and Maintenance

Common Name	Scientific Name	Status	Conclusion	Justification
American burying beetle	*Nicrophorus americanus*	E	No Effect.	Although the proposed MAR initiates in Antelope County, the route would be located east of the estimated current range of this species. All other counties along the MAR are located entirely outside the current range of the American burying beetle. The occurrence of suitable habitat within the MAR is likely diminished by the predominantly tilled agricultural landscape. Surveys conducted during the Spring of 2018 did not identify any populations within the MAR. Additional surveys will be conducted to update density information as required for the pre-construction conditions imposed in the Biological Opinion.
Northern long-eared bat	*Myotis septentrio-nalis*	T	May Affect, Not Likely to Adversely Affect.	Although the northern long-eared bat's range is within the MAR, suitable habitat is limited because most of the land cover has been converted from forested habitat to agriculture. Suitable habitat would primarily be relegated to the forested and riparian corridors which are left along the major rivers or streams. The use of HDD to avoid riparian forested areas along the Elkhorn River, Union Creek, Platte River and Big Blue River, and conservation measures included in the 2014 Keystone XL Final SEIS would reduce the potential for adverse effects.
Western prairie fringed orchid	*Platanthera praeclara*	T	May Affect, Not Likely to Adversely Affect.	Although the western prairie fringed orchid's range overlaps with the MAR in Antelope, Madison, Stanton, Seward and Saline counties and Spring and Summer 2018 surveys identified suitable habitat areas in Colfax County just north of the MAR crossing of the Platte River, conservation measures included in the 2014 Keystone XL Final SEIS would reduce the potential for adverse effects.

HDD = horizontal directional drilling; MAR = Mainline Alternative Route; SEIS = Supplemental Environmental Impact Statement

4.7.3.2 Operations and Maintenance

Vegetation

Operation and maintenance of the pipeline would result in minor adverse impacts to vegetation. As shown in Table 4.7-1, the permanent pipeline is located predominantly within cultivated cropland (approximately 804 acres), followed by grassland (approximately 125 acres). Previously forested areas within the permanent ROW (approximately 15 acres) would be permanently converted to a non-forested vegetation type (per agreement with the landowner). Routine maintenance vegetation clearing within the permanent ROW (approximately 949 acres of vegetated areas) would occur no more than every 1 to 3 years. In addition, as required, Keystone would implement noxious and invasive weed management to control invasive species within the permanent ROW. This could include use of approved herbicides or manual removal.

As discussed in the 2014 Keystone XL Final SEIS, operation of the pipeline would cause increases in soil temperatures at the soil surface (from 4 to 8˚F) primarily during winter and greater increases would occur with increasing depth toward the pipeline (from 10 to 15˚F at 6 inches below ground surface). While many plants would not produce root systems that would penetrate much below 6 inches, the root systems

of some plants, notably native prairie grasses, often penetrate well below 6 inches. Soil temperatures immediately around the buried pipeline may reach temperatures as much as 40˚F warmer than the ambient surrounding soil temperatures. In general, increased soil temperatures during early spring could cause early germination and emergence and increased productivity in annual crops such as corn and soybeans and in tallgrass prairie species (U.S. Department of State 2014).

Biologically Unique Landscapes and Vegetation Communities of Conservation Concern

Operation and maintenance of the pipeline would result in minor adverse impacts to the Rainwater Basin Wetland Management District, forested areas, native grasslands and riparian woodlands. Non-forested wetlands would be restored and maintained to their original condition during normal operations. Areas of forest cleared within the permanent ROW during construction would be maintained as non-forested areas during operations. As documented in Section 4.5.4 of the 2014 Keystone XL Final SEIS, heat dissipated from the pipeline during operations could potentially lead to early germination and increased productivity of plants (including native prairie grasses), but may also lead to decreased soil water content, which could be detrimental to native prairie plants (U.S. Department of State 2014). Invasion of non-native plants as well as altered land management also may prevent recovery of prairie grasslands. In addition, altered land management could include suppression of wildfires, which help to maintain prairie sod. Overall impacts, however, to these communities would be isolated and minor.

Wildlife and Fisheries

Operation and maintenance of the pipeline would result in minor adverse impacts to wildlife and fisheries. The primary impacts associated with the operational phase of the pipeline include potential invasion by noxious weeds and maintenance activities associated with the pipeline and ancillary facilities (e.g., pump stations). Other than maintenance and pipeline inspections, normal operations of the proposed pipeline would generally result in negligible effects on wildlife. Direct impacts from maintenance activities, such as physical pipeline inspections or pipeline repair that would require digging up the pipeline, would be the same as those for construction. Locally elevated noise levels potentially could mask wildlife communications that are used to attract mates and defend territories, and locally reduce the use of an area by species; in addition, development could result in nest abandonment and decreased reproductive success if such activity occurs during the breeding season (U.S. Department of State 2014). Additionally, vibration detected in the soils surrounding roadways has been shown to cause certain invertebrates to ascend to soil surfaces allowing them to become prey to birds (U.S. Department of State 2014). Minor adverse effects to wildlife would occur from permanent noise generated at pump stations and temporary noise generated at sites requiring construction equipment during maintenance activities. Aerial surveillance of the pipeline (conducted 26 times per year at intervals no greater than once every 3 weeks per) at an altitude of about 1,000 feet would also generate noise and potential disturbance to wildlife; however, due to the elevation of aircraft and occurrence of this type of activity within the region, impacts would be minor. Potential impacts associated with accidental release of crude oil are addressed in Chapter 5. Appropriate federal and state wildlife management agencies would be consulted prior to initiation of maintenance activities beyond standard inspection procedures.

Potential impacts to fisheries resources during the operational phase of the pipeline include reduced riparian vegetation, increased water temperature, herbicide contamination, increased bank erosion and sedimentation. Measures to avoid or minimize these impacts include aerial and ground surveillance to allow for early detection of bank stability problems and to minimize the potential for continued environmental impacts during pipeline operation, maintenance of non-forested vegetation, restrictions on herbicide use near waterbodies, use of licensed applicators for herbicides and restoration and revegetation measures presented in the CMRP. The burial depth of the proposed pipeline could mitigate potential temperature impacts, as typical pipeline burial depth under streams would be a minimum of 60 inches.

HDD installation would locate the pipeline even deeper below the river bottom and would also avoid riparian vegetation clearing in these areas, thus further mitigating for potential temperature increases to streamflow. In accordance with the CMRP, no herbicides would be used within 100 feet of a wetland or waterbody, and all herbicide application would be performed by applicators appropriately licensed or certified by the state in which work is conducted. Overall adverse effects to fisheries would be minor.

Migratory Birds

Impacts to migratory birds would be minor. Keystone has committed to developing and implementing a conservation plan, in consultation with the USFWS. This conservation plan discussed in the 2014 Keystone XL Final SEIS would provide avoidance and mitigation measures for migratory birds and bald and golden eagles and their habitats. Keystone would implement this plan for the MAR where construction, operation and maintenance could result in the destruction or disturbance of a migratory bird nest.

Threatened and Endangered Species

As described in Table 4.7-4, the Department has determined that normal operation and routine maintenance of the pipeline within the MAR is not likely to adversely affect threatened and endangered species. Table 4.7-5 describes the potential for adverse effect on each species and conservation measures that power providers (first four conservation measures) and Keystone would implement for the operational phase of the pipeline to avoid adverse effects.

Table 4.7-5. Potential Impacts During Normal Operations and Maintenance and Species Conservation Measures

Species	Potential Impacts	Conservation Measures
Interior least tern (*Sterna antillarum)*	Aerial surveillance would be conducted 26 times per year at intervals no greater than once every 3 weeks with quick aircraft passes at an altitude of about 1,000 feet. Indirect impacts during aerial and ground surveillance are unlikely to disturb nesting interior least terns due to height and duration of pass. Power lines would create a collision hazard, possibly resulting in injury or death to individuals. This long-term impact would persist for the life of the Project. Incidents are unlikely because the bird's size and agility to easily avoid the transmission line in most cases.	• Power provider to use BFDs, according to APLIC and NPPD standards, on the overhead shield wire at river crossings in areas of known habitat.
Piping plover (*Charadrius melodus)*	Aerial surveillance would be conducted 26 times per year at intervals no greater than once every 3 weeks with quick aircraft passes at an altitude of about 1,000 feet. Indirect impacts during aerial and ground surveillance are unlikely to disturb nesting piping plovers due to height and duration of pass. Power lines would create a collision hazard, possibly resulting in injury or death to individuals. This long-term impact would persist for the life of the Project. Incidents are unlikely because the bird's size and agility to easily avoid the transmission line in most cases.	• Power provider to use BFDs, according to APLIC and NPPD standards, on the overhead shield wire at river crossings in areas of known habitat.

Table 4.7-5. Potential Impacts During Normal Operations and Maintenance and Species Conservation Measures

Species	Potential Impacts	Conservation Measures
Rufa red knot (*Calidris canutus rufa)*	Aerial surveillance would be conducted 26 times per year at intervals no greater than once every 3 weeks with quick aircraft passes at an altitude of about 1,000 feet. Indirect impacts during aerial and ground surveillance are unlikely to disturb nesting rufa red knots due to height and duration of pass. Power lines would create a collision hazard, possibly resulting in injury or death to individuals. This long-term impact would persist for the life of the Project. Incidents are unlikely because the bird's size and agility to easily avoid the transmission line in most cases.	• Power provider to use BFDs, according to APLIC and NPPD standards, on the overhead shield wire at river crossings in areas of known habitat.
Whooping crane (*Grus americana)*	Aerial surveillance would be conducted 26 times per year at intervals no greater than once every 3 weeks with quick aircraft passes at an altitude of about 1,000 feet. Indirect impacts during aerial and ground surveillance are unlikely to disturb nesting whooping cranes due to height and duration of pass. Collisions with transmission and distribution lines are considered to be a major threat to whooping cranes. Mortality resulting from collision with power lines is most likely to occur during spring and fall migrations.	• Power provider to use spiral BFDs, consistent with APLIC standards, in appropriate areas as identified in pre-construction field reviews.
Pallid sturgeon (*Scaphirhynchus albus)*	According to Keystone's Pipeline Temperature Effects Study (Appendix S of the 2014 Keystone XL Final SEIS), the proposed pipeline would have some effect on surrounding soil temperatures, primarily at pipeline depth. Because the pipeline would be buried greater than 25 feet below the Platte River bottom using the HDD method, temperature effects would be negligible.	• Avoiding broadcast applications of pesticides or herbicides near aquatic habitat.
Topeka shiner (*Notropis topeka)*	According to Keystone's Pipeline Temperature Effects Study (Appendix S of the 2014 Keystone XL Final SEIS), the proposed pipeline would have some effect on surrounding soil temperatures, primarily at pipeline depth. Because the pipeline would be buried greater than 25 feet below the Union Creek bottom using the HDD method, temperature effects would be negligible.	• Avoiding broadcast applications of pesticides or herbicides near aquatic habitat.

Table 4.7-5. Potential Impacts During Normal Operations and Maintenance and Species Conservation Measures

Species	Potential Impacts	Conservation Measures
American burying beetle (*Nicrophorus americanus)*	Direct impacts to American burying beetles could occur as a result of proposed Project construction during vegetation clearing, site grading and trench excavation, which could result in temporary habitat loss, potential alteration of suitable habitat to unsuitable habitat, temporary habitat fragmentation where the pipeline is not already located next to other utilities and potential mortality to eggs, larvae and adults through construction vehicle traffic and exposure during excavation. Artificial lighting has the potential to disrupt American burying beetle feeding behavior and increase mortality through predation.	• When performing maintenance activities in suitable American burying beetle habitat requiring use of vehicles and ground disturbance, follow similar conservation measures identified for construction (e.g., confine vehicle traffic, sequential replacement of topsoil, trapping and relocation of species prior to disturbance, worker training, posting of signs and reseeding areas of disturbance with appropriate seed mixes).
Northern long-eared bat *(Myotis septentrionalis)*	Operational impacts would be limited to the small areas where maintenance and repair activities overlap with suitable habitat. Bats flying over the pipeline route are expected to avoid any ground-based operational activities. Power lines would create a collision hazard, possibly resulting in injury or death to individuals. This long-term impact would persist for the life of the Project. Incidents are unlikely because the bat's size and agility to easily avoid the transmission line in most cases.	• None identified.
Western prairie fringed orchid *(Platanthera praeclara)*	Since the majority of the lands crossed by the MAR are disturbed agricultural lands, proposed permanent facilities would not likely be located within existing, preferred habitat. Operations could affect western prairie fringed orchid populations during noxious weed control.	• Populations of western prairie fringed orchid would be identified pre-treatment, and no herbicides would be used at those locations. Application would be conducted by spot spraying.

APLIC = Avian Power Line Interaction Committee; BFD = bird flight diverter; NPPD = Nebraska Public Power District; SEIS = Supplemental Environmental Impact Statement

4.8 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

4.8.1 Environmental Consequences

To evaluate the impacts on socioeconomic and environmental justice conditions, the Department reviewed the Proposed Action and No Action Alternative to determine whether any activities have the potential to cause the following:

- Adverse impacts to the local economy, housing, public services, property values or traffic and transportation, such as from an influx of workers and their families
- Additional strain to areas currently experiencing a shortage of health professionals and medical services

- Beneficial impacts to the local economy (e.g., increased local commerce, increased tax revenues);
- Substantial increases in daily vehicular traffic on key roadway segments, thereby degrading the Level of Service (LOS) to exceed traffic-handling capacity or resulting in delays at grade crossings. (LOS is a qualitative measure used to describe the operating conditions of a roadway based on factors such as speed, travel time, maneuverability, delay and safety);
- Conflicts with regional or local transportation improvement plans; or
- Cause a disproportionately high and adverse impact to minority or low-income populations.

The following analysis considers impacts to socioeconomic conditions and environmental justice populations during construction, normal operations and maintenance activities. Chapter 5, Environmental Consequences from Accidental Releases, discusses potential impacts to socioeconomic conditions and environmental justice populations in the event of an accidental release.

4.8.2 No Action Alternative

Under the No Action Alternative, construction of the MAR would not occur. No changes to the existing socioeconomic conditions or adverse effects to minority or low-income populations would occur. Beneficial impacts to the local economy as described under the Proposed Action Alternative would not occur.

4.8.3 Proposed Action Alternative

This SEIS quantifies potential direct and indirect impacts to socioeconomic conditions and environmental justice populations using an assessment of data sources presented in Section 3.8. This SEIS also references IMPLAN Model data from the Goss and Associates report, "Socioeconomics Report for the MAR in Nebraska (Goss and Associates 2018), which describes the potential economic conditions in Nebraska resulting from the MAR. This updated report (previously updated in 2012 and 2017) focuses on the state and local taxes generated by the construction phase and operations of the MAR. Potential construction- and operations-related impacts include:

- Overburdening of the local housing stock because of demand generated by the temporary and permanent workforces;
- Substantial burden on public service providers serving the proposed Project area, such that they would need to expand their service capacities to meet those demands;
- Substantial changes to local social or economic activities, including changes in employment and income levels resulting from the proposed Project construction and operations;
- Substantial changes in economic impacts, including output and spending;
- Substantial effects to potential environmental justice populations;
- Substantial changes in fiscal revenues, including tax receipts, of local jurisdictions;
- Substantial changes in private property values; and
- Substantial effects to transportation resources.

Impacts are characterized as positive (beneficial) or negative (adverse) and, where possible, are evaluated relative to regional conditions to help assess the magnitude of socioeconomic effects.

4.8.3.1 Construction

Socioeconomics

Population

Overall impacts to population from construction would be temporary and minor. The number of residents within the counties along the MAR would increase temporarily during construction as a result of the influx of construction workers. The construction workforce of the MAR would consist of approximately 106 workers over the duration of construction, which would include Keystone employees, contractor employees and environmental inspection staff. The construction phase would support the highest number of jobs in Antelope County (approximately 20 jobs), and the lowest number in Stanton County (approximately 3 jobs) (Goss and Associates 2018). A portion of the workforce during the construction phase may be hired outside of the local area, which could result in a minor temporary increase of population.

Housing

Overall impacts to housing from construction would be short term and minor. Non-local construction workers would likely seek temporary housing within the Project area, such as hotels/motels and campgrounds. There are approximately 1,572 hotels/motels and 821 campground sites within the counties along the MAR (EXP Energy Services, Inc. 2018). Actual vacancy rates vary seasonally, with the lowest vacancy rates likely in the spring and fall seasons, but actual vacancy rates could vary at any given time. Given the relatively low number of workers dispersed across a relatively large nine-county area and considering at least a portion of these workers would be hired locally, there would be ample temporary housing supply during construction.

Economic Base

Overall impacts to the economic base from construction would be beneficial. The construction phase would directly support approximately 106 jobs in the Project area. The estimated total labor income within the counties along the MAR during the 2-year construction phase would be approximately $12.1 million per year, which would generate a total direct economic output of approximately $40.7 million during the duration of construction. Construction jobs and spending could indirectly support or induce up to approximately 2,996 jobs throughout the state of Nebraska, resulting in indirect economic impacts of $340.2 million in labor income and $928.4 million in additional economic output. Specific industries experiencing most indirect economic benefits would include support activities for oil and gas operations; business support services; residential construction; and architectural, engineering and related services (Goss and Associates 2018).

Tax Revenue

No impacts to tax revenue would occur during construction.

Public Services

Overall impacts on public services from construction would be negligible. The temporary increase of construction workers into local communities has the potential to generate additional demands on local public services (e.g., emergency response, medical, police and fire protection services). Given the relatively small amount of construction workers dispersed over a relatively large area, it is anticipated existing public services would be able to handle this temporary increase in demand.

Traffic and Transportation

Overall impacts to traffic and transportation from construction would be minor. Construction activities would involve movement of people, equipment, vehicles and materials throughout the Project area, which could result in increases in traffic volumes on local roadways. There would be an increase in the number of trips taken by the 106 construction workers traveling to and from construction sites, as well as for truck trips to deliver materials to the Project site, during the 2-year construction period (Goss and Associates 2018). In some cases, construction could increase the demands for permits for oversize or wide vehicles. Some temporary traffic delays would be likely as a result of these movements, but long-term reductions in LOS are not anticipated. These movements during construction could also result in minor wear and tear on the affected roadways caused by frequent trips of heavy machinery or large trucks. These impacts would be dispersed along major roadways within the Project area throughout the different phases of construction and would result in minor impacts on roadways. The construction contractor would identify and document routes that would be used for moving materials and equipment, which would minimize potential impacts.

Construction would also require crossing small unpaved roads. Open-cut methods would be used to cross these roads, which would require temporary closure of the road to traffic and use of detours for approximately 1 to 2 days per crossing. Keystone would cross paved roads by boring beneath the roads, allowing traffic activity to continue.

After construction is complete, the roads used during this phase would be restored to their preconstruction conditions or better (U.S. Department of State 2014). During the construction phase, Keystone and the pipeline contractor would maintain roads used for construction in a condition that is safe for both members of the public and the workforce. Keystone's construction contractors would be required to submit a road use plan prior to mobilization and to coordinate with the appropriate state and county representatives to develop a mutually acceptable plan. This plan, along with monitoring of road activity related to the proposed Project, would establish measures to reduce or avoid traffic and transportation impacts on local communities.

Environmental Justice

Minority and low-income populations, as identified in Section 3.8.2, would experience minor, temporary impacts from noise pollution and fugitive air emissions during construction of the pipeline within the MAR. Each county within the ROI, with the exception of Seward and Pierce counties, contains a Medically Underserved Area. In addition, all counties along the MAR are designated as a Health Professional Shortage Area (see Table 3.8-7) (U.S. Department of Health & Human Services 2018b). The temporary increase of construction workers in these areas could increase the competition for medical or health services during the construction phase. Impacts would be temporary and scattered throughout the length of the pipeline, and not be concentrated in any specific area. Therefore, construction activities would not result in disproportionately high and adverse impacts on environmental justice populations within the Project area.

4.8.3.2 Operations and Maintenance

Socioeconomics

Population

Operation of the pipeline within the MAR *would* support approximately 13 employees per year within the counties along the MAR *(*Goss and Associates 2018). As a result of the small number of new employees, the Proposed Action would result in negligible impacts on population within the Project area.

Housing

The 13 new employees associated with the proposed Project operations would result in a slight increase in demand for housing throughout the Project area (Goss and Associates 2018). As stated in Section 3.8.1.2, there are ample housing options to handle this marginal increase, and overall impacts on housing would be negligible.

Economic Base

Overall impacts to the economic base from operations and maintenance would be beneficial. Economic impacts were forecasted over the first 15 years of pipeline operation. During this period, the operations phase would directly support approximately 13 jobs in the Project area. The estimated total labor income within the counties along the MAR during the operations phase would be approximately $15.4 million, which would generate a total direct economic output of approximately $45.8 million.

Tax Revenue

Overall impacts would to tax revenue from operations and maintenance would be beneficial. During operations, Keystone would be required to pay property taxes on the proposed pipeline route for the first 15 years of operations (2019-2035). Within the MAR, Keystone would pay approximately $8.9 million in property tax per year, which would equate to a total of $134.1 million over the 15-year span. Property taxes paid would be lowest in Stanton County ($260,000/year) and highest in Seward County ($1.5 million/year) *(*Goss and Associates 2018).

Public Services

Operations and maintenance of the pipeline within the MAR would result in negligible impacts on public services based on the small increase in the number of employees during the operation of this pipeline in the Project area. There is at least one acute care facility within each county along the MAR or nearby county, which would eliminate any negative impact or concern regarding a strain on medical services.

Traffic and Transportation

Operations and maintenance of the pipeline within the MAR would have negligible to minor impacts of traffic and transportation. Routine maintenance activities would occur infrequently and most of the pipeline monitoring *would* occur remotely. Occasional maintenance activities that require minor ground disturbance may result in additional trips for workers and various equipment but impacts to traffic and transportation would likely be minor. Permanent access roads constructed for the proposed Project would not change traffic patterns on public roads.

Environmental Justice

The operations of the MAR would result in negligible impacts to minority and low-income populations. Impacts from maintenance activities would not be disproportionately high and adverse and would be similar, but of less intensity and duration, to those described for construction of the proposed Project.

4.9 CULTURAL RESOURCES

4.9.1 Environmental Consequences

This section presents the potential impacts on heritage and cultural resources from the Proposed Action and No Action Alternative during construction, normal operations and maintenance activities. Consideration is made for these resources consistent with NEPA and Section 106 of the NHPA.

Consistent with Section 106 of the NHPA, adverse impacts to heritage resources (also referred to herein as historic properties) would occur if the MAR and associated facilities "may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, setting, materials, workmanship, feeling or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the NRHP. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or cumulative" (36 CFR 800.5(a)(1)).

Chapter 5, Environmental Consequences from Accidental Releases, discusses potential impacts to heritage resources in the event of an accidental release of crude oil.

4.9.2 No Action Alternative

Under the No Action Alternative, construction of the MAR would not occur. No impacts to cultural or heritage resources would occur.

4.9.3 Proposed Action Alternative

This SEIS quantifies potential direct and indirect impacts to cultural and heritage resources using an assessment of informational sources presented in Section 3.9. Impacts to cultural and heritage resources from construction and operation of the MAR would result from ground disturbance within the construction work area and maintenance activities associated with the proposed MAR and ancillary facilities (e.g., access roads and pump stations). As stated in Section 3.9, cultural resources surveys for the MAR are ongoing.

Potential construction- and operations-related impacts on cultural and heritage resources would include:

- Possible direct damage to cultural resources within the construction footprint;
- Possible indirect damage to cultural resources through vibrations caused by earthmoving, heavy equipment, blasting, drilling, boring, etc.;
- Temporary loss of community access to cultural resources, such as Traditional Cultural Properties, during construction;
- Potential visual impacts to cultural resources during construction while heavy equipment and numerous personnel are present;

- Increased dust and noise, potentially impacting historic structures or Traditional Cultural Properties near the construction area; and
- Unanticipated discovery of previously unknown cultural resources within the construction footprint.

As stated in Section 3.9, the Department executed a Programmatic Agreement to take into account the effects of the Keystone XL Pipeline project on historic properties listed in or eligible for listing in the NRHP resulting from construction, operations and maintenance of the Keystone XL Pipeline project (U.S. Department of State 2014). The existing Programmatic Agreement would be implemented for the Keystone XL Pipeline portion of the MAR. If impacts to NRHP-eligible properties could not be avoided, mitigation plans would be reviewed by the Department and the consulting parties to evaluate the submitted information following the protocols outlined in the amended Programmatic Agreement developed for the Keystone XL Pipeline. The following are available mitigation measures described in the 2014 Keystone XL Final SEIS which would apply to the MAR (U.S. Department of State 2014):

- **Avoidance**, which could be accomplished by shifting the proposed footprint away from the resource, boring underneath/around the resource, limiting activities in the vicinity of the resource, monitoring construction activities near the resource or any combination of these techniques.
- **Minimization**, which would reduce to the extent possible the impact to the resource through avoidance measures as described above, but would not completely avoid the resource. For historic structures, impacts to viewshed could be minimized by reducing the visibility of the project such as planting of trees as a visual barrier or through fencing.
- **Mitigation**, which, when impact to a resource could not be avoided, would offset that impact through some means such as protection of a similar resource nearby, detailed documentation of the resource through data recovery excavations in the case of archaeological sites or Historic American Buildings Survey/Historic American Engineering Record documentation in the case of historic structures, contributions to the preservation of cultural heritage in the affected community, interpretative exhibits highlighting information gained about cultural resources through the project or some combination of these strategies.

If the pipeline could not avoid a particular cultural resource, the Department would consult with the Advisory Council on Historic Preservation, SHPO, consulting Indian tribes and other federal and state consulting parties to determine those measures to be implemented by Keystone to minimize and mitigate adverse effects on eligible historic properties identified in the APE. If the Department determines that the adverse effect could not be avoided, Keystone would draft a comprehensive Treatment Plan for each adversely affected historic property. The Treatment Plan would describe the measures to minimize and mitigate the adverse effect of proposed construction activities on historic properties, the manner in which these measures would be carried out and a schedule for their implementation.

The Department will review and forward survey reports as they are completed to the applicable consulting parties consistent with 36 CFR 800. NRHP assessments and any resulting avoidance or mitigation plans would be reviewed by the Department and the consulting parties to evaluate the submitted information following the protocols outlined in the amended Programmatic Agreement developed for the proposed Project. Where cultural resources have not been sufficiently assessed at this time to finalize an eligibility determination for the NRHP, these sites would be treated by the Department as a historic property, and mitigation plans would be developed to protect these sites until they could be further assessed through NRHP evaluation procedures.

Direct impacts, such as an unanticipated discovery of previously unknown cultural resources during construction, could have a permanent impact on that resource. Should any unanticipated discoveries of cultural resources be made during construction or operation of the pipeline, the terms of the Unanticipated

Discoveries Plan would be followed. Typically, construction activities within a 100-foot radius (including traffic) would be immediately halted, the Keystone Environmental Inspector would be notified, and interim measures would be placed to protect the discovery from looting or vandalism. The appropriate federal, state, local or tribal authorities would be notified of discovery within 48 hours of the initial find, and construction would not proceed within the discovery area until all mitigation measures defined in the Programmatic Agreement are concluded and Keystone receives approval from the appropriate agencies that construction may resume. Should a cultural resource discovered in this fashion appear to be significant, appropriate additional mitigation measures would be considered, as feasible and appropriate, consistent with the terms of the Programmatic Agreement.

4.9.3.1 Construction

Overall adverse impacts to cultural resources along the MAR would be less than significant through implementation of the Programmatic Agreement. Construction of the pipeline along the MAR might affect cultural resources within or near the ROW and in the locations of ancillary facilities (e.g., access roads and pump stations). Construction-related impacts could be either direct or indirect. Duration of the construction phase could affect the degree of indirect cultural resources impact. Indirect potential impacts during proposed construction, such as noise, dust, vibrations, heavy equipment traffic and changes in viewshed, would be temporary and would be expected to last for the duration of construction in specific areas for discrete periods of time. Given the temporary nature of construction and use of the ancillary facilities such as pipe and contractor yards, no permanent indirect adverse effects to cultural resources are anticipated. Potential temporary effects to cultural resources, such as historic structures, could include visual effects from the stacked pipe, noise effects associated with loading and unloading pipe from trucks, dust from the contractor yard surface and increased truck traffic to and from the contractor yard. The low-rise of stacked pipe and vehicle equipment would have a minimal effect on the viewshed. Noise associated with construction of ancillary facilities generally would be intermittent and limited to daytime hours when higher noise thresholds are permitted by federal agencies; therefore, noise would not be expected to be a significant factor in the development of the APE. Similarly, any increase in traffic, noise or dust associated with truck traffic, in regard to cultural resources, such as historic structures, would be intermittent and temporary.

As indicated in Table 3.9-3, cultural resources are located within areas of potential disturbance during MAR construction. These sites are currently pending eligibility determination. Avoidance, if possible, would be recommended for all eligible, potentially eligible and unevaluated/pending sites. By avoiding these sites, construction of the proposed Project would have no effect on these historic properties. Unavoidable impact to unevaluated, potentially eligible and eligible sites would be mitigated in accordance with the Programmatic Agreement.

4.9.3.2 Operations and Maintenance

During normal operations and maintenance of the pipeline, only previously disturbed areas would be expected to require periodic disturbance; therefore, the potential for additional direct impacts to cultural resources would be very limited and negligible to minor. Indirect impacts during operations could consist of a permanent change in viewshed to historic structures near permanent ancillary facilities such as pump stations and MLVs, and a periodic increase in noise, vibration and dust created by vehicular traffic conducting operation and maintenance activities. These types of impacts have been evaluated by the Department as part of the Section 106 consistent evaluation process for the Keystone XL Pipeline project (U.S. Department of State 2014). Permanent ancillary facilities are unlikely to visually impact the setting and feeling of historic structures due to the distance separating them, their low-lying nature and the various vegetative and topographic elements of the landscape in such areas. Similarly, periodic increases in noise, vibration and dust created by vehicular traffic conducting operation and maintenance activities would not be expected to cause any adverse effects to cultural resources.

5 ENVIRONMENTAL CONSEQUENCES FROM ACCIDENTAL RELEASES

5.1 INTRODUCTION

This chapter addresses the likelihood of potential accidental releases resulting from the Proposed Action and introduces information on pipeline and crude oil characteristics. This chapter also describes the potential consequences that could occur to the resources described in Chapter 3, Affected Environment, if a release of product were to occur along the proposed MAR. Table 5-1 presents key terms and definitions used in this chapter.

Table 5-1. Key Terms

Types of Releases	
Release	A *release* is a loss of integrity of a container (i.e., pipeline or its associated components) that results in a failure to contain liquid as designed.
Leak	A *leak* is a release over time.
Spill	A *spill* is a volume of liquid that escapes a containment system and enters the environment.
Categories of Spill Sizes	
Small Spills	*Small spills* release less than or equal to 50 barrels (2,100 gallons).
Medium Spills	*Medium spills* range from greater than 50 barrels (2,100 gallons) to less than or equal to 1,000 barrels (42,000 gallons).
Large Spills	*Large spills* release more than 1,000 barrels (42,000 gallons).

Source: 42 USC 9601 et seq

5.2 METHODOLOGY

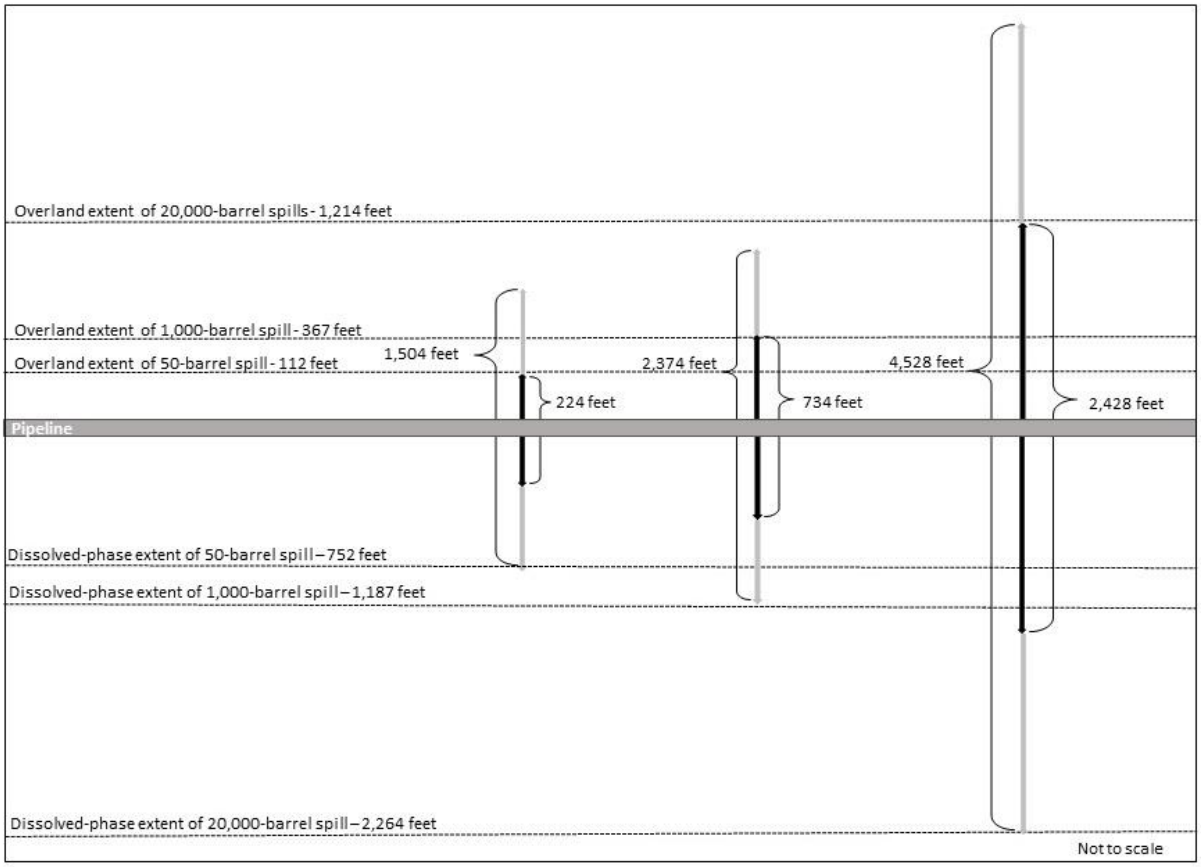
To evaluate the potential effects of accidental releases of products that could be transported along the MAR, this SEIS considers the likelihood of a release and the range of potential consequences that could result if a release were to occur. The analysis of spill risk includes a review of pipeline mileage and incident data as recorded in the USDOT's PHMSA databases. As also assessed in the 2014 Keystone XL Final SEIS, the Department analyzed three spill sizes (small, medium and large [see Table 5-1]) and determined spill incident rates for each spill size, based on historical pipeline incident data (see Section 5.3). The 2014 Keystone XL Final SEIS assessed effects associated with potential spills along the Preferred Route and addressed the potential for spills to affect sensitive resources within the ROI. This SEIS builds upon the conclusions of the prior document and assesses the risk to sensitive resources located along the MAR and to evaluate whether any new or unique features or resources may be present along the MAR that were not previously considered in the 2014 Keystone XL Final SEIS. As summarized in Section 5.5, which addresses potential impacts along the MAR, the characteristics of the MAR are substantially similar to the Preferred Route and no new or unique resource impacts were identified along the MAR.

To evaluate the range of consequences related to different spill types, the Department reviewed information on accidental releases during the pipeline transport of products, including those potentially transported along the MAR. This review included an evaluation of the causes and circumstances surrounding documented incidents, as well as the range of environmental effects. This analysis uses analogous cases as the basis for establishing the types and extent of impacts that could occur within the environmental setting described in Chapter 3, Affected Environment. In addition, incident rates for each spill size serve as the basis for determining the likelihood of each spill size affecting a resource.

The analysis uses GIS data sets to establish the presence of environmental resources that would be susceptible to impacts from small, medium and large releases.

The ROI is the area that is susceptible to a release of crude oil from the proposed MAR pipeline. The analysis assumes the ROI is the estimated distance the crude oil would spread overland, as well as the additional distances that crude oil and its dissolved components could travel upon reaching a water source. Based on the analysis presented in the 2014 Keystone XL Final SEIS, this SEIS assumes that a 50-barrel (small) spill could spread over land up to 112 feet from the site of a spill; a 1,000-barrel (medium) spill could spread up to 367 feet; and a 20,000-barrel (large) spill could spread up to 1,214 feet over land from the release point. If released crude oil reached groundwater, the screening modeling conducted for the 2014 Keystone XL Final SEIS found that components in the oil, such as benzene, could spread downgradient in groundwater an additional 640 feet for a 50-barrel spill, 820 feet for a 1,000-barrel spill, and 1,050 feet for a 20,000-barrel spill. This modeling effort also indicated that the three spill volumes could reach groundwater at a depth of 50 feet, although larger volumes could be expected to reach groundwater at deeper depths. Thus, as shown in Figure 5-1, the potential extent of a spill could reach the overland distance plus the additional dissolved phase distance. Along surface water features, including flowing streams and rivers, as well as lakes and wetlands where a release could spread over the extent of the waterbody's surface area, the Department assessed the hydraulic pathways that are susceptible to a release of crude oil from the pipeline and their interconnections with other downstream waters.

Subsequent to the 2014 Keystone XL Final SEIS, Keystone prepared a Site-Specific Risk Assessment as part of its Section 408 permit application to USACE for the Keystone XL Project's Missouri River crossing near the Fort Peck Reservoir in Montana. The model analysis calculated downstream transport distances of crude oil along the Missouri River under a worst-case discharge scenario, which according to the report, would have a probability of occurring once in 2,230,000 years. The analysis calculated the distance the released crude oil might travel within 6 hours, which is the maximum response time stipulated by federal pipeline safety regulations (49 CFR 194). The downstream transport distance ranged from 0.27 mile (at very low flow) to a maximum worst-case scenario of 33.3 miles (using record 2011 historic flood conditions) (TransCanada 2017). As a result of this Site-Specific Risk Assessment and other recent information (refer to the discussion of the July 2010 spill near Marshall, Michigan in Section 5.3.4), the Department is considering an ROI for the surface water transport of released crude oil up to 40 river-miles downstream.



Source: U.S. Department of State 2014

Note: The potential extent of a spill is the estimated overland distance (112 feet for a 50-barrel spill; 367 feet for a 1,000-barrel spill; and up to 1,214 feet for a 20,000-barrel spill) plus the additional dissolved phase distance in groundwater (640 feet for a 50-barrel spill, 820 feet for a 1,000-barrel spill, and 1,050 feet for a 20,000-barrel spill).

Figure 5-1. Spill Distances Used in the Likelihood Analysis

5.3 INCIDENT ANALYSIS

This section reviews pipeline accidents and incidents for onshore crude oil pipelines in the United States in order to determine the likelihood of different types of accidental releases for consideration in this SEIS's impacts analysis.

5.3.1 Pipeline Incident Analysis

Several different sources of pipeline incident data support the pipeline incident analysis; however, the primary source of data is the USDOT PHMSA incident database. A review and analysis of PHMSA pipeline incident data provide information used to calculate the frequency of spills from U.S. onshore pipelines carrying crude oil. A subset of the PHMSA incident database that includes the period 2010 to 2017 is used to support the incident analysis, since this data set is the most complete and representative of modern day pipeline facilities. This analysis does not include spills from offshore pipelines or pipelines transporting other products, such as refined petroleum products or highly volatile liquids.

Table 5-2 provides PHMSA incident data compiled between 2010 and 2017 for small, medium and large spills. The table also includes pipeline mileage per year and the total volume of crude oil spilled each year. Pipeline mileage has increased each year over this time period, increasing by approximately

43 percent between 2010 and 2016. Of the 1,584 onshore crude oil spill incidents reported between 2010 and 2017, small spills accounted for over 81 percent, medium spills for approximately 16 percent and large spills for approximately 2.5 percent.

Table 5-2. Summary of Pipeline Incident Data

Year	Small Spills	Medium Spills	Large Spills	Miles of Onshore Crude Oil Pipelines	Volume Spilled (barrels)	Volume Spilled per Thousand Miles of Pipeline (barrels)
2010	121	24	7	49,460	52,710	1,066
2011	109	28	6	51,052	35,276	691
2012	151	31	4	52,657	15,025	285
2013	171	28	5	56,170	43,048	766
2014	200	37	1	61,888	17,620	285
2015	212	38	3	68,012	20,687	304
2016	161	37	6	70,594	42,394	601
2017	162	35	7	NR	43,697	619

Source: PHMSA 2018a, 2018b
NR = not yet reported

Table 5-3 summarizes the average annual incident frequencies and volume released for each spill size category based on the pipeline component that caused the release. The Department calculated the incident rate for tanks, valves and pump stations by dividing the total number of incidents attributed to each of those components by the number of components estimated to be in operation during that period. The table presents the annual incident rate in total number of incidents for every 1,000 miles of pipeline or for every 1,000 tanks, valves or pump stations. For example, the rate of occurrence for spills resulting from any pipeline system component is 0.41 incidents per year for every 1,000 miles of pipeline. By far, the highest rate of incidents occur at pump stations, occurring at a rate of 8.96 incidents per year for every 1,000 pump stations in operation (presented as 8.96 incidents per 1,000 pump station-years in Table 5-3). Table 5.3 shows that no matter the component that caused the release, the majority of releases were small in size (i.e., ranging from 65 percent of releases along large-diameter mainline pipelines to 88 percent of releases occurring at valves). While small spills occur more frequently across all pipeline components, large spills account for a higher percentage of volume released. Valves are the only component for which this trend does not apply; medium spills account for the greatest volume lost from incidents involving valves.

As presented in Figure 5-2, the data reveal a higher incidence of failure for older mainline pipes, but also a higher incidence of failure for newer pump stations and valves (PHMSA 2018b). This is likely the result of pump stations and valves experiencing a “burn-in phase,” which refers to the beginning of the working lifetime of these components. During this time, pump stations and valves are more susceptible to failure resulting from defects that can develop during manufacturing and construction. After this initial phase passes, these components experience a low constant failure rate until the end of their working lifetime, during which time there is once again a higher probability of failure (Muhlbauer 2004).

Table 5-3. Spill Volume Distribution by Pipeline Component

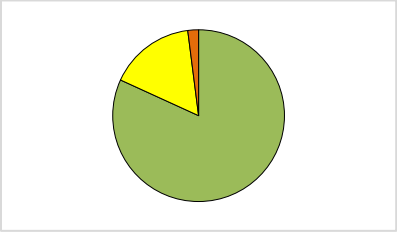
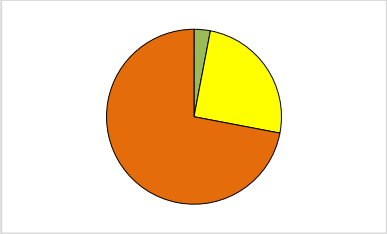
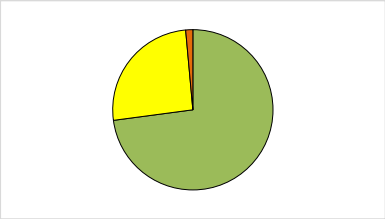
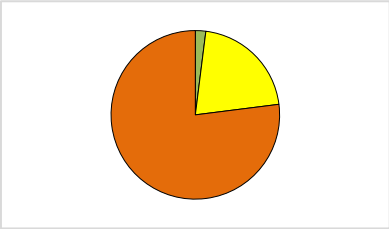
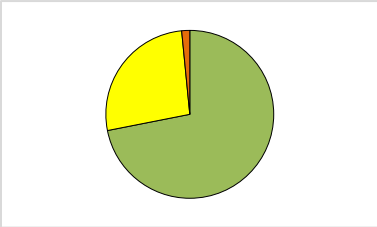
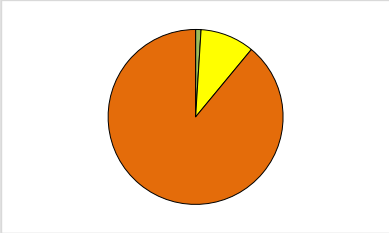
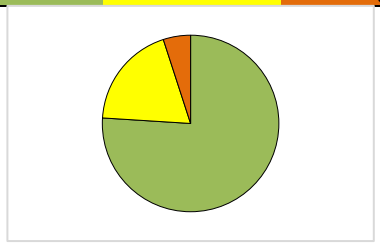
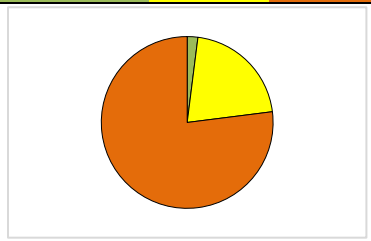
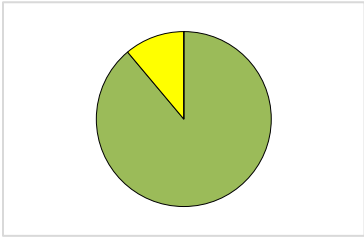
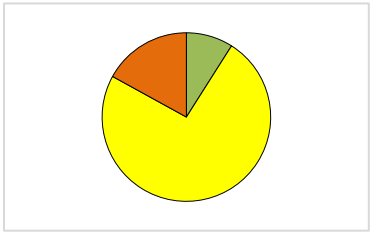
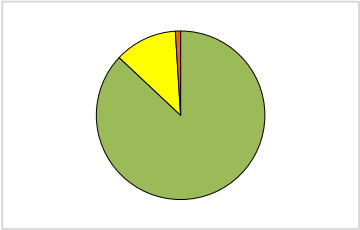
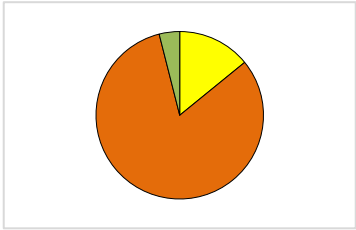
Pipeline Component (number of reported incidents)	% Spills of Each Size Category			% Volume Spilled by Size Category			Pipeline Mileage or Equipment-Years[a]	Annual Incident Rate per 1,000 Mile-Years or Equipment-Years
	Small	Medium	Large	Small	Medium	Large		
Pipeline, All Elements (1,534)	 81%	16%	2%	 3%	25%	72%	60,053	0.41
Mainline Pipe (481)	 71%	25%	4%	 2%	21%	77%	60,053	0.13
Mainline Pipe, 16-inch Diameter and Greater (145)	 65%	24%	11%	 1%	10%	89%	29,828	0.08

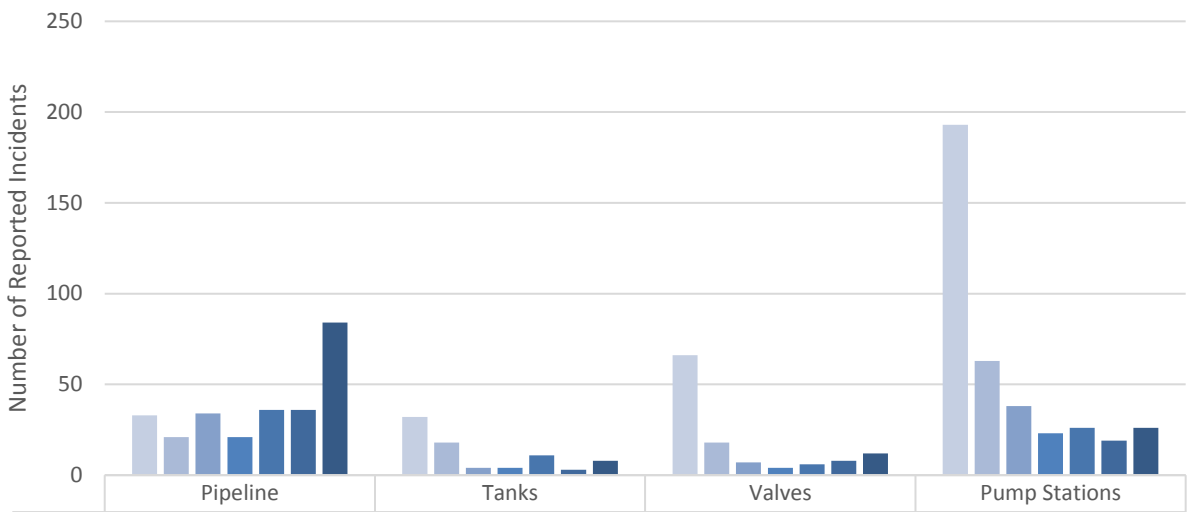
Table 5-3. Spill Volume Distribution by Pipeline Component (Continued)

Pipeline Component (number of reported incidents)	% Spills of Each Size Category			% Volume Spilled by Size Category			Pipeline Mileage or Equipment-Years[a]	Incident Rate per 1,000 Mile-Years or Equipment-Years
	Small	Medium	Large	Small	Medium	Large		
Pipeline System, Tanks (110)	 76%	19%	5%	 2%	21%	77%	2,362	0.78
Pipeline System, Valves (215)	 88%	11%	0%	 9%	74%	17%	3,003	1.16
Pipeline System, Pump Stations (728)	 87%	12%	1%	 5%	29%	66%	1,306	8.96

Source: PHMSA 2018a, 2018b

[a] Equipment-years are calculated by counting the total estimated number of equipment (i.e., valves, pumps, etc.) in operation from 2010 to 2017 and dividing by the number of years, in this case, 8 years.

Note: At the time of this Draft SEIS preparation, 2017 pipeline mileage was not yet available. As such, this table uses 2016 mileage data as a reasonable estimate for 2017 mileage.



	Pipeline	Tanks	Valves	Pump Stations
2010s	33	32	66	193
2000s	21	18	18	63
1990s	34	4	7	38
1980s	21	4	4	23
1970s	36	11	6	26
1960s	36	3	8	19
1950s	84	8	12	26

Source: PHMSA 2018a, 2018b

Figure 5-2. Decade in which Failed Part was Installed

5.3.2 Pipeline Incident Causes

Threats to pipeline and component integrity arise from numerous sources. According to the American Society of Mechanical Engineers, threats fall within three categories: time-dependent, stable and time independent. Time-dependent threats are those that tend to increase over time. Stable threats are threats that are constantly present, but that do not manifest unless activated by a change in operations or the surrounding environment. Time-independent threats are those that are not influenced by the passing of time (ASME 2010).

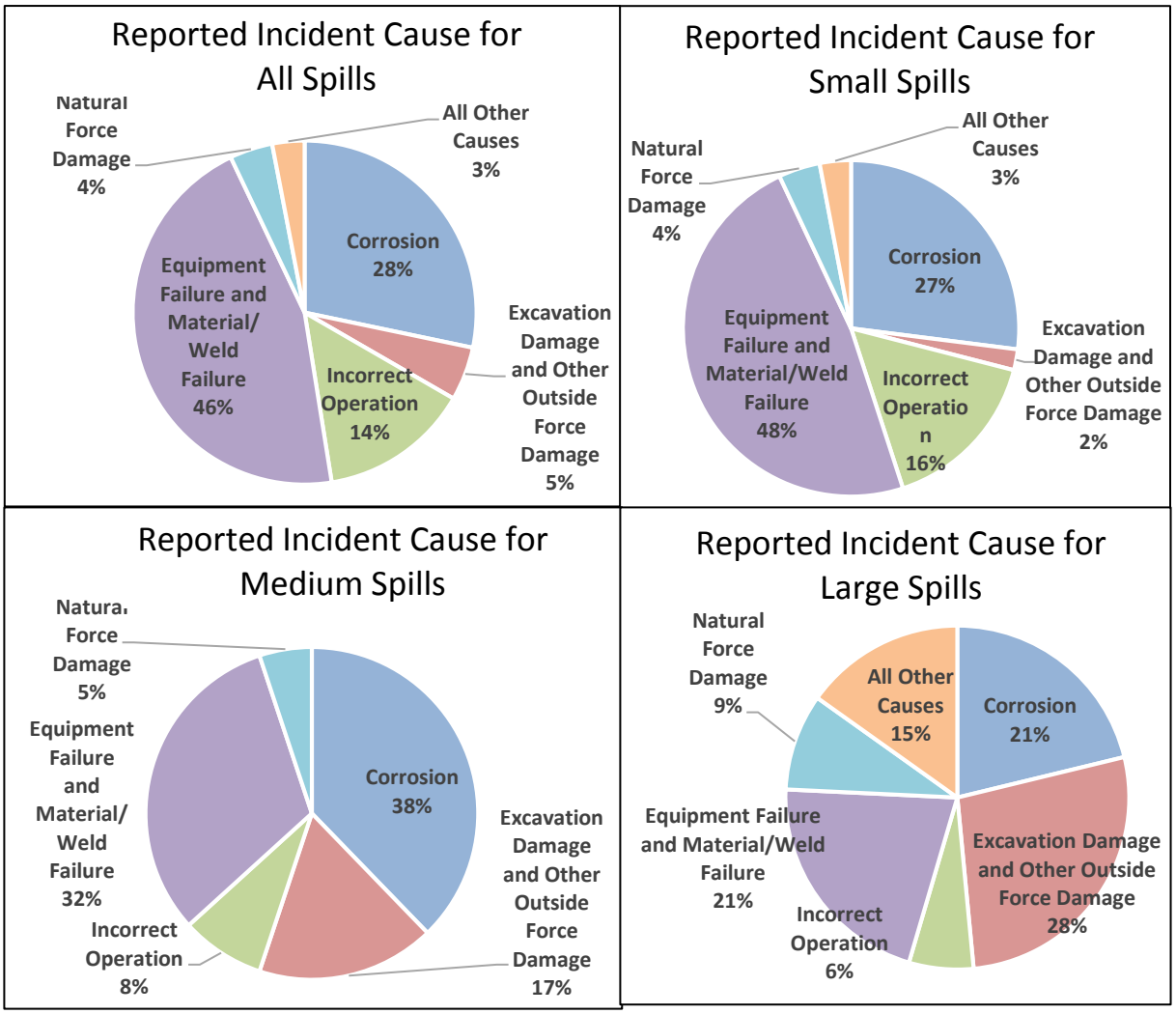
Time-dependent threats include internal corrosion, external corrosion and stress corrosion cracking. Corrosion is the deterioration of a metal by oxidation or other chemical action. External corrosion occurs when the pipeline walls, seam welds or joint welds weaken from corrosive action on the exterior surface of the pipe. Internal corrosion similarly weakens the pipeline system through corrosive action on the interior surface of the pipe. Stress corrosion cracking occurs when the combined action of corrosion and applied stress results in the formation of cracks. Scour is an additional physical mechanism that can threaten the integrity of a pipeline when exposed to continuous water currents over time. Scour is the gradual erosion (removal) by hydrodynamic forces of the granular bed material or overlying material (e.g., soil, stone) surrounding a buried pipe, such that the pipe itself could become dislodged and exposed, causing it to be at higher risk of failure, such as from fracturing or corrosion. Scour is a concern when pipelines cross under rivers or other water bodies.

Stable threats include manufacturing, construction and equipment threats. Manufacturing threats result from defects in the pipeline system during the manufacturing of the components. Construction threats result from defects caused during the construction, installation or fabrication of the pipe and its

components. Equipment threats result from a failure of the equipment to perform its intended design or its operational or functional purpose.

Time-independent threats include third-party damage, incorrect operations and damage from weather or other natural forces. Third-party damage threats consist of potential actions by the pipeline operator and/or other parties that could compromise the integrity of the pipeline. Incorrect operations are those caused by human error leading to the incorrect operation of the pipeline system, which could ultimately lead to a release. Weather-related and other natural force threats occur in nature and have the potential to damage the pipeline system, such as a lightning strike or tornado.

A review of the incident data revealed that corrosion and equipment failure were the two primary causes of pipeline incidents; together they accounted for approximately 73 percent of the incidents reported between 2010 and 2017. The Department notes that, per the PHMSA incident database, the two notable recent spills along TransCanada-owned pipelines, as discussed in Section 5.3.3, were caused by material failure of the pipe or weld (i.e., a welding anomaly) and other incident cause (i.e., mechanical damage caused during pipeline construction). Figure 5-3 depicts the cause of pipeline incident by incident size.



Source: PHMSA 2018b

Figure 5-3. Reported Incident Cause by Spill Size

5.3.3 Incident Analysis for TransCanada

Several different sources of pipeline incident data support the pipeline incident analysis; however, the primary source of data is the USDOT PHMSA incident database. The Department reviewed PHMSA data sets collected between 2010 and 2017. A review and analysis of PHMSA pipeline incident data provide information used to calculate the frequency of spills from U.S. onshore pipelines carrying crude oil. This analysis does not include spills from offshore pipelines or pipelines transporting other products, such as refined petroleum products or highly volatile liquids.

Table 5-4 compares this industry incident rate to that of a subset of pipeline incident data for pipeline facilities operated by TransCanada (the parent company of Keystone) and presents the number of incidents per 1,000 miles of industry or TransCanada-operated pipeline. During the period between 2010 and 2017, TransCanada-operated pipeline facilities experienced 11 small spills, 2 medium spills and 1 large spill (PHMSA 2018b).

Table 5-4. Incident Rate Summary (2010-2017)

Pipeline Operator	Incident Rate Per 1,000 Miles of Onshore Crude Oil Pipeline			Total Volume Spilled (bbl)
	Small Spills	Medium Spills	Large Spills	
Industry Average	2.68	0.54	0.08	270,458
TransCanada	0.86	0.16	0.08	10,555

Source: PHMSA 2018a, 2018b
bbl = barrel
Note: As 2017 mileage was not yet available at the time of this Draft SEIS preparation, this table uses the 2016 mileage of onshore crude oil pipeline to reasonably estimate the mileage for 2017.

A large spill occurred along the 30-inch TransCanada-operated existing Keystone Mainline pipeline releasing 9,726 barrels (408,492 gallons) on November 16, 2017 in Marshall County, South Dakota (PHMSA 2018b). Personnel initiated pipeline shutdown and isolation 3 minutes after the supervisory control and data acquisition (SCADA) system detected a drop in pressure and increase in flow rate. However, initial estimates underestimated the volume of product released. The release occurred in a rural agricultural area and resulted from previously undetected mechanical damage caused during construction of the pipeline in 2008 (PHMSA 2017). All remediation efforts, consisting primarily of soil removal, replacement and reseeding, have since been completed. Twelve groundwater monitoring wells were installed, but no groundwater contamination was detected as a result of this release (Exp 2018).

A recent medium spill occurred on April 2, 2016 when the existing Keystone Mainline pipeline released approximately 400 barrels (16,800 gallons) of crude oil onto a rural agricultural area near Freeman, South Dakota. A landowner notified a One-Call center, which then notified TransCanada. A welding anomaly caused the spill. An anomaly is a defect or imperfection, such as a change in wall thickness resulting from metal loss, a deformation of the pipe wall or a crack. During excavation, oil was discovered to have migrated into the soil farther than initially estimated. A shutdown of the affected segment of the pipeline lasted for 7 days, under the direction of PHMSA, before beginning to operate again on April 9 under increased supervision (PHMSA 2016). The state's environmental response agency stated that the release did not affect aquifers (Egan 2016)

5.3.4 Major Spills by Other Companies

The Department reviewed available data for the following major spills of crude oil on pipelines operated by companies other than TransCanada, selected based on their sizes, impacts and similar product properties, to further support the analysis of impacts resulting from releases.

- **Marshall, Michigan 2017.** A spill near Marshall, Michigan in July 2010 released approximately 20,082 barrels (843,444 gallons) of dilbit, a heavy crude oil, into a wetland, which flowed into Talmadge Creek and ultimately to the Kalamazoo River. At the time, the river flowed at flood stage, meaning that the water flowed higher and faster than usual. Observable floating and submerged oil from the release traveled 40 river-miles downstream along the Kalamazoo River and to the western side of Morrow Lake (National Transportation Safety Board 2012). Water sampling showed no spill-related contamination below Morrow Dam to Lake Michigan (USEPA 2010). This dam, located at the western end of Morrow Lake, represents the end of the 40-river-mile extent exposed to visually observed crude oil. While this spill represents extreme circumstances regarding the volume of oil released to the environment and the flow rate of the waterway, the Marshall spill provides a conservative example of what impacts could result from a spill along a waterway.
- **Laurel, Montana 2011.** On July 1, 2011, the Silvertip Pipeline, owned by Exxon Mobil Pipeline Company, released approximately 1,509 barrels (63,378 gallons) of light, sweet crude oil into the Yellowstone River near Laurel, Montana. The Yellowstone River flowed at the peak of a 30-year flood at the time of the rupture (Montana Department of Environmental Quality 2016a). River scour and erosion had exposed the pipeline (which was buried 5 to 8 feet below the riverbed according to a January 2011 depth-of-cover survey), and debris became caught on the exposed line. The pressure caused by the debris and the flood-stage river flow gradually increased external stress until the pipeline failed (PHMSA 2015). The river was under flood conditions when the release occurred, which allowed visible signs of the oil to spread at least 70 miles downstream of the release point. The flooding also raised safety concerns, resulting in a delayed spill response. The floodwaters also forced oil to wash ashore into agricultural fields along the river. Samples of groundwater and drinking water sources found no evidence of spill-related contamination (Montana Department of Environmental Quality 2016a). In 2012, ExxonMobil Pipeline Company paid $1.6 million in penalties, cleanup costs and payments of the state's costs (Montana Department of Environmental Quality 2016a). A 2015 final order from PHMSA ordered the payment of an additional $1.05 million in civil penalties (PHMSA 2015).
- **Mayflower, Arkansas 2013.** On March 29, 2013, a 3,190-barrel (133,980-gallon) Wabasca Heavy crude oil spill occurred from a 20-inch pipeline operated by ExxonMobil Pipeline Company in a residential neighborhood in Mayflower, Arkansas (Fariello 2013; PHMSA 2018b). Metallurgical analysis determined that the spill resulted from a crack in the pipeline (Hurst Metallurgical Research Laboratory, Inc. 2013). Valves closed 16 minutes after detecting a pressure drop in the pipeline. The release did not cause any known injuries, fatalities or fires; however, the city of Mayflower recommended the evacuation of 22 homes near the release. The Mayflower Police Department notified residents of these homes as to the city's recommendation. Sampling efforts conducted in support of the spill response detected elevated levels of polycyclic aromatic hydrocarbons and benzene in a small percentage of collected soil samples. The air quality remained within acceptable levels with the exception of the high pooling areas, where response crews worked with safety equipment (Arcadis 2014). Total costs to respond, remediate and address property damage resulting from the spill exceeded $81 million.
- **Mountrail, North Dakota 2013.** On September 29, 2013, a local farmer observed oil in an agricultural field in Mountrail, North Dakota. An underground pipeline operated by Tesoro High Plains Pipeline had released 20,600 barrels (865,200 gallons) of Bakken crude oil (PHMSA

2018b; Sider 2013). This spill was one of the largest in state history. At the time of the release, continuous leak detection equipment was not installed, nor required for the segment of pipeline affected (Frosch 2013). The spill was contained within a 7-acre spill zone, according to the North Dakota Department of Health, and 13 acres of land were excavated as part of the remediation phase (Nemec 2016). The spilled oil seeped into the soil to a depth of at least 30 feet, but was still well above the water table (Smith 2014). The root-cause analysis conducted by the pipeline operator determined that the release occurred at the site of a hole created by an electrical discharge through the soil, which could have been the result of a lightning strike (PHMSA 2018b).

- **Glendive, Montana 2015.** A January 17, 2015, a pipeline operated by Bridger Pipeline ruptured beneath the Yellowstone River in Montana and released over 729 barrels (30,618 gallons) of Bakken crude oil (PHMSA 2018b). The spill occurred from a breach in the pipe body caused by river scour. The frozen Yellowstone River impeded cleanup efforts. Sampling efforts detected benzene at a water intake associated with the city of Glendive's public drinking water supply located 7 miles downstream. Glendive's water treatment plant used activated carbon filtration to remove VOCs from drinking water. Daily sampling continued at the treatment plant prior to the installation of an alarm system that would shut down the plant if benzene levels reached 2 ppb (less than half of the maximum contaminant level allowed by the Clean Water Act) (Montana Department of Environmental Quality 2016b). More than a month after the release, Montana Fish, Wildlife and Parks personnel caught and tested fish in the affected area. They found detectable levels of polycyclic aromatic hydrocarbons in some of the fish muscle tissues (Montana Fish, Wildlife and Parks 2015). Section 5.5.7 provides additional information regarding potential impacts to fish and wildlife from exposure to polycyclic aromatic hydrocarbons. The section of damaged pipeline was removed from the river and sent to a lab in Oklahoma for metallurgical testing (Montana Department of Environmental Quality 2016b). Bridger and the Montana Department of Environmental Quality signed a Consent Order for the incident on February 8, 2017. In accordance with this agreement, Bridger will pay a $1 million civil penalty, which will include $200,000 toward the State's general fund and $800,000 on Supplemental Environmental Projects approved by the Montana Department of Environmental Quality (Montana Department of Environmental Quality 2017).

5.4 CRUDE OIL RELEASES

This section summarizes key information that is required to understand how crude oil behaves following release to the environment. The following characteristics are of particular importance with respect to environmental effects from a spill.

5.4.1 Characteristics of Crude Oil

Crude oils differ in their solubility, toxicity, persistence and other properties that affect their impact on the environment. The following characteristics of crude oil are of particular importance with respect to environmental effects from a spill:

- Density – determines whether the crude oil is classified as light, medium or heavy.
- American Petroleum Institute (API) gravity – (measured in degrees) indicates whether the crude oil would sink or float upon release to a waterbody.

The API gravity is an inverse measure of a petroleum liquid's density relative to that of water. If the API gravity of the product is greater than 10 degrees, it is less dense than water and thus floats on water. If the API gravity of the product is less than 10 degrees, it is denser than water and thus sinks in water (Platts 2018).

- Viscosity – a measure of how easily the oil would flow. Typically, viscosity increases (meaning it does not flow as easily) as temperature decreases.
- Pour point – the lowest temperature at which the oil changes from a free-flowing liquid to a material that does not flow freely.
- Proportions of volatile fractions (e.g., benzene, toluene, ethylbenzene and xylenes [BTEX]) and semi-volatile fractions (e.g., polycyclic aromatic hydrocarbons) – an indicator of (1) the portion of oil that would more readily evaporate, (2) the portion of oil that would more likely physically persist in the environment (3) the portion of oil that could dissolve or disperse into an aquatic environment and cause potential toxicological effects on animals and plants. Many of the volatile and semi-volatile compounds are considered key toxic components of crude oil.
- Proportions of other elements and compounds, including sulfur and metals. Typically, crude oil with a sulfur content greater than 0.5 percent by weight is considered sour, and crude oil with less than 0.5 percent sulfur is considered sweet.

Under the Proposed Action, the MAR pipeline would transport a variety of crude oils. These can be categorized into three general categories: conventional light crude oil (from the Bakken formation), synthetic crude oil (e.g., Suncor Synthetic A) and dilbit (e.g., Western Canadian Blend). Table 5-5 summarizes the characteristics of these products.

Table 5-5. Average Physiochemical Properties of Crude Oils Transported on the MAR Pipeline

			Bakken	Suncor Synthetic A	Western Canadian Blend
Parameter	**Unit**	**Measure**	**Light Conventional**	**Sweet Synthetic**	**Dilbit**
Density	g/ml	Mean	0.82	0.86	0.92
Gravity	API	Mean	42.1	32.5	21.8
Viscosity	cSt @ 38°C	Mean	3.4	4.5	63
Pour Point	°C	Mean	3	-72	-45

Source: Crude Quality, Inc 2018a, 2018b, 2015; North Dakota Petroleum Council 2014; TransCanada 2017
% = percent; °C = degrees Celsius; API = American Petroleum Institute; cSt = centistoke; g/ml = grams per milliliter

Bakken crude oil is a light sweet crude oil that typically contains high concentrations of light end petroleum hydrocarbons, such as methane, ethane, propane and butane, and may also include hydrogen sulfide. Bakken crude oil has a very high API gravity and therefore would be more volatile and buoyant in water than the heavier crude oils.

Synthetic crude (Suncor Synthetic A) is created when raw bitumen is partially refined (i.e., upgraded) through a process that removes many of the high molecular weight compounds present in the bitumen (e.g., asphaltenes). Synthetic crude oil is comparable to mid-weight conventional crude oils. The representative synthetic crude oil (Suncor Synthetic A, has an API gravity of 32.6, indicating that it will have environmental processes between a light and a heavy crude oil with respect to spreading, evaporation or emulsification.

Dilbit is created when the highly viscous raw petroleum product extracted from the Alberta oil sands (called bitumen) is diluted so it can be transported by pipeline. Bitumen is composed of high-molecular-weight hydrocarbons, commonly called asphaltenes. Asphaltenes primarily contain heavy hydrocarbons, nitrogen, oxygen, sulfur and traces of heavy metals like nickel and vanadium. At room temperature,

bitumen is a dark, sticky sand that looks similar to topsoil. In order to transport through a pipeline, diluents are added to reduce the viscosity of the product. Diluents typically include natural gas condensate, naphtha or a mixture of other light hydrocarbons; however, diluents vary, and the mixture typically remains a trade secret. Natural gas condensate (a by-product of natural gas production) is currently the primary type of diluent used for Canadian heavy crude oil. Typically, dilbit consists of 30 percent diluent and 70 percent bitumen (Crosby et al. 2013). The ratio of diluent to bitumen in dilbit is such that it will still flow at the lowest pipeline operating temperature (42 degrees Fahrenheit [°F], or 6 degrees Celsius [°C]). Like all the crude oils transported on the MAR, dilbit has an API gravity higher than 10, indicating it will initially float on water. In addition, dilbit is more viscous than either synthetic or conventional light crude oils, so it will spread over land and across water at a slower rate. Due to their high viscosity, heavy crude oils do not disperse in the environment as quickly as light crude oils. Heavy crude oil like Western Canadian Blend has a greater proportion of heavy molecular weight compounds (e.g., asphaltenes, resins), and tends to be more stable and thus have longer environmental persistence than lighter crude oils.

5.4.2 Propagation of Spills

Many variables influence the speed and distance a released product travels from the site of a release (referred to as propagation). This section first discusses the types of releases that could occur, and then discusses the factors specific to surface releases and water releases. Section 5.5 discusses how these general factors apply to the specific resources and conditions found within the proposed MAR pipeline ROI.

5.4.3 Release Type

One major characteristic that affects the volume of a release is the release type (e.g., leak versus rupture). A leak is a release over time, typically over an extended duration. Leaks can result from a small crack or hole in a pipeline and may be difficult to detect. A rupture, however, occurs because of a significant failure of the pipeline system. A rupture produces an opening in the pipeline that is capable of releasing product at a relatively high flow rate. A rupture generally renders the pipeline inoperable, as opposed to a leak, which may remain undetected during the operation of the pipeline and its facilities. Leaks and ruptures also differ in terms of fluid lost per unit of time; ruptures have a much higher rate of release than leaks. As a result, ruptures are typically easier for a leak detection system to identify; however, the higher release rate could result in a larger spill.

The total volume of a pipeline release depends on a number of factors, such as the type of release, hole size, pipeline pressure, pipeline elevation and the distance between isolation valves. After detecting and confirming a leak, the pipeline control center personnel would shut down the pump stations on the pipeline, thus eliminating the force maintaining pressure on the pipeline. Personnel would then begin closing valves to isolate the leak. The volume contained in the mainline pipe between the isolation valves could also contribute to the spill even after the isolation valves are closed. The time it takes to shut down the pipeline and close valves directly affects the volume of product that escapes and depends on the pipeline equipment. For example, valves with manual controls (referred to as “manual valves”) require a person to arrive onsite and either turn a wheel crank or activate a push-button actuator. Valves that can be closed without a person at the valve’s location (referred to as “automated valves”) include remote-control valves, which can be closed via a command from a control room, and automatic-shutoff valves, which can close without human intervention based on sensor readings.

In accordance with Subpart D of 49 CFR 195, Keystone would locate remotely activated valves along the proposed pipeline at pump stations and receipt facility sites, as well as at upstream and downstream sides

of each waterbody crossing greater than 100 feet in width. When planning valve placements, Keystone would consider topography, access and proximity to power.

5.4.3.1 Surface Release

The behavior and distance that spilled crude oil could travel over land from the site of a release depends upon many factors, including the viscosity of the crude oil, the topography of the area, location of the release, soil type, land cover, weather, volume of the release and the timing and effectiveness of the spill response.

Crude oil released from an underground pipeline would absorb into the soil in the area of the release. A leak with a very low flow rate would saturate the soils around the site of the release and would likely flow downwards toward the water table, potentially resulting in the contamination of groundwater. If the flow rate of the release were large enough, the product could flow to the surface and create overland flow. Lighter crude products, such as Bakken crude oil, have lower viscosities than heavier crude oils and could therefore spread faster from a release point than heavier products like dilbit, but may permeate into the soil more readily.

A release that makes it to the surface would initially accumulate at the site of the release and then spread along the surface of the land. As the oil is released and spreads from the site of the release, weathering and dispersion would occur. Major weathering and dispersion processes in soil include sorption (attachment of free oil product to soil particles), evaporation (vaporization of volatile components), photodegradation (degradation caused by sunlight) and biodegradation (degradation caused by microorganisms). These processes may act on crude oils at different rates. For instance, a spill of light crude oil would have a higher evaporation rate compared to heavy crude oils. Through evaporation, the lighter components of the crude oil would transfer from the liquid phase to the vapor phase. Evaporation would begin immediately after a release and result in a significant reduction in the volume of the release. Light crude oils can lose up to 75 percent of their released volume after just a few days because of evaporation, while medium crude oils can lose up to 40 percent of their released volume in that time period (National Research Council 2003).

The type of soil at the site of the release also affects the spread of the spill. Sands and gravels have larger pore sizes, so the soil particles are spaced farther apart. Soils with a larger pore size allow liquid to pass through them more quickly. A release that occurs in an area of sandy soils could soak into the soil more quickly than a release that occurs in soils that are more tightly packed. Clays and silts have smaller pore sizes, which restrict crude oil from moving as freely. Thus a spill of equal volume on sandy soils would tend to penetrate deeper than in clays and silts. Because spills are more likely to move downward in sandy soil, there are generally fewer impacts to the surface, but increased potential for impacts to groundwater. The reverse is true with clay soils. In areas with a rocky surface, spills would tend to both cover and pool between the rocks.

The moisture content of soil also influences its ability to soak up liquids. In wet or saturated soil, water partially or completely fills the pores between the soil particles, leaving little or no room for the less dense oil to move downward. A lack of downward movement generally leads to a spill that covers a larger surface area. As a spill spreads over land, the oil adheres to dry surfaces. Because saturated soils are less susceptible to the downward movement of crude oil, they tend to allow oil to flow over the ground surface.

Ground cover also affects the ability of a spill to flow over the ground surface. Ground covers, including grasses, forests, saturated ground and hardscape (e.g., concrete or asphalt) all retain different amounts of oil. Crude oil that flows over the ground surface would coat vegetation. The surface area of the affected

plants and the amount of oil retained would affect the overall extent of the spill. Where the oil flows into forested areas, shallow root zones may act as conduits and allow the oil to penetrate deeper into the soil. In hardscapes, oiling tends to be surficial, except where expansion joint seams, cracks or other deformities in the cover's surface exist. Cracks and joints in roadways could allow oil to reach the potentially more permeable underlying soils and increase the depth of the impact.

5.4.3.2 Water Release

The crude oils to be transported on the proposed MAR have an API gravity higher than 10 (see Table 5-5), indicating that if a release occurred in or flowed to a waterbody, the crude oil would initially float on the surface of the water. As the oil floats, some constituents within the crude oil would evaporate and others would dissolve. Lighter crude oils with lower densities (higher API gravities) and a higher proportion of volatile compounds have a greater propensity to float in water and evaporate more readily than heavier crude oils. In turn, the lighter components create a very thin sheen of oil that can spread farther and affect a larger area than what would be expected of a heavy crude oil (e.g., refer to Section 5.3.4 discussion of the Laurel, Montana 2011 spill of light sweet crude oil into the Yellowstone River that resulted in visible signs of oil at least 70 miles downstream). Physical factors that could affect the crude oil's mobility in water include wind speed, waterbody currents, waves, waterbody flow velocity and temperature. As the product floats, some constituents would evaporate and others would dissolve; eventually some material would disperse into the water and the remainder would sink. Heavier crude oils are more viscous than either synthetic or conventional light crude oils and would spread across water at a slower rate. As such, heavier crude oils do not disperse into the environment as much or as quickly as light crude oils following a water release. Turbulence in the water promotes dispersion, such that during storm events, dispersion can be the chief removal mechanism of the slick. During storms, the majority of the oil can be dispersed into the water column. For releases under more normal weather conditions, dispersion generally is nominal, and evaporation is the primary environmental fate process.

While crude oil would initially float on water following a release, the heavy compounds remaining after the volatile constituents evaporate are more likely to become submerged or sink after product weathering and adhere to sediment or other particles within the water column. Submerged products are heavier than water, which causes them to sink below the water surface and become suspended in the water column by the tide or current. Whereas sunken products reach the floor of the waterbody and will collect in low-lying areas. Flowing water systems could transport submerged or sinking product downstream or result in deposits in river or stream bottoms. These deposits could become a continual source of contamination as stream flow continues to distribute them.

Evaporation is the primary mechanism responsible for the reduction in crude oil volume, particularly in the first few days following a release, through the loss of low molecular weight constituents and light oil products. Evaporation increases with spreading of a slick, higher temperature, and wind and wave action. As lighter components evaporate, remaining crude oil becomes more dense and more viscous. Evaporation usually reduces the toxicity of the oil; however, it can also lead to greater persistence within the water if the remaining oil is not cleaned up quickly.

Dissolution of crude oil in water is not a primary fate process since most components of crude oil are relatively insoluble. Dissolution increases based on evaporation, increasing temperature, decreasing salinity and increasing concentrations of dissolved organic matter (MassDEP 2015). Photodegradation (decomposition of the oil by sunlight) is also not a primary fate process. Photodegradation tends to enhance the solubility of crude oil in water but can also increase its toxicity.

The cold temperatures typical of winters in Nebraska could freeze waterways and greatly complicate the response to an oil release into water. The presence of ice inhibits initial detection of a spill, observations of the presence of oil and estimates of the extent of the oil within the waterway (Montana Department of Environmental Quality 2016b). A recent (January 2015) Bakken crude oil spill near Glendive, Montana occurred when an underwater section of the Popular Pipeline, operated by Bridger Pipeline, LLC, ruptured and released 729 barrels (30,618 gallons) of product into the frozen Yellowstone River (PHMSA 2018b). The ice slowed the oil's travel downstream, but also trapped VOCs within the water column that would have otherwise quickly dissipated in open water. These VOCs affected drinking water intakes downstream of the spill (Nunez 2015). Response personnel carved ice slots along the Yellowstone River to find and recover the oil. Fractures in the ice trapped some of the oil found on the surface of the frozen river (Montana Department of Environmental Quality 2016b; Nunez 2015). Oil recovery took place slowly, potentially increasing the downstream distance affected by the release.

As explained in Section 5.3.2, continuous scour caused by water currents or other hydrodynamic forces can threaten the integrity of pipelines buried beneath water bodies. As part of the U.S. Army Corps of Engineers Section 14 of Rivers and Harbors Act of 1899 review process (as codified at 33 USC 408), Keystone prepared a Missouri River Scour Analysis on the integrity of the Keystone XL pipeline to withstand scour action at the proposed Missouri River water crossing in Montana. At this crossing location (downstream of the Fort Peck spillway), the pipeline would be installed using HDD for 2,592 feet at a depth of approximately 43 feet below the lowest surveyed river elevation. The hydraulic model and scour analysis estimated that the 500-year flood frequency event could result in a river-bottom scour depth of 11.9 feet, which would leave 22.1 feet of covering over the pipe. The analysis also considered a worst-case scenario, the equivalent of a 40,000-year event, whereby the Fort Peck spillway outflows exceeded design capacity (resulting in a full spillway release) adding an additional 350,000 cubic feet per second of flow. This event could generate a river-bottom scour depth of 21.7 feet, leaving 12.3 feet of cover over the Keystone XL pipe. Based on the analysis, the report concluded that the current design depth would be adequate to protect against potential scouring (TransCanada 2018a).

Based on these findings and the conservative 40 river-miles downstream transport distance used within this analysis (see Section 5.2), water intake withdrawals considered in the 2014 Keystone XL Final SEIS would be outside of the potential area affected by a worse-case discharge. As described in the 2014 Keystone XL Final SEIS, both the Assiniboine and Sioux Rural Water Supply System and the Mni Wiconi Rural Water Supply System (MWRWSS) operate water intakes on the Missouri River to provide potable water. The distance from the pipeline crossing to the Assiniboine and Sioux Rural Water Supply System intake is over 70 miles, and the MWRWSS intake is over 100 miles. Another crossing potentially influencing the Missouri River and water intakes is the Bad River crossing, which is approximately 44 river-miles upstream of the Missouri River confluence. The MWRWSS intake is on the Missouri River and more than 3 miles upstream from the confluence with the Bad River. The Cheyenne River crossing is approximately 57 river-miles upstream of Lake Oahe, a reservoir on the Missouri River, and approximately 110 river miles upstream of Pierre.

The potential of spills or releases into surface waters could potentially result in impacts to vegetation, wildlife and fisheries as discussed in the 2014 Keystone XL Final SEIS and within this Chapter. The intensity of impact to the resource would be dependent on the location and size of release. As discussed in Section 5.2, this could include up to 40 river-miles downstream of the site of release. Impacts to vegetation, wildlife and fisheries also have the potential to impact subsistence activities including impacts to hunting and fishing rights. The loss of access to subsistence resources as a result of an accidental release would require individuals dependent on these resources to hunt, gather, harvest and fish elsewhere until the site of an accidental release is remediated.

As discussed in the 2014 Keystone XL Final SEIS, if there is an accidental release that could affect surface water, Keystone would be liable for all costs associated with cleanup and restoration, including damages to natural resources and for the loss of subsistence use of these natural resources (U.S. Department of State 2014).

5.4.3.3 Fire and Explosion

Crude oils are flammable petroleum products; however, a fire or explosion will only occur under the following conditions:

- **Fuel** – The vapors produced from the crude oil must mix with the air to a sufficient concentration (lower flammable threshold) at which the mixture will ignite).
- **Oxygen** – Oxygen must be present in the air at a concentration to support ignition.
- **Heat** – The temperature of the fuel must be heated to a point where sufficient vapors are given off for ignition to occur.

By federal definition, a substance is flammable when it has a flash point between 20 °F (-6.7 °C) and 100°F (37.8°C) (16 CFR 1500.3). The flash point is the temperature at which a substance reaches a sufficient fuel-to-air concentration to ignite when exposed to an open flame (Tsaprailis 2014; Platts 2018). By this flash point definition, crude oil is a flammable product; however, the appropriate concentrations of flammable vapors from the crude oil and oxygen would need to be available in the presence of an ignition source for a fire to occur. Crude oil released into confined areas could generate a sufficient concentration of flammable vapors to ignite, while crude oil released in an open environment would be less likely to reach the concentration necessary to cause a fire or explosion since the flammable vapors released from the oil would disperse throughout the surrounding area. Very low oxygen levels and the lack of an ignition source inside a closed pipeline make it unlikely that an explosion or fire would occur.

After a spill, the flammability of crude oil decreases through natural weathering and the loss of volatile components. This occurs through processes such as evaporation, wave/wind action, dispersion, dissolution, sedimentation and biodegradation, among others. The location of an oil spill plays a role in the rate of weathering, and therefore the length of time that the oil remains flammable.

The range of values reported for the flash point of Bakken crude oil varies significantly with some values reported on safety data sheets as low as less than -20°F (-28.9°C) (ConocoPhillips 2014), but more typically reported as less than 73°F (22.8°C). One reason for this variability is the test methods that are used to determine the flash point in the laboratory may allow some of the lighter compounds to evaporate from the product during sampling and analysis, which would bias the test for a higher flash point (Sandia National Labs 2015). Since it is the vapor emissions that actually burn, crude oil containing more light components, such as Bakken, have lower flash points and are more flammable than heavier crude oils.

Dilbit, although classified as a heavy crude oil, initially acts more like a lighter crude oil, governed by the 20 to 30 percent volume of diluent component (Tsaprailis 2014). The abundance of volatile compounds in dilbit allows the product to be potentially flammable for a day or longer after a release (National Academies of Sciences, Engineering and Medicine 2015). Cold weather conditions slow the volatilization process and thus may extend the period during which the product is flammable (Tsaprailis 2014). The flash point of dilbit is comparable to light crude oil before it is released. However, initial weather of dilbit occurs very rapidly after a release, which causes its flash point to quickly rise above the flammable limit (e.g., to greater than 148°F [60°C]) (National Academies of Sciences, Engineering and Medicine 2015).

5.4.4 Response and Remediation of Spills

After safety, the highest priority for spill response is to prevent released product from reaching water and then to reduce or avoid product migration out of the source area. When a spill occurs, one of the first challenges that first responders face is containing and recovering the spilled product. The faster a spill can be contained, the smaller the area (and number or extent of resources) that the spill would affect. The methods and technologies used to contain a spill depend on whether the spill occurs over land or water.

Many of the methods used to detect, contain and recover spilled product are well established and have been used over the past several decades. Technological refinements and advances in addressing spills continue to improve and advance the ability of responders to contain and clean up spills. Whichever methods response crews use to contain and recover the spilled product, they must weigh the effectiveness of the response and remediation technique against the intrusiveness of the remedial effort on the environment and potential receptors. Response personnel need to select technologies that provide the greatest degree of protection to human health and environmental resources.

All spill prevention, mitigation and remediation plans developed for the Keystone XL Project and discussed in the 2014 Keystone XL Final SEIS would apply to the MAR. (Refer to Section 3.13.1 and Appendix B of the 2014 Keystone XL Final SEIS.) The combined implementation of industry standards and practices that Keystone would implement as part of construction and operation of the Keystone XL and MAR would aid in reducing the potential for spill incidents associated with the proposed Project. The standards were developed by the National Association of Corrosion Engineers (NACE), International and American Society of Mechanical Engineers (ASME), and other industry leaders.

The Department, in consultation with PHMSA, has determined that these standards and practices, combined with PHMSA regulatory requirements and the set of proposed Project-specific Special Conditions developed by PHMSA, would result in a degree of safety over any other typically constructed domestic oil pipeline system under current code and a degree of safety along the entire length of the proposed pipeline system, similar to that required in high consequence areas as defined in 49 Code of Federal Regulations (CFR) 195.450. The Project-specific Special Conditions include a list of 59 items, or "considerations" that PHMSA recommended be included in the written design, construction, operating and maintenance plans and procedures for the Keystone XL pipeline. (Refer to Appendix B of the 2014 Keystone XL Final SEIS). These considerations exceed existing federal standards and will also be implemented along the MAR pipeline. The 59 conditions include, among others, the items listed below separated into four categories:

- **Material requirements** for the steel used to manufacture the pipeline, manufacturing standards, fracture control measures, quality control measures, puncture resistance and pipe coatings.
- **Construction requirements** for coatings, fittings, pipeline design factor, temperature control, overpressure protection control, welding procedures, depth of cover and pressure tests.
- **Operations and Maintenance** requirements for the SCADA system, pipeline inspection, corrosion surveys, cathodic protection, pipeline markers, a damage prevention program and anomaly evaluation and repair.
- **Reporting, records retention, and senior-level certification requirements.**

In accordance with 49 CFR 195, Keystone will maintain an Integrity Management Program required for pipelines that could affect a high consequence area. As stated in Section 3.13-1 of the 2014 Keystone XL SEIS, a Facility Response Plan, which would include the proposed Project-specific Emergency Response Plan, would be prepared and submitted to PHMSA prior to initiating operation of the proposed Project, in accordance with requirements of 49 CFR Part 194. These plans rely on final permitting requirements and detailed design and construction information. A proposed Project-specific, worst-case spill scenario including location, available resources, and response actions would be addressed in the Facility Response Plan and Emergency Response Plan once the final permitting, detailed design, and construction information were available. Under current regulations, Keystone would be required to submit these plans for review 6 months prior to operation of the proposed Project, and PHMSA would provide them to the USEPA for their review.

5.4.4.1 Spill Response and Containment

Mechanical containment and recovery is the primary method used in spill response. This equipment includes booms, skimmers, temporary dams or berms, sorbent materials and vacuum equipment/trucks, which response crews use to contain, capture, temporarily store and recover spilled product until it can be properly disposed.

Submerged and sunken oil is difficult to detect because it is often not visible from the surface. Visual observation is a viable detection method in shallow water, although expert analysis is essential for this technique as aquatic biota (vegetation) in the water may be mistaken for oil. Currently, the best method for detecting submerged oil is to drop weighted sorbent materials into low areas for short distances and then visually inspect them for oil to map oil distribution.

Response crews may also use chemical and biological methods in combination with mechanical means for containing and cleaning up spills. Chemical dispersants break up spilled product into fine droplets that then disperse into the water column. This helps prevent the product from reaching the shore and promotes biodegradation. The USEPA maintains a list of the dispersants, washing agents, collecting agents, bioremediation agents and other spill control agents authorized for use during cleanup activities. This include agents that have undergone testing for toxicity and effectiveness and have received approval for use in the environment.

In situ burning, or burning the product in place, is a less commonly used method of containment. Response crews typically use this method only for major spills, for which burning provides the only means to eliminate large volumes of product quickly when they cannot contain or recover the product readily using other means. This technique works best when the product is fresh and the weather is relatively calm. Many regulatory agencies strictly regulate burning as a means of response. When responders burn spills over water, they can retain better control over a fire by using fire-resistant booms to cordon off portions of the overall spill, rather than igniting the entire spill at once (Barnea 1995).

5.4.4.2 Remediation

Excavation, or removal of contaminated soil and sediments, is a very common remediation method employed at spill sites. Excavation is similar to dredging, but the term dredging typically applies to work done in water, while excavation may occur on completely dry land or on streambanks. In both cases, trucks haul the contaminated soil, sediment and any associated vegetation to an approved location for treatment and disposal. For contaminated ground that cannot be removed, such as paved roads, concrete curbing or concrete drainage ditches, heated pressure washing is an effective cleaning method. The collection of wastewater, including the water used for cleaning, is important; therefore, a vacuum truck or some other type of collection must be available. Once the spill remediation effort is no longer effective or

efficient, response personnel may implement more passive remediation methods to further the remediation and restoration of affected soil, groundwater and surface water.

The reuse of hydrocarbon-affected soils as road base or in asphalt mixtures (as approved by the appropriate agencies) is one way to remediate affected soil at a spill site. The remediation crew could recycle recovered product from skimming or vacuum operations by removing water and debris and re-blending. Incineration or burning of contaminated waste from spill response and remediation for energy recovery may be an option in some areas. Disposal of contaminated soil and debris at a solid or hazardous waste landfill is the least environmentally sound method of disposal and would be considered only as the last option.

5.5 IMPACTS OF RELEASES

5.5.1 Introduction

A spill of crude oil could result in impacts to the various resources discussed in Chapter 3, Affected Environment. The nature and extent of impacts would depend on many factors, including the size of the release, the proximity of the release to sensitive resources, the proximity to features that would promote the transport and migration of the crude oil, and weather conditions that could affect the mobility of the oil and accessibility of areas for response actions. This section provides a qualitative and, where practicable, quantitative description of the types of impacts that could occur from spills and the likelihood of various spill sizes affecting resources.

The remainder of this chapter addresses the likelihood and consequences of spills associated with each of the resource areas analyzed in this SEIS. This analysis takes into account the location of sensitive resources near the MAR by evaluating which resources exist nearby that could experience adverse impacts in the event of a spill. The 2014 Keystone XL Final SEIS considered the risk of an accidental release along the Preferred Route, as well as the potential effects of such a release. This SEIS builds upon the conclusions of the prior document and assesses the risk to resources located along the MAR and evaluates whether any new or unique features or resources may be present along the MAR that were not previously considered in the 2014 Keystone XL Final SEIS. This analysis of the MAR concludes that the potential environmental impact resulting from an accidental spill of crude oil along the MAR would have similar potential impacts as that originally identified in the 2014 Keystone XL Final SEIS along the Preferred Route.

The increased length of the MAR, which is 6.2 miles longer (4 percent) than the Preferred Route, would represent an increase of 0.0026 event per year (1 additional event in 400 years) of a release of any size from the pipeline. Therefore, the likelihood of a release from the MAR would be substantially similar to that of the Preferred Route as analyzed in the 2014 Keystone XL Final SEIS. In addition, the MAR would require less newly constructed pipeline ROW, since approximately 89 miles (55 percent) of the MAR would be co-located within an existing pipeline ROW (Keystone Mainline). In contrast, only 0.6 mile (0.04 percent) of the Preferred Route would be co-located within an existing pipeline ROW (Keystone Mainline). As a result, because of the greater overlap with an existing pipeline ROW, the level of newly introduced risk to resources from a pipeline release would be less for the MAR in comparison with the Preferred Route. In addition, the MAR was routed to avoid the Sand Hills Region, a sensitive area that would be affected by the Preferred Route. Therefore, the MAR would result in less intensive adverse impacts if a spill were to occur as compared to the Preferred Route assessed in 2014. The remainder of this section describes potential effects from an accidental release to specific resources found along the MAR, and therefore not assessed in the 2014 Keystone XL Final SEIS, and calculates the likelihood of such effects occurring.

A spill of crude oil from the MAR pipeline could result in impacts to the various resources presented in Chapter 3, Affected Environment. As discussed in the 2014 Keystone XL Final SEIS, the nature and extent of impacts of a spill depends on many factors including the product spilled, the size of the release, the proximity of the release to sensitive resources, the proximity to features that would promote the transport and migration of the crude oil, the response time and actions taken by responders, the weather conditions that could affect the mobility of the oil and the accessibility of areas for response actions. This section provides a qualitative and, where practicable, quantitative description of the types of impacts that could occur from spills as well as the likelihood of various spill sizes affecting resources along the MAR. This analysis considers the location of sensitive resources near the MAR by evaluating which resources exist nearby that could experience adverse impacts in the event of a spill.

As explained in Section 5.2, this analysis incorporates the screening-level spill modeling conducted during preparation of the 2014 Keystone XL Final SEIS to estimate the distance that crude oil could travel over flat land after a spill. This analysis determined that a 50-barrel (small) spill could spread over land up to 112 feet from the site of a spill; a 1,000-barrel (medium) spill could spread up to 367 feet; and a 20,000-barrel (large) spill could spread up to 1,214 feet over land from the release point. If released crude oil reached groundwater, the screening modeling conducted for the 2014 Keystone XL Final SEIS found that components in the oil, such as benzene, could spread downgradient in groundwater an additional 640 feet for a 50-barrel spill, 820 feet for a 1,000-barrel spill, and 1,050 feet for a 20,000-barrel spill. This modeling effort also indicated that the three spill volumes could reach groundwater at a depth of 50 feet, although larger volumes could be expected to reach groundwater at deeper depths. Thus, as shown in Figure 5-1, the full extent of a spill could reach the overland distance plus the additional dissolved phase distance. Refer to the 2014 Keystone XL Final SEIS for further discussion of the screening-level modeling effort and the calculation of these distances.

The Department also considered a 40 river-mile downstream distance as the distance crude oil released to water could travel (see Section 5.2). For each of the modeled spill distances, the Department assessed the likelihood that a spill could affect sensitive resources, based on spill incident rates and the amount of the resource present within these areas determined to be susceptible to a spill. The following subsections present the likelihood of resources along the MAR being affected by potential small, medium and large spills.

Depending upon the resource, a release could have a variety of impacts. For example, a release of crude oil could have a negligible impact on geology but could contaminate soils and groundwater. Other resources, such as biological resources and surface waters, contain sensitive receptors. Sensitive receptors can include habitat for protected species and drinking water intakes, which could experience substantial adverse effects in the event of a release. The impacts of a spill on other resources such as air quality (by the volatilization of organic compounds in the oil) and socioeconomics (through changes to commercial activity and residential properties) may also affect local residents adversely. Therefore, the analysis of impacts from a release requires a balanced consideration of the resources affected and the particular receptors that would be most at risk.

Impacts that result from accidental releases of crude oil may be short- or long-term in duration. Short-term impacts generally signify that a resource can recover within a reasonable length of time. Removal of the spilled oil typically can mitigate short-term impacts. Examples of short-term impacts include the noise and visual impacts associated with cleanup efforts, or the potential impact on air quality near the spill site. Long-term (chronic) impacts may signify that affected resources require many years to return to pre-spill conditions, or that an affected resource will not return to pre-spill conditions. Such impacts may include the substantial alteration of an existing habitat, recreational area or cultural resource to the point that it no longer serves its original function. Whether an impact is short- or long-term depends on factors

such as the location of a spill, the geographic extent of a spill, resources present within that spill area, and the volume of product released.

The volume of crude oil released during a spill can substantially affect the potential for impacts. However, a more critical factor is the location of the spill in relation to sensitive resources, such as waterbodies and population centers. A small spill that occurs near a sensitive resource may result in greater impacts than a large spill in an area devoid of sensitive resources and receptors. Therefore, location (i.e., proximity of the spill to sensitive resources) is a key factor that influences the actual consequences of a spill.

The location of a release relative to areas of human activity could affect its overall impact. Generally, most spills would occur within or near the pipeline ROW or ancillary features (e.g., access roads, pump stations). Spills in populated areas have a greater probability of early discovery and easier access than those that occur in a rural setting, which shortens the response time and can mitigate the extent of the impact. A spill in an urban setting generally may have different effects on human health and the environment from one in a rural setting. Spills in populated areas are much more likely to affect human receptors and their property. However, a release in a remote setting, such as a wetland or forest, may be difficult to access by response vehicles and equipment. The sparse population and infrequency of passersby may also delay the initial discovery of a spill in remote areas.

5.5.2 Land Use, Recreation and Visual Resources

An accidental release of crude oil along the MAR could result in short- or long-term effects to land use, recreation and visual resources existing within the ROI summarized in Section 3.2, Land Use, Recreation and Visual Resources. Typically, the extent of each effect would be small relative to the overall land area; however, effects from even small spills become more severe within areas of unique land use, important or unique recreation opportunities or exceptional aesthetic quality. These resources would typically be most susceptible to the physical effects of a potential release, such as physical coating of crops, recreational areas and fishing areas, including the potential accompanying nuisance odors and visual effects from the product or associated cleanup efforts. The remainder of this section discusses potential impacts to the two predominant land uses susceptible to impacts from accidental releases: agricultural and recreational land uses. Table 5-6 lists the potential direct and indirect effects to land use and recreation resulting from a release of crude oil.

Table 5-6. Potential Effects to Land Use, Recreation and Visual Resources from a Release

Resource	Direct Effect	Indirect Effect
Agricultural Land Use	Physical coating of vegetation (see Section 5.5.7).	Contaminated forage for livestock. Loss of commercial crops.
	Contaminated water (see Section 5.5.6).	Contaminated water for livestock. Contaminated irrigation water.
	Contamination of prime farmland soils (see Section 5.5.3).	Reduced soil productivity.
Recreational Land Use	Contaminated water (see Section 5.5.6).	Restricted access for boating, swimming, fishing, etc.
	Physical and toxicological effects to fish (see Section 5.5.7).	Short- or long-term loss of fishing areas or fish consumption restriction.

5.5.2.1 Agricultural Land Use

Cultivated farmland represents the dominant land use within the areas crossed by the proposed MAR, including corn, alfalfa, winter wheat, oats, grain sorghum, soybeans and hay. An accidental release has the potential to coat vegetation, including row crops, wild lands and rangelands; the crops within these areas might not survive or may experience physical impacts caused by oiling. Affected vegetation may not be suitable for grazing animals, and any affected commercial row or field crops would likely not be marketable. Other effects on agriculture, which include farming and ranching, could occur if a water supply that is contaminated by an oil spill is used to irrigate fields or support livestock (see Section 5.5.6). Potential impacts could include loss of agricultural land use, limited production and adverse health impacts to livestock. Additional long-term impacts may require the use of alternative sources of drinking water for livestock and water for irrigation.

The extent and duration of the effects would depend on the number of productive areas affected, the response time, the remediation method implemented, and the length of time required to return the land to pre-spill conditions. Short-term disruption in local agricultural production could result from a spill that enters agricultural lands or wild lands used by grazing livestock. A medium spill is less likely to contaminate large acreage of agricultural land. However, oil adsorbed or otherwise adhered to soil particles may be transported extended distances by processes such as wind or water erosion. Oil migration could contaminate and adversely affect agricultural land use in areas beyond the initial spill location. Contamination by a large spill could affect soil productivity adversely, and the beneficial use for farming or grazing would be restricted for the duration of the remedial period or longer. In some cases, including large-scale removal of contaminated soils during spill remediation, soil productivity would not likely return to prior levels. In an extreme event, a spill could result in the permanent loss of agricultural lands.

In order to evaluate and characterize the potential for environmental impacts to agricultural land, the Department reviewed the prevalence of these resources near potential release locations along the MAR. The potential for a spill that could affect each resource type based on the proximity criteria presented in Section 5.2 was determined using incident rate data for the various spill sizes and the linear distances along the MAR that met each criterion.

As presented in Table 5-7, the likelihood of a release affecting agricultural lands is greatest for cultivated crops, with the highest annual incident rate being 0.06 incident per year for any size spill that could affect this resource within 112 feet of the release point. The highest projected annual incident rate for pasture/hay is 0.0003 incident per year of any size affecting such lands within 112 feet of the release point.

Table 5-7. Projected Annual Rate of Spills that Could Impact Agricultural Land Use

Resource	Spills > 0 barrel[a]	Spills > 50 barrels[b]	Spills > 1,000 barrels[c]
Cultivated crops	0.06	0.01	0.002
Pasture/hay	0.0003	0.0001	0.00006

Source: USGS 2011

a. This incident rate applies to resources that are susceptible to small, medium and large spills.

b. This incident rate applies to resources that are susceptible to medium and large spills.

c. This incident rate applies to resources that are susceptible to large spills.

5.5.2.2 Recreational Land Use

If a spill reached recreational lands and/or waterways, areas used for hunting, fishing, sightseeing and other recreational activities could experience a short-term negative effect that could last the duration of the cleanup effort. Impacts on fish species prized for recreational fishing would be as discussed in Section 5.5.7. During response and restoration actions, access to affected areas would generally be limited or prohibited to anyone except the response and remediation personnel, thus limiting the use of recreational areas, such as NHTs or designated recreational waterbodies. Adverse publicity regarding the impacts of large spills could reduce use by recreationists for an extended period. For small spills, there would likely be a negligible effect to businesses relying on recreational uses, and it is possible that cleanup responses would not require resource closure. Once the area is clean, normal activities would likely resume. However, more long-term and damaging impacts can occur when members of the public perceive an area to be polluted even after the oil has been removed.

The Marshall, Michigan release of dilbit that occurred on July 25, 2010 provides examples of actual recreation and land use effects caused by a large spill. This incident released approximately 20,082 barrels (843,444 gallons) of dilbit into waterways near the town of Marshall, Michigan; the oil then flowed into the Kalamazoo River and Morrow Lake, which serve as recreational boating and fishing areas. Soon after the spill occurred, the Kalamazoo and Calhoun County health departments prohibited the use of affected surface waters for irrigation and the watering of livestock. The Calhoun County Public Health Department also banned recreation activities, including boating, swimming and fishing. All affected areas of Talmadge Creek and the Kalamazoo River remained closed to recreational use for almost 2 years (National Transportation Safety Board 2012).

This SEIS considers the annual likelihood of a potential release affecting recreational land use within the ROI. As presented in Table 5-8, the Department's analysis found that the highest annual incident rate for recreational land use along the MAR was 0.0001 incident per year for any size spill that could affect a recreational waterbody. The highest annual incident rate for any size spill that affected an NHT is 0.00006 incident per year. Crude oil spills reaching NHTs and recreational waterbodies could also result in adverse impacts to cultural resources (see Section 5.5.9), surface waters (see Section 5.5.6) and aquatic organisms (see Section 5.5.7).

Table 5-8. Projected Annual Rate of Spills that Could Impact Recreational Land Use

Resource	Spills > 0 barrel[a]	Spills > 50 barrels[b]	Spills > 1,000 barrels[c]
National Historic Trail	0.00006	0.00006	0.00002
Recreational Waterbody	0.0001	0.00007	0.00003

Source: NDEQ 2016, USFWS 2005

a. This incident rate applies to resources that are susceptible to small, medium and large spills.

b. This incident rate applies to resources that are susceptible to medium and large spills.

c. This incident rate applies to resources that are susceptible to large spills.

5.5.3 Geology and Soils

As presented Section 3.3.1, no known seismic faults or oil, natural gas or coal mining operations exist along the MAR, and therefore, a release of crude oil is not anticipated to adversely affect the underlying geology. As such, this section focuses on soil resources. An accidental release of crude oil along the MAR could result in short- or long-term effects to soil resources existing within the ROI summarized in Section 3.3, Geology and Soils. Table 5-9 lists the potential direct and indirect effects to soils that could result from a crude oil spill. The extent of these potential effects depends on the location of the spill and the volume of oil released,

Table 5-9. Potential Effects to Geology and Soils from a Crude Oil Release

Direct Effects	Indirect Effects
Contamination of hydric soils.	Adverse impacts to wetlands (see Section 5.5.6).
Contamination of coarse-textured soils.	Infiltration to groundwater (see Section 5.5.6).
Contamination of prime farmland soils.	Reduced oil productivity. Restricted farming or grazing.

Prime farmland soils are prevalent along the proposed MAR ROI. Contamination of prime farmland soils could adversely affect soil productivity, and the use of the land for farming or grazing would be restricted during remediation of the spill and potentially after remediation is complete. Remediation may require the excavation and removal of contaminated soils, which would result in a permanent loss of prime farmland soils. Vehicles and equipment used to respond to and remediate a spill may increase the potential for soil disturbance (e.g., rutting, compaction and erosion). It is also possible that wind or water erosion could carry contaminated soils off a spill site and adversely affect prime farmland soils in areas beyond the spill location.

The existence of hydric soils is one indicator of wetlands, so an accidental release near hydric soils could potentially result in wetland contamination. Section 5.5.6.3 addresses the potential for wetland contamination from an accidental release. Likewise, the existence of soils with higher permeability (e.g., with a coarse texture) could allow spilled oil to seep more readily into groundwater resources. Section 5.5.6.1 discusses the potential effects of released crude oil reaching groundwater.

As presented in Table 5-10, the Department's analysis determined that the likelihood of a release affecting designated farmland soils is greatest for prime farmland soils, where there is a projected annual rate of 0.05 incident per year for any size spill that could affect such soils within 112 feet of a release point. For farmland of statewide importance, there is an annual likelihood of 0.004 incident per year of any size spill affecting this resource within 112 feet of a release point along the MAR.

Table 5-10. Projected Annual Rate of Spills that Could Impact Designated Farmland Soils

Resource	Spills > 0 barrel[a]	Spills > 50 barrels[b]	Spills > 1,000 barrels[c]
Prime Farmland Soil	0.05	0.01	0.002
Farmland of Statewide Importance	0.004	0.001	0.0004

Source: USDA/NRCS 2018x, 2018y

a. This incident rate applies to resources that are susceptible to small, medium and large spills.

b. This incident rate applies to resources that are susceptible to medium and large spills.

c. This incident rate applies to resources that are susceptible to large spills.

5.5.4 Air Quality and Greenhouse Gases

An accidental release of crude oil along the MAR could result in short- or long-term effects to air quality and an increase in greenhouse gases within the ROI summarized in Section 3.4, Air Quality and Greenhouse Gases. These direct and indirect air quality impacts would be short term in nature, ranging from a few hours to several weeks. A release of crude oil could contribute to air pollution and greenhouse gases from fugitive emissions from combustion of fuel in vehicles and equipment used for spill response and remediation actions, and from combustion of spilled crude oil in the event of a fire. Table 5-11 presents the potential direct and indirect effects to air quality and greenhouse gases from a spill.

The most notable impacts related to air quality are adverse effects on human health. Human health impacts arise from inhalation of the hydrocarbons (organic molecules made of hydrogen and carbon

atoms) that make up crude oil. The hydrocarbons that are of particular importance with respect to air quality are volatile and semi-volatile compounds, which readily evaporate and disperse through the air. Health effects from exposure depend on the concentration of the chemical in the air and the duration of exposure. In addition, degraded air quality and visual obstructions caused by smoke can disrupt professional and/or recreational activities in affected areas, negatively affecting the aesthetic and economic value of affected regions.

Table 5-11. Potential Effects to Air Quality from a Crude Oil Release

Direct Effects	Indirect Effects
Air quality degradation resulting from volatilization of hydrocarbons.	Temporary adverse effects to human health related to inhalation of hydrocarbons. Temporary adverse effects to birds and mammals related to inhalation of hydrocarbons (see Section 5.5.7).
Air quality degradation resulting from burning of crude oil.	Temporary adverse effects to human health related to inhalation of hydrocarbons and particulate matter. Temporary adverse effects to birds and mammals related to inhalation of hydrocarbons and particulate matter (see Section 5.5.7). Temporary adverse effects to recreational activities (see Section 5.5.2).
Fugitive emissions of greenhouse gases.	Greenhouse gas emissions from vehicles and equipment used in spill response and remediation.
Greenhouse gas emissions from potential fire caused by spontaneous ignition or explosion during spill incident.	Greenhouse gas emissions from fire intentionally ignited for spill containment.

In the event of a crude oil spill, the effects on air quality would depend on the size of the spill, the type of oil spilled, environmental conditions (i.e., topography), and the weather. Oil spills spread over the ground or via waterways. The volatile and semi-volatile compounds then vaporize, emitting odors and airborne contaminants. Volatile and semi-volatile organic compounds (including BTEX and polycyclic aromatic hydrocarbons) evaporate most rapidly and disperse according to the ambient temperature and wind strength and direction. Conditions with no wind could result in the highest air concentrations, as wind serves to dissipate the contaminants. The extent of the impacts would depend on the volume of oil spilled, the size of the plume, the proximity of the incident to populated areas, the evaporative and dispersion characteristics of the weather and wind conditions, and the effectiveness of the spill response. While any release of crude oil may have an immediate and direct impact on the air quality near the release site, the potential for air quality impacts reduces with time as the material evaporates.

Emergency response teams sometimes initiate controlled burning as a measure to mitigate impacts from spills. Burning crude oil can create substantial air quality impacts, depending on the volume and type of crude oil and the wind and weather conditions. Smoke plumes can reach several hundred to several thousand feet high, carried by prevailing winds. Most of the oil burned converts to CO_2 and water. However, particulates, mostly soot, make up approximately 10 to 15 percent of the smoke plume. The combustion process also releases small amounts of sulfur dioxide, nitrogen dioxide, carbon monoxide and small amounts of polycyclic aromatic hydrocarbons. Depending on environmental conditions, the gases in the burn plume would likely dissipate to background concentrations several miles downwind and would not significantly affect human inhalation exposure to the air contaminants, unless weather conditions caused the plume to descend to ground level (Barnea 1995).

Greenhouse gas emissions could also occur from open burning of released crude oil in the event of a fire occurring in conjunction with a crude oil spill. Because the lifecycle greenhouse gas impacts of the Proposed Action include the combustion of fuels produced from the crude oil, crude oil fires would

greatly increase total greenhouse gas emissions. However, crude oil fires could emit greater amounts of black carbon and other particulates that contribute to atmospheric warming. Black carbon has a relatively short atmospheric lifetime of days to weeks, as compared to the longer atmospheric lifetime of the dominant greenhouse gases (Melillo et al. 2014).

After the July 25, 2010 Marshall, Michigan oil spill, the Michigan Department of Community Health and the U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry, developed air monitoring protocols for testing, levels of concern and decision trees for evacuation and re-occupancy based on benzene levels. The initial "real-time" readings at the spill site did not detect combustible gas at concentrations above the protective screening level for explosives, and all measured oxygen and carbon monoxide concentrations were within normal limits. However, measurements found elevated levels of the screening compounds of benzene, total VOCs and hydrogen sulfide (H_2S). This warranted the voluntary evacuations of residents from approximately 50 houses within a designated area of approximately 400 acres between the spill site and the Kalamazoo River. During the first 3 weeks following the Marshall, Michigan spill, people in the spill area who inhaled oil-related chemicals reported short-term health effects, including headaches, nausea, respiratory discomfort and eye irritation. These short-term effects diminished or stopped when people were no longer breathing the contaminated air. By August 18, 2010 (i.e., the end of the voluntary evacuation period), approximately 3 weeks after the spill, concentrations of air contaminants fell below human health screening levels, such that individuals near the oil did not breathe oil-related chemicals at concentrations or for durations of time that would cause long-term adverse health effects (Michigan Department of Community Health 2014).

5.5.5 Noise and Vibration

An accidental release of crude oil along the MAR could result in short-term noise impacts within the ROI summarized in Section 3.5, Noise and Vibration. Noise impacts would occur primarily during response, restoration and remediation activities. Potential impacts from noise would likely be associated with the equipment and vehicles used for site access, cleanup and restoration efforts. These impacts would be similar to those of a construction site; however, the activities could occur at all hours of the day and night. Equipment would likely include vehicles and construction equipment, such as bulldozers, excavators and dump trucks, as well as various types of all-terrain vehicles. In addition, response and cleanup efforts could also include the use of watercraft and aircraft.

Elevated noise levels would be similar to those related to construction activities, with noise levels in the immediate vicinity of the site generally in the range of 80 to 90 dBA. These elevated noise levels would dissipate with distance and would have the greatest effect if they were to occur near receptors during the nighttime hours, when unwanted noise is most obtrusive. The nature (i.e., location of the release and environmental setting conditions) and size of the spill would likely govern the intensity and duration of response and cleanup efforts and the related increase in noise levels. Large spills would be more likely to result in elevated noise levels across a larger area and for a longer duration. Conversely, small spills would be more localized and less likely to affect noise receptors. Regardless of spill size, however, effects from increases in noise levels would be limited to the duration of response and cleanup activities. Furthermore, residents most vulnerable to noise during the spill response would likely be the same people that officials overseeing the response effort would evacuate for health and safety reasons.

Similar to human sensitive receptors, wildlife can experience impacts from exposure to noise and vibration resulting from human activities during response, restoration and remediation activities. These impacts to wildlife species could include stress, avoidance of feeding and decreased breeding success.

5.5.6 Water Resources

An accidental release of crude oil along the MAR could result in short- or long-term effects to existing groundwater, surface water, wetlands and floodplains within the ROI summarized in Section 3.6, Water Resources, if released crude oil reached these resources. This section considers potential impacts to water quality as they relate to the potential uses of the water resources, including for purposes of potable water, as summarized in Table 5-12. Section 5.5.7 presents the potential impacts of a surface water release to aquatic habitats and species.

Table 5-12. Potential Effects to Water Resources from a Release

Direct Effects	Indirect Effects
Contamination of groundwater by free product and dissolved hydrocarbons.	Water quality degradation downgradient of spill site. Temporary closure of groundwater wells resulting in disruption of municipal water service. Temporary human health hazards resulting from short-term ingestion or exposure to dissolved hydrocarbons.
Contamination of open waters by free product and dissolved hydrocarbons.	Water quality degradation downstream of spill. Adverse impacts to aquatic ecosystem (see Section 5.5.7). Water quality degradation to impaired waters resulting in more severe impairment. Water quality degradation of NRI streams potentially limiting use and quality of theses streams. Temporary human health hazards resulting from short-term ingestion or exposure to dissolved hydrocarbons.

NRI = Nationwide Rivers Inventory

As discussed in Section 5.4.4, in accordance with 49 CFR 195, Keystone will maintain an Integrity Management Program required for pipelines that could affect high consequence areas, which include surface water unusually sensitive areas and groundwater unusually sensitive areas identified for their potential as a drinking water resource (49 CFR 195.6 and 195.450). (Refer to Section 4.13 Potential Releases of the 2014 Keystone XL SEIS for further discussion on drinking water resources).

5.5.6.1 Groundwater

As stated in Section 3.6.1, principal groundwater aquifers underlying the MAR include alluvial aquifers and the Northern High Plains Aquifer, a nationally important water resource that underlies much of the state; and the Lower Cretaceous Aquifer. Groundwater impacts resulting from a release are focused on the physical fate of the product, rather than the volatilization properties. Factors that influence the potential for migration into groundwater include the type of release, areal extent of the spill, soil conditions and characteristics, and the depth to groundwater. Shallow (surficial) aquifers, particularly those overlain by hydric and coarse-textured soils, would be more susceptible to impacts than confined or deep aquifers because of their susceptibility to infiltration from the surface.

Coarse-textured soils, or sandy soils, allow for easier percolation of liquid through the soils to reach groundwater. If a spilled product reached these soils, infiltration rates could be greater than in other areas. Because the infiltration rate of the product into the underlying soil controls vertical migration, rapid emergency response measures to control the release, contain it and collect the released product would mitigate the potential for groundwater contamination. Released crude oil would become more viscous in the environment as the lighter hydrocarbons volatilize. Cooling of the product after its release would increase its viscosity, particularly in the cooler months of the year. Increasing viscosity tends to

reduce vertical migration rates in soil profiles and infiltration into the shallow groundwater table. If crude oil were to infiltrate into the soil and encounter groundwater, it would tend to form a distended layer above and slightly below the water table, largely based on the size and duration of the spill and the associated vertical hydraulic pressure. The crude oil plume would then spread horizontally, primarily in the down-gradient direction, until reaching a steady state based on the crude oil hydraulic pressure, groundwater flow rate and soil characteristics. This local contamination would not be anticipated to affect the entire aquifer. Lighter crude oils would be less viscous and less adhesive when released, which could result in greater vertical migration rates than heavy crude oils (Tsaprailis 2014). As such, lighter crude oils could penetrate more deeply into the soil and could result in a greater risk of groundwater contamination. Lighter crude oils also carry higher proportions of lighter volatile hydrocarbons, which readily dissolve in water.

Impacts to groundwater resulting from a release would include water quality impacts, similar to those presented in Section 5.5.6.2 for surface water. Groundwater that serves as a source of drinking water or irrigation is of particular concern when assessing the potential for impacts, because contamination of a drinking water aquifer could affect human health. For this reason, the Department identifies private wells within 100 feet of the MAR (see Table 3.6-1) and wellhead protection areas within 1 mile of the MAR (see Table 3.6-2). Spills that occur near these areas would have the potential to impact groundwater aquifers that are used as a source of drinking water.

Keystone has committed to conducting baseline water quality testing for domestic and livestock wells within 300 feet of the final centerline of the approved route upon the request of individual landowners (NDEQ 2013). These baseline samples would be collected prior to placing the pipeline in service. Subsequently, in the event of a significant spill in the area, Keystone would conduct water well testing as required by NDEQ pursuant to Title 118, Nebraska Administrative Code. Keystone would also provide an alternative water supply for any well where water quality was found to be compromised by the spill. Should a release occur from the Keystone XL Pipeline, Keystone has committed to clean up any releases that might occur. Keystone is also legally required to clean up spills under Title 118, Nebraska Administrative Code and the federal Oil Pollution Act of 1990. The Keystone XL CMRP (located in Appendix G of the 2014 Keystone XL Final SEIS) describes measures that Keystone would implement to minimize impacts on groundwater resources near the pipeline during and after construction.

The Department analyzed the annual likelihood of a potential release occurring in an area overlying the groundwater resources within the ROI. As discussed in Section 5.2, the ROI used to assess groundwater extends farther from a potential release point than the ROI discussed for an overland spill due to the potential for dissolved components of released crude oil to travel a farther distance (refer to Section 5.2 and Figure 5-1). As presented in Table 5-13, the likelihood of a release affecting groundwater resources is greatest for surficial aquifers; there is an annual likelihood of 0.05 incident per year of any size spill affecting this resource within 752 feet of the release point. The Department also calculated an annual rate of 0.01 incident per year of any size spill affecting active wells located within 752 feet of a release point and 0.0001 incident per year of spills releasing more than 50 barrels affecting wellhead protection areas located within 1,187 feet of a release point.

Table 5-13. Projected Annual Rate of Spills that Could Impact Groundwater Resources

Resource	Spills > 0 barrel[a]	Spills > 50 barrels[b]	Spills > 1,000 barrels[c]
Surficial Aquifer	0.05	0.009	0.001
Wellhead Protection Area	0	0.0001	0.00005
Active Well	0.01	0.005	0.001

Source: NDEQ 2018, NDNR 2018, USGS 2002

a. This incident rate applies to resources that are susceptible to small, medium and large spills.

b. This incident rate applies to resources that are susceptible to medium and large spills.

c. This incident rate applies to resources that are susceptible to large spills.

5.5.6.2 Surface Water

A crude oil spill in a stream, river or lake would have impacts resulting from the tendency of crude oil to float on the water surface and to mix with water. These impacts could include the degradation of water quality from dissolution and mixing of the oil in the water column, contamination of the water by chemical constituents (i.e., hydrocarbons) within crude oil and related degradation by-products and secondary effects such as lower levels of dissolved oxygen that occur from biodegradation of these compounds. The intensity and severity of water quality impacts would be dependent on several variables, including the volume of crude oil released into the waterbody and the characteristics of the waterbody (e.g., size, flow volume and rate at the time of the spill, etc.), which would influence propagation of the crude oil.

The hydrocarbons that make up crude oil include volatile and semi-volatile compounds, which behave differently after a release. Most of the lightweight volatile hydrocarbons, which comprise the majority of light crude oils, readily evaporate when a release occurs. However, volatile hydrocarbons (such as BTEX) also tend to be water-soluble and as a result, some portion would dissolve into the water column. Heavier semi-volatile hydrocarbons, including polycyclic hydrocarbons, are not very volatile or water-soluble and may remain in the water environment longer than lightweight volatile compounds. The more water-soluble fraction of the crude oil that volatilizes may later be washed out of the atmosphere in precipitation and reenter surface waters. The heavier constituents are generally less toxic than other more soluble compounds. Based on the combination of toxicity, solubility and bioavailability, benzene is the most toxic hydrocarbon associated with crude oil spills.

The crude oil products with higher proportions of heavier components are more likely to submerge beneath the water's surface due to their density compared to water. Submerged crude oil could result in a persistent source of contamination because of the slow rate of natural degradation of this material. Thus, submerged crude oil could result in the slow release of dissolved hydrocarbons, resulting in long-term chronic toxicological impacts to aquatic organisms (see Section 5.5.7). Removal of submerged product from the water column can be a difficult and long process, as observed in the response and cleanup efforts related to the July 2010 release in Marshall, Michigan. Cleanup efforts to remove the submerged oil from the Kalamazoo River, including dredging, excavation and aeration, continued for 4 years after the spill (Parker 2014).

The magnitude of impacts that could occur from a spill would largely depend on the size of the spill and the affected waterbody. Small releases into or close to a surface waterbody could result in minor short-term degradation of surface water quality, particularly for small waterbodies with low flow energy. Similar spills that reach larger lakes or rivers would result in minimal effects on overall water quality, assuming the lake or river volume is substantially larger than the volume of spilled product and that the flow rate of the river is sufficient to dilute the released product. Direct toxicity and contamination in

small, low-flow waterbodies would generally occur at the point of the release because of the inability of the waterbody to transport and dilute the contaminants. Toxicity impacts in larger waterbodies would be unlikely or would last for relatively short periods because of the high dilution volume in these lakes or rivers, and the rapid evaporation of most of the potentially toxic lighter hydrocarbons. However, in surface waters with high energy (e.g., turbulent river flows and/or high sediment deposition), sunken oil may become buried under or mixed within stream sediment and soil along streambanks, where it may become trapped and remain for an extended duration. This buried oil may slowly biodegrade into soluble components or volatilize over time. Future disturbances to the aquatic environment, such as dredging, wave action, boat propellers or bioturbation, could re-suspend buried oil or its weathered components. The potential re-suspended oil could represent a source of contamination for an extended duration.

As discussed and considered in the 2014 Keystone XL Final SEIS, the potential adverse effects of a large spill to water could have potentially significant adverse effects on water quality. Following the Marshall, Michigan spill, water quality effects occurred as far as 40 river-miles downstream from the spill location, and submerged oil contaminated large areas of the river bottom. Small streams and ponds with low flow energy would be more susceptible to substantial adverse impacts from large spills, but any waterbody that experiences a spill of this magnitude could experience both short-term (during response and remediation) and long-term (dissolution of residual product) adverse impacts to water quality. Response and remediation activities would likely return the waterbody to near pre-spill conditions, but remediation could take years to complete. However, it is possible that waterbodies may not return to pre-spill conditions, as it would depend on the size and location of the spill.

The Department identified rivers and lakes within the ROI for the Proposed Action (see Section 3.6, Water Resources). The Department also identified four categories of waterbodies that are of particular concern with regard to potential impacts from a crude oil spill: major rivers, lakes, perennial streams with state water classifications and impaired waterbodies. Water quality degradation resulting from a spill could affect the value of these waters and result in short- or long-term loss of scenery, habitat, etc. Impaired waters, listed under Section 303(d) of the Clean Water Act, are under environmental stress and are likely to have a lower capacity for recovery in the event that a spill was to impact the water quality of one of these waterbodies.

Surface waters contaminated with dissolved hydrocarbons could also cause indirect impacts to groundwater resources in instances where surface waters recharge these resources. The connection between surface water and groundwater is dynamic throughout the region because of the presence of shallow aquifers and coarse-textured soils. Most groundwater recharge occurs from the percolation of rainwater through surficial soils and from lakes and streams into shallow aquifers. In these areas, the potential exists for dissolved hydrocarbons from surface water to migrate to groundwater through the process of groundwater recharge.

Table 5-14 presents the likelihood of a spill along the proposed MAR reaching surface water resources, including major rivers, lakes, perennial streams with state water classifications and impaired waterbodies. As presented in Table 5-14, the likelihood of a release affecting considered surface water resources is greatest for perennial streams with state water classifications, with the estimated potential for 0.0004 incident per year of any size spill affecting this resource within 112 feet of the release point. Annual likelihoods of affecting other surface water resources ranged from 0.0003 incident per year of any size spill affecting major rivers to 0 for small or medium spills affecting lakes, as no lakes are located within 367 feet of the MAR.

Table 5-14. Projected Annual Rate of Spills that Could Impact Surface Water Resources

Resource	Spills > 0 barrel[a]	Spills > 50 barrels[b]	Spills > 1,000 barrels[c]
Major River	0.0003	0.0002	0.00009
Lake	0	0	0.00003
Perennial Stream with State Water Classification	0.0004	0.0003	0.0001
Impaired Waterbody	0.00009	0.00009	0.00003

Source: USGS 2018; USEPA 2015

a. This incident rate applies to resources that are susceptible to small, medium and large spills.

b. This incident rate applies to resources that are susceptible to medium and large spills.

c. This incident rate applies to resources that are susceptible to large spills.

5.5.6.3 Wetlands

Wetlands are biologically diverse and provide habitat for many types of animals and plants. A spill from the MAR pipeline would impact vegetation and wildlife that directly and indirectly rely on an affected wetland. Direct impacts to wetlands would range from stress of vegetation and wildlife to species mortality and the degradation of wetland habitat and function. The severity of impacts on wetlands depends upon the volume and type of product spilled, environmental factors (e.g., time of year, type of vegetation, amount of surface water present) and the cleanup response actions. Product type is a major factor in determining the degree and type of impacts on wetland vegetation and wildlife (see Section 5.5.7).

Lighter products are more acutely toxic than heavier products. Heavy products affect wetlands through the smothering of leaves and soils (Michel and Rutherford 2013). The viscosity of the heavy products would likely restrict the geographic extent of potential spills, particularly in cooler months. Spills of less viscous crude oil, such as light crude oil extracted from the Bakken formation, could spread a farther distance and affect a larger area than the more viscous dilbit because of the higher proportion of lighter components. However, the lower viscosity of light crude oil may allow the product to migrate downward through the soil more easily and quickly than dilbit (National Academies of Sciences, Engineering and Medicine 2015). As such, light crude oil may also seep into oil more readily and therefore limit the horizontal extent of the spill.

In the event of a spill of heavy crude oil, dense stands of emergent vegetation could act like booms and collect the product at the edges of the stands, particularly given the viscosity of heavier products. Spills in interior wetlands are also likely to result in thicker product residues, higher levels of wetlands impacts and slower natural removal rates of product residues. The higher level of impacts to interior wetlands and increased product persistence are attributable to product settling and penetrating into the hydric soils. Persistence increases with deeper product penetration, soils high in organic matter and sites such as interior wetlands that are sheltered from natural removal processes. In comparison, reduced persistence occurs in coastal, riverine and open water wetlands as the active movement of surface water weathers the crude oil contents. Dilbit is more likely than lighter crude oils to persist within wetlands because of the higher amount of residual oil left behind after weathering, increased adhesion and resistance of dilbit to biodegradation (National Academies of Sciences, Engineering and Medicine 2015). Lighter crude oil would be apt to spread more quickly over the ground surface, but it can also penetrate more easily into the soil and spread vertically. Vegetation recovers more quickly from spills of any type of product during the non-growing season, compared to a spill during the growing season (Michel and Rutherford 2013).

Following a release, aggressive and intrusive cleanup methods would cause impacts to wetlands from excavation and the removal of hydric soils. Cleanup could also increase the potential for the product to mix with water and sediments. Disturbance to wetlands sediments would lead to longer lasting impacts to the wetlands by inhibiting plant growth and recovery. Igniting the spilled product floating on the water surface in a controlled manner (in situ burning) could reduce the physical disruption of wetland resources below the water line, but would result in smoke and the potential associated effects to air quality, biological resources and human health.

Passive cleanup methods (including natural attenuation) would cause less impact to wetland resources. If no active remediation activities were undertaken, with concurrence of the regulatory body, natural biodegradation and attenuation could ultimately allow a return to preexisting conditions in both soil and groundwater. However, recovery would likely require a timeframe measured in decades.

As presented in Table 5-15, the likelihood of a release affecting wetlands along the MAR is greatest for palustrine emergent wetlands, where 0.003 incident per year of any size spill could affect these resources located within 112 feet of a release point. Calculated incident rates for palustrine forested and palustrine scrub-shrub wetlands were 0.0004 and 0.00008 incident per year of any size spill, respectively.

Table 5-15. Projected Annual Rate of Spills that Could Impact Wetlands

Resource	Spills > 0 barrel[a]	Spills > 50 barrels[b]	Spills > 1,000 barrels[c]
Palustrine Emergent	0.003	0.002	0.0005
Palustrine Forested	0.0004	0.0002	0.0001
Palustrine Scrub-Shrub	0.00008	0.00003	0.00002

Source: Exp and Westech 2018a; USFWS 2018b

a. This incident rate applies to resources that are susceptible to small, medium and large spills.

b. This incident rate applies to resources that are susceptible to medium and large spills.

c. This incident rate applies to resources that are susceptible to large spills.

5.5.6.4 Floodplains

A release of product to a floodplain would not have direct impacts to the floodplain. Potential impacts to the specific landscapes and habitats located within nearby floodplains would remain consistent with those impacts discussed for similar resources throughout this chapter. Floodplains would, however, actively convey and disperse crude oil within the floodplain boundary if a release were to happen during a flood event. As discussed in Section 3.6.1.5, portions of the pipeline ROW are classified by FEMA as 100-year floodplains, and the remaining portions of the pipeline ROW are classified as areas of minimal flooding (FEMA 2018). These 100-year floodplains are the most likely portions of the pipeline ROW to experience flooding; areas within a 100-year floodplain have a 1 percent annual likelihood of experiencing a flood. Per Section 3.6.1.5, areas showing the highest flood hazard appear to be located along the Elkhorn, Platte, Big Blue and Little Blue rivers. A release of product into these floodplains during a flood event could cause widespread dispersal of the product within the floodplain, especially because of flat topography in the area.

Flood events may increase the potential for a pipeline release because of erosion and channel migration. Erosion may arise from seasonal flood events or increased stream velocities, which in turn undermine support soils, increase lateral water force and increase the impact from waterborne debris. If a pipeline release does occur during a flood, pipeline components (e.g., valves, regulators, relief sets, pressure sensors, etc.) may become submerged and either inoperable or inaccessible. Submerged pipeline components would experience a greater risk of damage caused by floating debris, river currents and watercraft.

Remediation efforts could encroach upon floodplains because of the movement of remedial equipment and vehicles; however, the encroachment would be short-term and minor because response personnel would not install any permanent aboveground structures in floodplains. If the cleanup effort requires excavation, the floodplain could be shaped differently, and may need additional remediation. In general, the greatest threat for impacts in the remediation phase would be the movement of heavy equipment or vehicles. Large spills that have wider geographic extents may have the most impact on floodplains because of the more extensive remedial requirements. Small or medium spills would have negligible to minor impacts on floodplains.

5.5.7 Biological Resources

An accidental release of crude oil along the MAR could result in a variety of short- or long-term direct and indirect physical and toxicological impacts on the biological resources summarized in Section 3.7, Biological Resources. A spill would have localized impacts on vegetation generally limited to the physical bounds of the spill, but the spill may have impacts on wildlife that could extend beyond the spill area.

Physical impacts could arise from direct contact with released crude oil. Toxicological impacts result from the chemical and biochemical actions of crude oil constituents on the biological processes of individual organisms. Toxicological impacts resulting from releases are a function of the chemical composition of the product, the solubility of each class of compounds and the sensitivity of the receptor. Toxicological impacts could include direct and acute mortality; sub-acute interference with feeding or reproductive capacity; disorientation or confusion; reduced resistance to disease; tumors; reduction or loss of various sensory perceptions; interference with metabolic, biochemical and genetic processes and many other acute or chronic effects. Biological resources encompass a wide variety of habitats, flora and fauna, all of which could experience different impacts during a release. Table 5-16 summarizes these specific resources and the potential physical and chemical effects experienced during a spill. The following subsections provide details pertaining to each of these resources and the associated specific potential impacts.

Any release of crude oil may have an immediate and direct effect on local populations of flora and fauna. The potential for physical and toxicological effects from a release of crude oil reduces with time as the volume of material diminishes, leaving behind more persistent, less volatile and less water-soluble compounds (i.e., heavy aromatic compounds, including polycyclic aromatic hydrocarbons). Although many of these remaining compounds are toxic and potentially carcinogenic, they do not readily disperse in the environment and do not bioaccumulate; thus, they have less potential for widespread impacts. Lighter products contain higher proportions of the light, more volatile and soluble compounds. The risk of impacts reduces with time as concentrations of toxic compounds dissipate, but these volatile or soluble components bioaccumulate more readily than those found in heavier products, potentially resulting in toxic effects of the magnification of impacts as the toxins move up the food chain.

Table 5-16. Potential Effects to Biological Resources from a Release

Resource	Physical Effects to Resource	Chemical Effects to Resource
Vegetation	Coating leaves could inhibit gas exchange and respiration.	Coating soil could inhibit nutrient uptake. Uptake of dissolved toxic compounds.
Wildlife and Fisheries	Short- or long-term loss of habitat. Coated fur or skin could lead to loss of insulation or buoyancy, as well as reduced cutaneous respiration in amphibians. Transfer of product to eggs or young. Physical abnormalities and poor health caused by direct exposure.	Toxicological impacts through consuming contaminated food or ingesting product while cleaning feathers or fur. Effects to eggs laid in contaminated water or substrates leading to death or physical abnormalities. Decreased dissolved oxygen

5.5.7.1 Vegetation

A spill of crude oil could affect vegetation in several ways. A surface release could produce localized effects, in which product permeates through the soil, coating sediments and soils, which could impact plant populations. This affects the root systems and indirectly affects plant respiration and nutrient uptake by inhibiting water and gas exchange. Aboveground, physical coating of leaves could disrupt photosynthesis and further reduce the plant's ability to perform vital life processes. Without complete remediation of contaminated soil in a vegetation zone, long-term effects on vegetation could occur.

As stated in Section 3.7.1.1, cultivated crops represent the dominant land cover/vegetation type within the MAR and greater region. Impacts to cultivated crops resulting from an accidental release of crude oil are discussed in Section 5.5.2. Section 3.7.1.2 discusses the biologically unique landscapes and vegetation communities of conservation concern found in areas traversed by the proposed MAR. While impacts to the vegetation found in these communities would be similar to those discussed above, these impacts would be amplified because of the communities' sensitivity and limited acreage or extent. Table 5-17 summarizes the annual likelihood of a potential release affecting biologically unique landscapes and vegetation communities of conservation concern. As shown in this table, the greatest annual rate of spills affecting one of these resources occurs within the rainwater basin landscape, where 0.006 incident per year of any size spill could affect this resource located within 112 feet of a release point.

Table 5-17. Projected Annual Rate of Spills that Could Impact Biologically Unique Landscapes and Vegetation Communities of Conservation Concern

Resource	Spills > 0 barrel[a]	Spills > 50 barrels[b]	Spills > 1,000 barrels[c]
Rainwater Basin Landscape	0.006	0.001	0.0001
Native Grassland	0.002	0.0005	0.0001
Riparian Habitats and Bottomland Hardwood	0.002	0.0007	0.0002
Forest Communities	0.001	0.0004	0.0001

Source: Westech 2018; USFWS 2005

a. This incident rate applies to resources that are susceptible to small, medium and large spills.

b. This incident rate applies to resources that are susceptible to medium and large spills.

c. This incident rate applies to resources that are susceptible to large spills.

In addition to impacts related to the actual release, cleanup efforts could also generate impacts to terrestrial vegetation, including disturbance and the inadvertent spread of invasive species. Response activities create disturbances through movement of vehicles and personnel and through the implementation of cleanup methods, including excavation, dredging and in situ burning. Creating a disturbance may remove existing, native vegetation or alter the landscape, which enables non-native species to become invasive or spread to new areas. The movement of vehicles and equipment from one area to another in support of spill response and remediation activities also increases the opportunity to transport species into new areas. The implementation of appropriate preventive measures or monitoring regimes could reduce the impact of invasive species.

5.5.7.2 Wildlife and Fisheries

A release of crude oil could affect terrestrial wildlife directly or indirectly through impacts to their habitat or sources of food. For example, surface spills could affect vegetation, which is the principal food source of wild and domestic herbivorous mammals. Some of these animals probably would not ingest contaminated vegetation because of selective grazing. In these cases, such animals would need to seek out other food sources or temporarily relocate for the duration of the spill impacts. Contaminated vegetation would temporarily reduce local forage availability, but a spill would not substantially reduce the overall abundance of food for large herbivorous mammals. Unlike aquatic organisms that often cannot avoid spills in their habitats, the behavioral response of terrestrial wildlife may help reduce potential adverse effects.

Toxicological impacts arising from ingestion of petroleum products could include direct and acute mortality; sub-acute interference with feeding or reproductive capacity; disorientation or confusion; reduced resistance to disease; tumors; reduced or lost sensory perceptions; interference with metabolic, biochemical and genetic processes; and many other acute or chronic effects.

Spill response activities may disturb and/or remove soil and vegetation or temporarily relocate local species. This impact increases if the species use specialized habitats or if disturbed during sensitive periods, such as nesting. Federal agencies have developed a general process for protecting listed species and critical habitat during spill planning and response activities (U.S. Coast Guard et al. 2001).

Amphibians and reptiles are by nature unable to relocate quickly to avoid physical impacts from released crude oil. Amphibians obtain a portion of their oxygen through cutaneous respiration (i.e., they breathe through their moist, porous skin). This makes amphibians particularly at risk for suffering potential toxicological impacts. Together, amphibians and reptiles represented over 93 percent of the 3,970 animals treated at the wildlife response center established by the USFWS and Michigan Department of Natural Resources and Environment following the July 2010 spill of dilbit in Marshall, Michigan (USFWS 2015a). Contact with product in the water could lead to developmental deformities as amphibians hatch or undergo metamorphosis. Water contamination after a spill or habitat disturbance during spill response efforts could lead to temporary or permanent habitat loss for these species.

Birds may experience many chemical and toxicological effects following a spill. Acute toxic effects include drying of the skin, irritation of mucous membranes, diarrhea, narcotic effects and possible mortality. Birds are likely to ingest released crude oil as they preen their feathers in an attempt to remove the product. The ingested product may cause acute liver, gastrointestinal and other systemic impacts resulting in mortality, reduced reproductive capacity, loss of weight, inability to feed and similar effects. Stress from ingested product could be an additive to ordinary environmental stresses, such as low temperatures and metabolic costs of migration. Physical impacts experienced by physically coated birds could lead to loss of water repellency and insulative capacity of feathers, and affected birds could

subsequently drown or experience hypothermia. Coated females could transfer product to their eggs, which at this stage could cause mortality, reduced hatching success or potential deformities in young.

Many predators and scavengers could also experience toxic effects through feeding on birds, other mammals, reptiles or fish that have been killed or injured by the oil spill. However, polycyclic aromatic hydrocarbons, which are some of the most toxic constituents of crude oil, do not reside for long periods within the body because fish, birds and mammals are able to metabolize and excrete these compounds (Lee et al. 2011; Navarro 2013; Neff 1979; Sheffield et al. 2012; USFWS 2015b). As such, predatory or scavenging species would experience limited acute (short-term) toxic impacts through ingestion of affected food sources. However, polycyclic aromatic hydrocarbons are lipid soluble and may be carcinogenic, mutagenic or teratogenic (Sheffield et al. 2012). Some species may also experience a loss of fitness (such as illness or decreased reproduction) while detoxifying systems are overwhelmed by polycyclic aromatic hydrocarbons (Lee et al. 2011).

Fish and aquatic invertebrates could experience toxicological impacts from spilled product, and the potential impacts would generally be greater in standing water habitats (e.g., wetlands, lakes and ponds) than in flowing rivers and creeks. In general, the potential impacts would be lower in larger rivers and lakes and much lower under flood conditions since the water would rapidly dilute toxic hydrocarbon concentrations. In smaller streams, a spill could create direct aquatic toxicity in the water column because of the lower relative volume and rate of water flow. Therefore, there would be a higher likelihood of direct contact between the biota and the dispersed product. Some toxicity might persist in these streams for a few weeks or longer, until water washes out the toxic compounds trapped in the sediment or until cleaner sediment covers the contaminated sediment. Fish hatched from eggs laid on contaminated substrates have shown “frequent death or physical abnormalities, including spinal deformities, lesions, hematomas, and eye defects” (Crosby et al. 2013; Colavecchia et al. 2007, 2006, 2004).

Long-term aquatic toxicity is less likely to occur in larger lakes and rivers because currents, wind and wave action would dilute or disperse the oil within the sediment over large areas. Spills into larger rivers and creeks might result in some toxicity within the water column itself. In larger rivers, because of the large and rapid dilution of the oil relative to the flow volumes, these impacts would likely be limited to back eddies, calm water regions and reservoir pools downstream of the release point. In smaller streams, an oil spill could create direct aquatic toxicity in the water column because of the lower relative volume and rate of water flow, and thus there would be a higher likelihood of direct contact between the biota and the dispersed oil. Some toxicity might persist in these streams for a few weeks or longer, until water washes out the toxic compounds trapped in the sediment or until cleaner sediment covers the oiled sediment.

A spill that reaches a surface waterbody could also reduce dissolved oxygen concentrations, particularly from dissolved-phase hydrocarbons (e.g., BTEX). Because surficial petroleum slicks are less permeable to oxygen than water, spilled material that reaches wetlands, ponds or small lakes could lower dissolved oxygen concentrations caused by a decreased influx of atmospheric oxygen. A reduced dissolved oxygen concentration results in a lower sustainable capacity for aquatic life, thus reducing the overall waterbody population. Decreases in dissolved oxygen levels would be negligible in most cases but may be greater in large spills that cover much of the water surface for a day or more.

5.5.7.3 Threatened and Endangered Species

Threatened and endangered species, by definition, have declining population numbers, restricted habitats or are sensitive to human and natural influences. A spill that directly affects individuals of such species or indirectly affects their food sources or habitats would have a much greater impact on a threatened or endangered species than an unlisted species. Threatened and endangered species would not have the

flexibility to find alternative food sources or relocate to other suitable habitat. These already limited populations would experience greater impacts through the loss of a few individuals. Impacts experienced by these plant and animal species would be similar to those discussed in Sections 5.5.7.1 and 5.5.7.2, but amplified because of the species' sensitivity and limited population numbers and range.

As presented in Table 3.7-4, the following nine federally listed threatened and endangered species have the potential to occur along the proposed MAR: interior least tern, piping plover, rufa red knot, whooping crane, pallid sturgeon, Topeka shiner, American burying beetle, northern long-eared bat and western prairie fringed orchid. These species may suffer adverse impacts during a potential oil spill, as summarized in Table 5-18.

Table 5-18. Federally Listed Species Potentially Affected by an Oil Spill along the Proposed MAR

Species	Habitat along the Proposed MAR	Food Source	Potential Effects from an Oil Spill
Interior least tern	The MAR crosses the estimated breeding range at the Platte River near the border between Colfax and Butler counties where sandbars and sand/gravel pits could support breeding and foraging.	Fish	Depending on the oil spilled, some components of the released oil may bioaccumulate and result in potential toxicological impacts if interior least terns consume contaminated prey. While the most toxic components of crude oil do not bioaccumulate to high degrees, this species could still experience direct physical or toxicological adverse impacts from an oil spill due to ingesting oil while preening. Direct physical impacts could result from oiling, leading to loss of water repellency and insulative capacity of feathers or transfer of crude oil to eggs, which at this stage could cause mortality, reduced hatching success or potential deformities in young.
Piping plover	The MAR crosses the estimated breeding range at the Platte River near the border between Colfax and Butler counties where sandbars and sand/gravel pits could support breeding and foraging.	Invertebrates	Depending on the oil spilled, some components of the released oil may bioaccumulate and result in potential toxicological impacts if piping plovers consume contaminated prey. While the most toxic components of crude oil do not bioaccumulate to high degrees, this species could still experience direct physical or toxicological adverse impacts from an oil spill due to ingesting oil while preening. Direct physical impacts could result from oiling, leading to loss of water repellency and insulative capacity of feathers or transfer of crude oil to eggs, which at this stage could cause mortality, reduced hatching success or potential deformities in young.

Table 5-18. Federally Listed Species Potentially Affected by an Oil Spill along the Proposed MAR

Species	Habitat along the Proposed MAR	Food Source	Potential Effects from an Oil Spill
Rufa red knot	Although the rufa red knot occurs as a sporadic and somewhat uncommon migrant throughout the area of the MAR, it does not have a defined range in Nebraska.	Mollusks, insects	Depending on the oil spilled, some components of the released oil may bioaccumulate and result in potential toxicological impacts if rufa red knots consume contaminated prey. While the most toxic components of crude oil do not bioaccumulate to high degrees, this species could still experience direct physical or toxicological adverse impacts from an oil spill due to ingesting oil while preening. Direct physical impacts could result from oiling, leading to loss of water repellency and insulative capacity of feathers or transfer of crude oil to eggs, which at this stage could cause mortality, reduced hatching success or potential deformities in young.
Whooping crane	The estimated current range of the whooping crane overlaps with the MAR in Antelope, Madison, Butler, and Seward counties	Insects, crustaceans	Depending on the oil spilled, some components of the released oil may bioaccumulate and result in potential toxicological impacts if whooping cranes consume contaminated prey. While the most toxic components of crude oil do not bioaccumulate to high degrees, this species could still experience direct physical or toxicological adverse impacts from an oil spill due to ingesting oil while preening. Direct physical impacts could result from oiling, leading to loss of water repellency and insulative capacity of feathers or transfer of crude oil to eggs, which at this stage could cause mortality, reduced hatching success or potential deformities in young.
Pallid sturgeon	The MAR crosses the pallid sturgeon's estimated current range in the lower Platte River. The crossing location would be at the border between Colfax and Butler counties where it would cross the main channel of the river.	Insects, crustaceans, mollusks, fish	Depending on the oil spilled, some components of the released oil may bioaccumulate and result in potential toxicological impacts if pallid sturgeon consume contaminated prey. However, the most toxic components of crude oil do not bioaccumulate to high degrees. Direct toxicological effects could result from physical oiling although the likelihood of such impacts to pallid sturgeon are low due to their preferred habitat in flowing rivers, which would dilute and disperse spilled product.
Topeka shiner	In eastern Nebraska near the MAR, the estimated current range of the Topeka shiner is very localized, limited to a portion of Madison and Stanton counties. The MAR would pass through the Union Creek system in this area.	Invertebrates	Depending on the oil spilled, some components of the released oil may bioaccumulate and result in potential toxicological impacts if Topeka shiners consume contaminated prey. However, the most toxic components of crude oil do not bioaccumulate to high degrees. Direct toxicological effects could result from physical oiling if released product entered inhabited waterways.

Table 5-18. Federally Listed Species Potentially Affected by an Oil Spill along the Proposed MAR

Species	Habitat along the Proposed MAR	Food Source	Potential Effects from an Oil Spill
American burying beetle	The American burying beetle is listed as endangered in Nebraska and its estimated current range includes portions of Antelope County, Nebraska. Although the proposed MAR initiates in Antelope County, the route would be located east of the estimated current range of this species.	Scavenger	Depending on the oil spilled, some components of the released oil may bioaccumulate and result in potential toxicological impacts if American burying beetles consume contaminated carrion. However, the most toxic components of crude oil do not bioaccumulate to high degrees, and this species would not experience direct physical or toxicological adverse impacts from an oil spill.
Northern long-eared bat	The northern long-eared bat's range spans eastern Nebraska, including the area which would be crossed by the MAR.	Insects	The northern long-eared bat may experience adverse toxicological impacts from ingestion of contaminated water. Depending on the oil spilled, some components of the released oil may bioaccumulate and result in potential toxicological impacts if northern long-eared bats consume contaminated prey. However, the most toxic components of crude oil do not bioaccumulate to high degrees, and this species would not experience direct physical or toxicological adverse impacts from an oil spill. Areas surrounding wetlands remain susceptible to effects resulting from oil spills and associated response efforts (see Section 5.5.6). As such, local habitat for this sensitive species may experience short-term impacts from a release of crude oil. If a spill substantially alters the function of an existing wetland, long-term impacts could also occur.
Western prairie fringed orchid	The western prairie fringed orchid grows in wet to somewhat drier prairies in the eastern portion of Nebraska and its estimated current range overlaps with the MAR in Antelope, Madison, Stanton, Seward, and Saline counties. However, the majority of the lands crossed by the MAR are disturbed agricultural lands and are not likely to support this species.	Not applicable	Impacts could occur because of direct physical oiling of plants or supporting soils or through increased human and vehicle traffic during spill response activities.

Source: Jorgensen 2015; NatureServe Explorer 2018; NGPC 2017a, 2017b, 2015, 2014, 2011a, 2011b, 2011c; USFWS 2017a

The bald eagle, a predatory bird species, is no longer listed under the ESA, but remains protected under federal regulations. The Bald and Golden Eagle Protection Act usually requires the maintenance of minimum buffers between a nesting bald eagle and any new or intermittent activities (such as a recovery effort after a spill), or it requires the seasonal restriction of activities that may disturb these birds or their nests. While violations of this act may carry penalties of monetary fines and/or imprisonment, criminal penalties only apply when a person without a permit "knowingly or with wanton disregard for the consequences of his act" takes an eagle or any part, feature or nest. A release of crude oil into a waterway could affect important bald eagle food sources, and spill response activities may disturb these birds.

However, disturbances in these cases would be accidental and short term in nature. Should a spill alter the function of a surface water-related food source, a long-term impact could result and the bald eagle may relocate permanently.

As presented in Table 5-19, the Department calculated the likelihood of a release affecting a threatened or endangered species range to be 0.04 incident per year of any size spill. Note that this rate does not account for the northern long-eared bat due to the fact that this species utilizes roosting trees, which are less likely to be affected by a potential release. Most of the threatened and endangered species rely on habitats more likely to be directly affected through physical oiling or by the indirect toxicological impacts.

Table 5-19. Projected Annual Rate of Spills that Could Impact Threatened and Endangered Species

Resource	Spills > 0 barrel[a]	Spills > 50 barrels[b]	Spills > 1,000 barrels[c]
Species Range	0.04	0.008	0.001

Source: NGPC 2018d, 2017a, 2017b, 2015, 2014, 2011a, 2011b, 2011c

a. This incident rate applies to resources that are susceptible to small, medium and large spills.

b. This incident rate applies to resources that are susceptible to medium and large spills.

c. This incident rate applies to resources that are susceptible to large spills.

5.5.8 Socioeconomics and Environmental Justice

An accidental release of crude oil along the MAR could result in short- or long-term effects to the existing socioeconomic and environmental justice conditions within the ROI summarized in Section 3.8, Socioeconomics and Environmental Justice.

5.5.8.1 Socioeconomics

Potential socioeconomic effects from a release of crude oil include impacts to agricultural production, hunting and fishing, local property values and commercial activity. The extent and duration of the socioeconomic impacts would depend on the properties and uses affected, the response time, the remedial method employed by the response team, and the length of time required to return properties to conditions similar to those prior to the spill. The terrain near a spill location and the proximity of surface waters, residences and commercial uses are important factors that affect the extent of socioeconomic impacts. Releases in residential or commercial areas could require the evacuation of some residents and closure of businesses for an indeterminate period. During response and restoration actions, access to areas contaminated by crude oil would generally be limited or prohibited to anyone except the cleanup and monitoring crews. Table 5-20 lists the potential direct and indirect socioeconomic effects resulting from a crude oil release.

The effects of a spill on agricultural production could result in a loss of revenue to farmers by the destruction of crops or the contamination of grazing lands. Depending upon the timing of an incident during the growing cycle and the acreage affected, a year's production could be lost in some cases. Furthermore, if the soils require substantial decontamination in the event of a large spill, losses in agricultural revenues could extend to subsequent growing seasons for the farmland affected.

Table 5-20. Potential Socioeconomics Effects from a Crude Oil Release

Direct Effects	Indirect Effects
Physical covering or contamination of residential or commercial property by crude oil.	Evacuation of affected residences and businesses during response and remedial activity. Restricted access or impeded travel to residences, schools and businesses for the duration of remedial activity. Loss of business revenues and employee salaries during commercial closures. Adverse impact on property value. Noise, nuisance odors and visual effects.
Physical covering or contamination of recreational or economic resource by crude oil.	Restricted access to recreational resource area for the duration of remedial activity. Loss of business revenues associated with the resource. Loss of revenues from affected farmland, hunting or fishing resources. Potential permanent effect on recreational resources from residual contamination or perceived stigma.
Destruction of property during physical cleanup, including grading, excavation and dredging.	Accidental or intentional destruction of property during response and remedial efforts. Loss of residential property. Loss of business revenues. Adverse economic impacts for the municipal jurisdiction. Beneficial effects for some businesses (remediation firms, lodging providers, food and service businesses).

Releases that occur near commercial businesses could potentially cause their closure. This would result in lost revenues to the business owners and lost income for employees. The magnitude of potential losses would depend greatly on the extent of the release and the duration and effectiveness of cleanup operations. The stigma of an oil spill, particularly in areas that are viewed as prime recreational areas or areas perceived as being of pristine environmental character, and perception of contamination for members of the public could affect some businesses well beyond the remediation phase. In particular, businesses dependent upon recreational lands contaminated by an oil spill could experience longer-term impacts from diminished public interest in the locations, even after successful remediation. In addition, industries that experience indirect economic benefits from the influx of recreational users to the area could also be affected, including food services, hotel and accommodation providers, and retail.

First responders to the scene of an accidental release would consist of police, fire and emergency medical services. Depending on the size of the spill, communities would initiate actions under mutual aid agreements during the response. In addition, police could be required throughout the duration of the cleanup effort to secure the area near the spill and prevent entry into the affected area. This could result in temporary impacts to local police forces in the area of the release.

In the event that a spill would require extensive response and remediation efforts, additional cleanup workers and police, fire and medical services could be present throughout the duration of these activities. Depending upon the size and location of the spill, as well as the corresponding size of the response team, temporary stresses to police, fire and medical services could occur. Temporary housing would also be

necessary for the dedicated response team throughout the duration of cleanup. Temporary housing is available throughout the regional setting, as discussed in Section 3.8. Depending on the size of the response team, location of the spill and local availability of housing, temporary impacts to housing availability could occur. The response could stress local hospital capacity depending on the extent and severity of human exposure. Exposure pathways could include direct contact with oil, inhalation of airborne emissions or consumption of contaminated food or water.

5.5.8.2 Environmental Justice

CEQ guidance for the consideration of environmental justice during NEPA evaluations directs federal agencies to consider the following three factors to determine whether an action may have a disproportionately high and adverse impact on minority and low-income populations:

- Whether there would be a "significant" (as employed by NEPA) ecological, cultural, human health, economic or social impact that would adversely affect a minority population, low-income population or Indian tribe;
- Whether "significant" (as employed by NEPA) impacts on minority populations, low-income populations or Indian tribes may appreciably exceed those experienced by the general population; and
- Whether cumulative or multiple adverse exposures from environmental hazards would affect a minority population, low-income population or Indian tribe (CEQ 1997a).

Therefore, if a product released from the MAR pipeline would affect an environmental resource, and if the release were to occur in a Census block group or tract identified in Section 3.8, then minority or low-income populations may experience adverse effects. Impacts to these communities and environmental resources would be similar to the effects described throughout this chapter.

Because it is not possible to predict the location of a release, it is not possible to determine whether a disproportionately high and adverse impact would occur for minority or low-income populations from an accidental release potentially occurring along the proposed MAR. However, as discussed in Section 3.8, minority and low-income populations exist in block groups located within 2 miles of the proposed MAR. Section 3.8 also describes Health Professional Shortage Areas and Medically Underserved Areas/Populations. Depending on the location and extent of a spill, minority or low-income populations could be more vulnerable to health impacts associated with a crude oil release because of reduced access to health care services. This could result in disproportionately high and adverse impacts to minority and low-income populations in the event of a large release.

5.5.9 Cultural Resources

An accidental release of crude oil along the MAR could result in short- or long-term adverse effects to known or unidentified cultural resources that exist within the ROI summarized in Section 3.9, Cultural Resources. While the extent of potential effects depends on the location of the spill and the volume of crude oil released, short- and long-term effects could occur through the physical contamination of cultural resources. Impacts can also result from cleanup efforts or a lack of access to cultural sites during cleanup efforts. Table 5-21 lists the potential direct and indirect effects to archaeological and historic sites resulting from a crude oil release.

Table 5-21. Potential Effects to Archaeological and Historic Sites from a Crude Oil Release

Direct Effects	Indirect Effects
Contamination of the site (surface soils and subsurface features/artifacts) from crude oil.	Restricted access to historical sites, limiting use of historic structures, landscapes and identification of historic properties in the field. Adverse effect on TCPs. Acceleration of deterioration of an object or structure. Noise, nuisance odors and visual effects.
Physical covering of site by crude oil.	Restricted access prevents contaminated archaeological sites from being properly researched and documented. Inability to use radiocarbon dating.
Disturbance to archaeological sites from physical cleanup, including grading, excavation and dredging, and disturbance to historic structures from in situ burning and water flushing.	Accidental or intentional destruction of sites during cleanup efforts. Adverse effect on TCPs.

TCP = Traditional Cultural Property

The emergency provisions contained in the regulations that implement Section 106 of the NHPA do not directly address the requirements for emergency response in the event of an oil release. Therefore, in June of 1997, the Chairman of the Advisory Council on Historic Preservation signed a Nationwide Programmatic Agreement that established a national policy and procedures for the protection of cultural resources during emergency response under the National Contingency Plan. The USEPA, USDOT, U.S. Coast Guard, the National Conference of State Historic Preservation Officers and the U.S. Department of the Interior also signed. Responsibility for implementation of the National Contingency Plan fell to the U.S. Coast Guard for coastal areas and the USEPA for inland Areas (Advisory Council on Historic Preservation 1997).

The Nationwide Programmatic Agreement establishes the procedures for a response to an "emergency" circumstance. An "emergency" is a situation that dictates a response action to a spill that must take place expeditiously, such that normal consideration of the Section 106 process is not reasonably practicable. The Nationwide Programmatic Agreement designates a federal on-scene coordinator to make emergency response decisions regarding cultural resources and outlines procedures for making informed decisions that consider cultural resource information before authorizing actions that might affect such properties. In the event of a conflict between public health and safety and the protection of historic properties, the responsibility of the federal government in protecting public health and safety is paramount.

As presented in Table 5-22 and based on spring 2018 survey data, the likelihood of a release affecting cultural resources is greatest for cultural sites, which could experience 0.0008 incident per year of any size spill.

Table 5-22. Projected Annual Rate of Spills that Could Impact Cultural Resources

Resource	Spills > 0 barrel[a]	Spills > 50 barrels[b]	Spills > 1,000 barrels[c]
Cultural Sites[d]	0.0008	0.0004	0.0002
Paleo Sites [e]	0	0	0

Source: Exp 2018; Paleo Solutions 2018

a. This incident rate applies to resources that are susceptible to small, medium and large spills.

b. This incident rate applies to resources that are susceptible to medium and large spills.

c. This incident rate applies to resources that are susceptible to large spills.

d. Eligibility of sites within the MAR have not yet been determined; rates depicted in the table, therefore, represent an upper bound of incident rate.

e. No significant sites found.

6 CUMULATIVE IMPACTS

6.1 INTRODUCTION

This chapter describes the potential cumulative impacts that could occur from implementation of the MAR in combination with other past, present and reasonably foreseeable future actions. Reasonably foreseeable actions are those that are likely to be constructed or take place in the foreseeable future (based on permit applications or similar indication of significant intent). Potential long-term and/or permanent effects from these projects and activities may contribute to overall cumulative impacts within the MAR area. As defined in 40 CFR 1508.7, cumulative impacts are the incremental impacts on the environment resulting from the Proposed Action. The analysis of cumulative impacts follows the processes recommended by the CEQ and the regulations in 40 CFR Chapter V (CEQ 2005, 1997b).

The Department addressed direct, indirect and cumulative effects of the proposed Keystone XL Pipeline project in the previous 2011 Keystone XL Final EIS and in the 2014 Keystone XL Final SEIS. The focus of this SEIS is on specific direct, indirect and cumulative impacts related to the MAR, with consideration as to whether those impacts are consistent with those described in the 2014 Keystone XL Final SEIS.

6.2 METHODOLOGY

The scope of the cumulative impact analysis encompasses the geographic boundaries and timeframes that relate to the resources affected by the MAR and how the impacts interact with other actions across resource areas, regardless of Department jurisdiction. Similarly, the ROI for the cumulative impacts analysis was determined based on the potential for the MAR to contribute to cumulative environmental effects when considered with past, present or reasonably foreseeable projects. Table 6-1 describes the cumulative impact ROI for each resource.

Table 6-1. Region of Influence for Cumulative Impacts Analysis by Resource Area

Resource Area	Region of Influence
Land Use, Recreation and Visual Resources	Areas adjacent to and within the MAR ROW
Geology and Soils	Areas adjacent to and within the MAR ROW
Air Quality and Greenhouse Gases	Air quality: Regional (defined by counties crossed by the MAR in Nebraska) Greenhouse gases/climate change: Regional, national and global scale
Noise and Vibration	Areas adjacent to and within the MAR ROW
Water Resources	Watersheds, floodplains and state-designated stream segments associated crossed by the MAR ROW
Biological Resources	Biological resources within the counties crossed by the MAR ROW
Socioeconomics	Census tracts/block groups and transportation infrastructure within the counties crossed by the proposed MAR pipeline
Cultural Resources	Areas adjacent to and within the MAR ROW
Reliability and Safety	Area within the potential reach of released product, as described in Chapter 5

MAR = Mainline Alternative Route; ROW = right-of-way

The cumulative impacts analysis considers the direct effects of the MAR in the context of effects from past, present or reasonably foreseeable projects and uses similar impact assessment methodologies as described in Chapter 4.

The Department considered current and future project within the counties crossed by the proposed MAR by searching publicly available regulatory and planning databases – specifically related to energy development (e.g., wind farms, oil and gas pipelines, mining and mineral extraction activities, transportation projects and county-specific economic development offices). Projects or actions considered include those that have the potential to result in cumulative impacts to the resource as it relates to the ROI.

6.3 PAST, PRESENT AND REASONABLY FORESEEABLE PROJECTS

Historical and ongoing activities in the Project area, including agricultural development, ranching, livestock grazing, energy infrastructure and urban and suburban development have substantially altered localized areas along the pipeline ROW. All of these activities have contributed to a change to the once dominant grassland and rainwater basin landscape and degradation of natural habitat for wildlife and plant species. Refer to Chapter 3, Affected Environment, for a further description of the affected environment.

Current and reasonably foreseeable future projects within and near the ROI are identified below. Overall, the area remains predominantly rural and agricultural in nature with little activity having the potential for contributing to significant cumulative effects. Pipeline projects, associated facilities and new road construction are the primary activities identified that have the potential for cumulative effects, as these projects are large-scale and/or linear in nature.

The 2014 Keystone XL Final SEIS also evaluated connected actions. As defined by CEQ regulations, connected actions are closely related and therefore should be discussed in the same impact analysis. Actions are connected if they meet the following requirements:

- Automatically trigger other actions that may require environmental impact statements;
- Cannot or will not proceed unless other actions are taken previously or simultaneously; and
- Are interdependent parts of a larger action and depend on the larger action for their justification.

The connected action analysis in the 2014 Keystone XL Final SEIS considered the requirements for electrical distribution lines and substations for the operation of pipeline facilities (e.g., pump stations and MLVs). In relation to the MAR, no large utility line connection project would be required. The NPPD would construct local distribution lines to deliver power to the four proposed pump stations along the MAR (see Figure 2-1 for pump station locations). The NPPD determines the ultimate siting of the distribution lines and is responsible for obtaining permits, approvals or authorizations from federal, state or local governments. NPPD would also be responsible for adhering to the commitments included in their letters to the USFWS, which were included in Appendix H of the 2014 Keystone XL Final SEIS.

6.3.1 Cumulative Projects and Activities within the Region of Influence

6.3.1.1 Existing Keystone Mainline

This analysis identified the existing Keystone Mainline for cumulative impact consideration as it would share a ROW with the MAR portion of the Keystone XL pipeline and it has the potential to cumulatively affect similar resources. As depicted in Figure 2-1, the MAR parallels a significant portion of the existing Keystone Mainline in Nebraska (excluding Antelope and Madison counties), ending in Steele City, Nebraska. The Keystone Mainline has been in operation since 2010 and carrying crude oil from the

Western Canadian Sedimentary Basin in Canada to Steele City, Nebraska. From Steele City, the Mainline splits in two, with one leg running east through Missouri for deliveries into Wood River and Patoka, Illinois; and the second leg running south to Cushing, Oklahoma, and then on to refineries along the Gulf of Mexico via the Keystone Pipeline System's Gulf Coast extension.

A review of Keystone assets and projects identified no other assets, projects or plans to expand existing facilities in the Project area other than the proposed Keystone XL pipeline, including the proposed MAR that is the subject of this SEIS (TransCanada 2018b).

6.3.1.2 Other Pipeline Infrastructure Projects near the MAR (oil, gas, products and terminals)

This analysis identified other pipeline infrastructure projects for cumulative impact consideration as they share similar characteristics (linear in nature), traverse similar landscapes as the MAR and have the potential to cumulatively affect similar resources affected by the MAR. The primary source for all the pipeline infrastructure locations was the U.S. Energy Information Administration and the Nebraska Pipeline Association (Nebraska Pipeline Association 2018; U.S. Energy Information Administration 2018); additional sources that supplement specific infrastructure details are called out separately below. The following existing oil and natural gas pipelines run near (within the same county(ies)) as the MAR:

- Platte (carries crude oil through western Nebraska and terminates in Steele City, Jefferson County) (Enbridge 2018)
- NuStar Energy (East Refined Products Pipeline System), carries petroleum refined products and anhydrous ammonia pipeline through Nebraska (Platte and Madison counties) with a termination in Norfolk, Madison County) (NuStar Energy 2018)
- NuStar Energy's East System Pipeline (carries hydrocarbon gas liquid [HGL] through northeastern Madison County, north-south through the town of Norfolk) (NuStar Energy 2018)
- NuStar Energy's East Refined Products Pipeline System pipelines (carries refined products through Seward and Colfax Counties) (NuStar Energy 2018)
- Magellan (carries a refined product pipeline through Nebraska across Seward County and an ammonia pipeline across Jefferson County) (Magellan Midstream Partners 2018)
- Rockies Express West, Trailblazer and Natural Gas Pipeline Company of America (operates natural gas transmission lines in Jefferson County (TallGrass Energy 2018a; USFWS 2018h)
- Tallgrass Interstate Gas Transmission Line (operates natural gas transmission line in Madison, Stanton and Platte counties) (TallGrass Energy 2018b)
- Northern Natural Gas Pipeline (operates numerous natural gas through every county crossed by the proposed MAR) (Northern Natural Gas 2018)
- Petroleum product pipelines in Saline, Butler and Colfax Counties with petroleum product terminal in Colfax County (NuStar Energy LP terminal is called the Columbus Terminal but is located just across the Platte County line in Richland, Colfax County) and Madison County (NuStar Energy in Norfolk)

A review of oil, gas and product expansion projects identified no new projects or expansion in the ROI.

6.3.1.3 Wind Farms / Wind Energy Projects

This analysis identified wind farms and wind energy projects within the ROI for cumulative impact consideration as they often occupy large footprints and are dominant features in the landscape. These types of projects have the potential to cumulatively affect similar resources affected by the MAR. Existing wind farms, which became operational between 2013 and 2016 include: Steele Flats Wind Farm (Jefferson County, 2013; 44 turbines, 74.8 megawatts [MW]), Prairie Breeze Wind (Antelope County, 2014; 118 turbines, 206.5 MW), Prairie Breeze II Wind Energy Center (Antelope and Madison counties, 2015; 41 turbines, 73.4 MW), Prairie Breeze III Energy Center (Antelope County, 2016; 20 turbines, 35.8 MW); and the Creston Ridge Wind Farm in Platte County (4 turbines, 6.8 MW) (U.S. Energy Information Administration 2018; Kansas Energy Information Network 2014; Nebraska Office of Energy Statistics 2018; Nebraska Public Power District 2018). In addition, the Seward Wind Farm (1.7 MW) was recently completed (Seward Wind Farm Company (Nebraska Office of Energy Statistics 2016).

Wind farms currently proposed include: Milligan I Project (Saline County, planned start date 2019; maximum capacity 300 MW, 150 turbines); Milligan 3 Project (Saline County, planned start date 2020; maximum capacity 73 MW, 40 turbines); and Upstream Energy Center (Antelope County, start date not identified; maximum capacity 350 MW, 168 turbines) (Nebraska Energy Statistics 2016; Nebraska Public Power District 2018).

6.3.1.4 Transmission Lines

This analysis identified transmission lines for cumulative impact consideration as they share similar characteristics (linear in nature), traverse similar landscapes as the MAR and have the potential to cumulatively affect similar resources affected by the MAR. One existing in-state network of transmission lines extends through every county along the proposed MAR Route (U.S. Energy Information Administration 2018). A review of the Nebraska Public Power District website identified no planned transmission projects near the MAR (Nebraska Public Power District 2018; Nebraska Office of Energy Statistics 2018).

The proposed MAR will require local power providers to construct, operate and maintain power lines and substations to service pump stations for MAR pipeline and single power line connections to MLVs. These activities are considered connected actions and potential impacts are analyzed by each resource area within this chapter.

6.3.1.5 Energy Production Facilities

This analysis identified energy production facilities within the ROI (U.S. Energy Information Administration 2018; Nebraska Office of Energy Statistics 2018; Nebraska Public Power District 2018) for cumulative impact consideration as they often occupy large footprints and are dominant features in the landscape. These types of projects have the potential to cumulatively affect similar resources affected by the MAR. The area includes many existing energy production facilities, in addition to wind, including:

- Coal Plant (Columbus, Platte County)
- Natural Gas Plants (Crete in northeastern Saline County and Fairbury in Jefferson County)
- Petroleum Plants (David City in Butler County, Madison Utilities in Madison County, Wilbur in Saline County)
- Other – Elkhorn Valley Ethanol Plant (Norfolk in northeastern Madison County – 40 million gallons per year); Loup River Hydroelectric Plant (Platte County)

A review of energy production/power plant projects identified no new projects or issues in the project areas (US Energy Information Administration 2018; Nebraska Public Power District 2018).

6.3.1.6 Highway Construction

This analysis identified highway construction projects for cumulative impact consideration as they share similar characteristics (linear in nature), traverse similar landscapes as the MAR and have the potential to cumulatively affect similar resources affected by the MAR. The highway projects below, broken out by county, are identified as current and future projects in the Nebraska Surface Transportation Program Book for Fiscal Years 2018-2023 (Six Year Plan) (Nebraska Department of Transportation 2017). Unless otherwise noted, all are future projects. Also, no relevant projects were identified in Stanton, Madison or Antelope counties:

- Colfax: Resurfacing of Highway 15 (N-91) (15.2 miles)
- Butler: Milling and resurfacing of Highway 92 (Rising City East) (11.1 miles); milling, resurfacing and bridge repair of Highway 15 (N-92 South) (11 miles).
- Seward: Milling, resurfacing and bridge repair of Highway 6 (in Milford and north) (3.6 miles); milling, resurfacing and bridge repair of I-80 Goehner to Milford, milling, resurfacing and bridge repair (9 miles) and from York/Seward County line to Goehner (7.5 miles); resurfacing and bridge repair of Highway 6 (Emerald west) (3.9 miles).
- Saline: Resurfacing of Highway 33 (Crete) and US 6/N-15 (11 miles).
- Jefferson: Resurfacing of Highway 15 (Fairbury North) (11.8 miles).

6.3.1.7 Rail

Major rail lines intersect the MAR, including BNSF (Seward, Saline and Jefferson counties), Union Pacific (Colfax, Platte and Butler counties) and a regional railroad (Nebraska Central) that runs through Stanton, Madison, Platte and Butler counties. A review of rail projects identified plans for major investments in rail infrastructure in Nebraska by BNSF and Union Pacific (Aberdeen, Carolina and Western Railway Company 2018; Area Development News Desk 2012; BNSF 2017, 2018; Union Pacific 2018; Rio Pacific Grande 2016). This cumulative impact analysis considers existing rail lines; however, this analysis does not include planned rail projects since locations have not been identified.

6.3.2 Land Use, Recreation and Visual Resources

Overall cumulative impacts to land use would be negligible for the MAR and ancillary facilities. The MAR lies in a predominantly agricultural area. A large portion of the MAR lies within an existing utility corridor which helps minimize the permanent changes in land use, as well as potential impacts on recreation and visual resources resulting from MAR construction and operation. Construction and operation of various projects affect existing land use covers, typically converting one land use type to another. In agricultural areas, construction impacts are mostly temporary along ROWs, and agricultural activities can mostly resume after construction is completed. However, some construction impacts, including soil compaction and mixing, as well as impacts to prime farmland can be long lasting. In forested areas, construction of linear projects results in the removal of trees and shrubs and requires clearing of vegetation in ROW. While an extensive portion of the route crosses prime farmland (see Section 6.3.3), the MAR ROW would cross only a small area of forested land (36 acres), 12.9 acres of which would be required for operation and result in a permanent change in land use.

Long-term concerns for cumulative impacts relate to permanent changes in land use, a declining trend in the availability of recreational or special interest areas, and adverse impacts to visual resources.

Most impacts to land use, recreation and visual resources occur on a local level. To the extent they occur in the same corridor, the cumulative projects contribute to overlapping regional impacts and would add to the cumulative changes in land use. The MAR would cross one Nebraska Scenic Byway and two National Historic Trails (located on private land), as well as several perennial waterbodies that include a designated recreational use. There would be no long-term impacts on either of these resources, and any adverse effects during construction would be temporary and minor with the implementation of best management practices and special construction procedures for waterbody crossings. The majority of cumulative projects are existing projects and would have no additional impact on current or potential future land use along the MAR. However, past and current actions generally have caused minor cumulative impacts on land use. Due to its central location between northern oil and gas fields and southern refineries, numerous natural gas, crude oil and refined product pipelines have been constructed and now crisscross the state of Nebraska, including the area that would be crossed by the MAR. A more recent development in the area is wind power and portions of the route (e.g., southeastern Antelope County) include groupings of one or more wind farms with potentially hundreds of individual turbines in a given area. There are also plans to develop additional wind farms in some of the counties along the MAR. While wind turbine installations may cover a large area, they are compatible with many land uses, such as farming and grazing found in the Project area; they require only small areas of turbine foundations and infrastructure that would be unavailable for use and would not be expected to result in a cumulative impact on land use. Potential aesthetic impacts of wind turbines and the resulting changes in the visual landscape can be large; however, depending on the proximity of other important scenic or heritage protected landscapes, or the individual viewer's perspective. Regulatory controls in place include local land use plans, zoning and easement agreements. Such controls promote project-siting efforts that avoid protected lands, ensure land use compatibility and employ visual screening of infrastructure.

During construction of the MAR and ancillary facilities, impacts may include noise and dust from equipment, temporary traffic delays when equipment is being moved and the visual effects from removing vegetation and excavating soils. Of the past, present and planned projects within the ROI, none would contribute to long-term cumulative impacts on land use. Projects that have already been constructed and are in operation would not contribute to cumulative impacts because routine maintenance and management of the operating facilities do not require land clearing or ground disturbance.

6.3.3 Geology and Soils

Past, present and planned actions generally have caused, and may cause, minor cumulative impacts primarily to geology (fossil fuels, mineral resources and paleontological resources) and soils (including prime farmland) in the ROI. No fossil fuel resources or significant mineral resources or mining operations have been identified within the ROI, although there may be sand and gravel resources in the general area. Nationally "critical" mineral resources have been identified in nearby Elk Creek, Nebraska (over 50 miles east of the MAR in Jefferson County), where NioCorp Metals plans to develop North America's only niobium, scandium and titanium project. However, the project is at a sufficient distance from the MAR that the contribution to these impacts by the MAR would be negligible. Construction activities could potentially harm paleontological resources. Keystone would develop a Paleontological Monitoring and Mitigation Plan prior to construction on federal as well as certain state and local government lands. No cumulative effects on paleontological resources are expected.

Long-term impacts on soils relate to potential productivity concerns (reduction in the soil's ability to support plant growth) and the permanent conversion of prime farmland soil. Projects generally cause impacts that are confined and specific to the areas they disturb. This part of central Nebraska has been crossed extensively with numerous natural gas, crude oil and refined product pipelines coming from the northern oil and gas fields and heading to southern refineries. This has resulted in the conversion of

land uses, including the loss of prime farmland soils, which is additive and cumulative over a wide area. A significant portion of the ROI includes prime farmland. Past projects have also contributed to soil disturbance and the potential for a cumulative decline of productivity in temporarily disturbed areas, although disturbance from transmission line and wind turbine projects in the area are limited to small, isolated features associated with tower footings, substation sites and turbine foundations. In addition, industry standard best management practices, such as stockpiling and restoring topsoil, can reduce long-term effects. Regulatory controls (Farmland Protection Policy Act) are also in place to protect prime farmland soils and productivity.

6.3.4 Air Quality and Greenhouse Gases

Overall cumulative impacts to air quality and greenhouse gases would be minor. Past, present and planned actions generally have caused, and may cause, minor permanent changes in air quality, assuming that effective regulatory oversight and mitigation efforts occur. The majority of cumulative projects are existing projects, and the area is generally rural and meets national and state air quality standards. Agriculture is the dominant industry. Construction-related emissions, such as from ongoing or planned highway projects, or future wind farm projects, are, or would be, limited to fugitive dust and mobile-source combustion emissions, including both criteria pollutants and greenhouse gases. Given the temporary and localized nature of these dust emissions for projects occurring within the ROI, including those from farm equipment and farming activities, these activities are not expected to significantly affect air quality. In addition, fugitive dust control plans would be implemented not only for the MAR and ancillary facilities but also for other projects in order to comply with federal, state and local requirements. Therefore, cumulative impacts to air quality would be minor and short-term for construction phases.

A short-term, minor increase in greenhouse gases would occur during construction of the MAR and associated facilities. Overall cumulative impacts to greenhouse gases would be negligible for the MAR and ancillary facilities. Greenhouse gas emissions from the Proposed Action and No Action Alternative would contribute incrementally to global climate change in combination with all other global sources of greenhouse gas emissions. While the direct measurable impact of the Proposed Action on climate change would be small relative to global greenhouse gas emissions, greenhouse gas emission impacts are additive as the gases accumulate in the atmosphere and would likely be long-term because of the long atmospheric lifetimes of most greenhouse gases. Although climate change is a global concern, this cumulative analysis considers the potential cumulative effects of greenhouse gas emissions in the area of the MAR and ancillary facilities. The greenhouse gas emissions from the construction and operation of the MAR and ancillary facilities along with past, present and planned projects would be negligible compared to the global greenhouse gas emissions inventory. Neither the construction nor operation of the MAR and its ancillary facilities would noticeably contribute to greenhouse gas cumulative effects or climate change. The 2014 Keystone XL Final SEIS contains a detailed lifecycle analysis for operation of the entire Keystone XL pipeline and potential impacts on greenhouse gas emissions and climate change. The Department's 2017 Final SEIS for the Line 67 Expansion (Chapter 6, Section 6.4, Climate Change) also presents analyses on lifecycle greenhouse gas emissions and climate change pertaining to crude oil products similar to those transported on the MAR (U.S. Department of State 2017).

6.3.5 Noise and Vibration

Past, present and planned actions generally have caused, and may cause, minor to moderate cumulative impacts from noise. The cumulative impacts analysis of noise considers the long-term perceptible increases in ambient noise levels and increases of excessive ground-borne vibration to persons or property. Most of the potential impacts from noise are short-term and associated with the construction phase of a project, including construction equipment and vehicles and directional drilling. Examples of construction noise levels are provided in Section 4.5 and at 50 feet include 84 dBA because of ground clearing, 89 dBA from

excavation and grading and 85 dBA from HDD. Additionally, each pump station would operate using electrical power supplied by power lines and a substation operated by the regional power provider, NPPD. The NPPD would be responsible for managing the power lines and substations in accordance with all applicable federal, state and local regulations to maintain compliance with all noise requirements. Although construction noise could be moderately loud from activities resulting, the temporary and intermittent nature of the construction activities would not result in long-term cumulative impacts. Additionally, construction activities are generally limited to daylight hours in conformance with federal, state and local codes and ordinances, and manufacturer-prescribed safety procedures and industry practices.

For some projects, operations may also cause noise impacts. Potential impacts from noise could include direct impacts to nearby residences, wildlife and recreation areas. Because noise from other existing and planned projects generally would occur at separate locations, they would not contribute to cumulative noise effects in combination with the MAR. Current and planned actions, such as the multiple wind farms existing and planned in the area, have caused, and may cause, negligible to minor cumulative impacts to noise and vibration, such as in southeastern Antelope County where a large number of wind farms are located. Turbines generate noise and continuous noise can create stressors for humans and wildlife. However, turbine noise levels should not be a concern if the turbines are properly placed and located sufficient distances from residences and other sensitive noise receptors. However, the MAR is located miles away from the large grouping of wind farms in southeastern Antelope County such that they should not pose a cumulative concern.

During operation, long-term concerns include perceptible increases in ambient noise levels that exceed regulatory thresholds at sensitive receptors. As noted in Section 6.3.1, electrical transmission lines also crisscross the entire project area, and additional lines will have to be extended to, and substations constructed for, the three pump stations located along the MAR (Stanton/Platte, Butler and Seaward counties) and single line connections are required to the MLVs. Both the pump stations and the transformers used in electrical generation and distribution systems generate noise during operation, and their co-location along the MAR introduces the potential for minor to moderate cumulative impacts on sensitive noise receptors that live or work nearby. Regulatory controls in place include the Noise Control Act and local ordinances that all projects must follow to avoid potential noise impacts. Typically, mitigation measures for noise include avoidance during the site selection process for a project – locating it away from sensitive receptors – and the use of noise barriers and enclosures for noise emitting equipment (e.g., pump stations or generators).

6.3.6 Water Resources

6.3.6.1 Groundwater and Surface Water

Past, present and planned actions generally have caused, and may cause, minor cumulative impacts on surface water and groundwater resources within the ROI, assuming projects implement appropriate and effective mitigation and restoration efforts; however, the contribution to these impacts by the MAR would be negligible. Groundwater provides drinking water and water for industrial and irrigational uses from aquifers in unconsolidated materials and bedrock units throughout the ROI. The list of projects in Section 6.3.1 would not likely affect the availability or quality of groundwater, and the MAR would contribute negligibly to adverse cumulative groundwater impacts. Most of the projects are already existing and would not contribute to cumulative impacts on water resources because routine maintenance and management of the operating facilities do not require any groundwater or surface water disturbing construction activities. No mining operations, which have the potential to affect groundwater, have been identified nearby. In addition, the planned highway construction projects involve remodeling and construction of existing roads, and the planned windfarms do not require water. Therefore, cumulative impacts to water resources are not expected. Regulatory controls (Clean Water Act and Safe Drinking

Water Act) and industry standard best management practices (e.g., establishment of unusually sensitive drinking water areas/drinking water supply management areas) are also in place and would minimize adverse cumulative impacts on groundwater.

The ROI includes three watersheds and major surface waters (rivers and streams). The pipeline, rail and transmission line projects identified in Section 6.3.1, in particular, have the potential to cross multiple waterbodies along their planned routes. Permanent and long-term cumulative impacts from construction could include the placement of fill in surface waters or wetlands, which may reduce the quality of these water resources. In conformance with regulatory oversight, project proponents typically select and modify proposed routes for linear projects to minimize the potential for impacts on surface water resources, as well as on other sensitive environments. Projects avoid these resources whenever possible or include mitigation methods, such as HDD, to avoid impacts. Regulatory oversight under the Clean Water Act and Rivers and Harbors Act, and required best management practices for sediment and erosion control, would result in minor cumulative adverse impacts on surface waters.

6.3.6.2 Wetlands and Floodplains

Past actions, including agriculture, has drastically changed the landscape in many parts of Nebraska. In relation to the MAR and the ROI this would include the transformation of the once dominant complex of shallow lakes, marshes and other wetlands located within the Rainwater Basin Ecoregion. Farming and placement of drainage tiles have removed many of these features from today's landscape. Present and planned actions generally have caused, and may cause, minor to moderate cumulative impacts on wetlands and floodplains within the ROI, assuming that projects implement appropriate and effective mitigation and restoration efforts. With respect to floodplains, the MAR would make a negligible contribution to adverse cumulative impacts. Regulatory oversight and development restrictions under the National Flood Insurance Program (NFIP) and Executive Order 11988 (Floodplain Management) would limit cumulative adverse impacts on floodplains to minor.

The majority of the ROI includes agricultural land, and only a small area of predominantly emergent wetlands remains. The MAR would cross through the Rainwater Basin Region (Butler, Seward and Saline counties), named for the once abundant natural wetlands that formed where clay-bottomed playa depressions occur. Impacts to wetland resources, however, from the pipeline would be avoided or temporary in nature during construction. There are approximately 34,103 acres of wetlands remaining in the Rainwater Basin, which is only about 10 percent of what historically existed; the largest threat to these wetlands has been and continues to be habitat loss due to cropland conversion (NGPC 2005). Other projects in the ROI would have minor adverse impacts to wetland resources. Development projects would be required to comply with Section 404 of the Clean Water Act to avoid or mitigate impacts to wetlands; however, non-federally protected isolated wetlands may experience a cumulative loss if these resources are not avoided.

6.3.7 Biological Resources

Past actions, including agriculture, have drastically changed the biological communities and habitats in many parts of Nebraska. In relation to the MAR and the ROI this would include the transformation of the once dominant grasslands into agricultural crops and rangeland and loss of riparian forest. Overall cumulative impacts to biological resources would be minor to moderate for the MAR pipeline and ancillary facilities. Construction of the pipeline within the MAR would require the clearing of deciduous forest and woody wetland vegetation within the temporary ROW which would result in moderate long-term impacts on these communities given the length of time needed for the community to mature to pre-construction conditions. Once forested areas within the permanent ROW would not be allowed to re-establish due to periodic mowing and brush clearing during pipeline operation. Routine maintenance vegetation clearing would occur no more than every 1 to 3 years.

Based on historic and proposed projects, the primary impact concern with respect to terrestrial vegetation and potential cumulative impacts is the conversion of forested uplands to herbaceous habitats, which reduces forest cover and increases the amount of forest fragmentation. Much of the ROI includes agricultural lands. Agriculture has changed the landscape and reduced natural habitat by the planting of crops and ranging of cattle, which does not provide suitable habitat for most protected species, increasing the importance of those areas that do remain.

Past, present and planned actions identified in Section 6.3.1 relating to pipeline and transmissions infrastructure systems pipeline have contributed to cumulative impacts from continuing habitat (forested and prairie) decline and fragmentation. The recent growth in wind power and wind energy farms, many of which are located within the ROI has placed additional pressure on biological resources. While wind farms require expansive areas of land to operate, they require only small areas of land to be cleared for turbine foundations and infrastructure. While habitat fragmentation may not be a significant concern, the movement and noise of the turbines could have adverse effects on wildlife, including migratory birds and some federally protected species. This combined with regional transmission lines and power connections to pipeline facilities could cause cumulative adverse effects on avian species and bats from potential for collision. Impacts would be negligible to minor for smaller and more agile species but could be moderate for larger bird species such as cranes, herons and raptors. Mortality resulting from collision for bird species is most likely to occur during spring and fall migrations when concentrations of these species are at their peak.

Effects to other wildlife populations due to accidental injury or mortality of less mobile species are anticipated to be mostly minor and highly localized. Past, present and planned projects would minimize impacts on wildlife to the extent practicable by implementing best management practices, adhering to regulatory controls and avoiding habitat areas of concern when practicable.

Because trends in surface water quality are not evidencing declines in the region (see Section 6.3.6) and regulatory controls are in place to protect water quality and aquatic habitat (under the Clean Water Act), proposed projects would contribute minimally to cumulative declines in aquatic habitat and fisheries.

With respect to threatened and endangered species, project impacts to species would be minor, and the Department has concluded the proposed Project may affect but is not likely to adversely affect protected species based on adherence to conservation measures included in the 2014 Keystone Final SEIS. As previously discussed, the cumulative increase of transmission lines and wind farms increases collision potential with species, including the federally endangered whooping crane. Each pump station would operate using electrical power supplied by power lines and a substation operated by the regional power provider, NPPD. In addition, much of the highest wind energy potential in the country occurs in the Great Plains, which includes the U.S. portion of the whooping crane migration corridor in Nebraska and five other states. Ongoing and anticipated development in wind resources in the migration corridor could place thousands more wind turbines, associated transmission lines and other appurtenances in the Central Flyway path of the species in coming years (USFWS 2009). The NPPD would be responsible for managing the power lines and substations in accordance with all applicable federal, state and local regulations to maintain compliance with all conservation measures adopted in the CMRP and summarized in this SEIS to minimize adverse impacts to wildlife, including whooping cranes. Overall cumulative effects to whooping crane populations from the Proposed Action would be negligible.

6.3.8 Socioeconomics and Environmental Justice

Overall cumulative impacts to socioeconomics and environmental justice would be negligible to minor. Past, present and planned actions generally have caused, and may cause, negligible to minor cumulative impacts on socioeconomics within the ROI, and the MAR pipeline would make a negligible to minor

contribution to the cumulative impacts. Construction activities from the MAR and other planned projects in the area would result in temporary beneficial impacts on the economy, employment and income. Minor to moderate cumulative impacts could occur if there are concurrent and/or successive construction schedules of other geographically overlapping projects that would have competing demands on local construction workforce, public services and facilities (including schools and hospitals) and transportation infrastructure. Overlapping schedules could occur for the MAR and one or more of the planned windfarms but the impacts are expected to be minor. The impact of the 106 MAR construction workers that might relocate from another area is expected to be small and have a negligible impact on the existing housing market and public services. Similarly, wind farm construction is not labor intensive (estimated maximum 220 workforce for an 80-turbine facility) and can typically be completed within 6 months (Wyoming Industrial Siting Council 2010). Therefore, the increases in demand for housing and public services from the combined construction workforces of the MAR, and the planned windfarms that fall within the ROI would have negligible cumulative effect. The construction workforce associated with the MAR and other planned windfarm projects would also result in temporary beneficial impacts, generating increased spending at local businesses.

During construction activities, nearby residents may experience short-term increases in fugitive dust and noise, disruption to local traffic patterns and temporary competition for services. This may be especially true for some of the small communities along the MAR, particularly those communities that also have other concentrated businesses, industry (power plant), extensive pipeline infrastructure, rail and other planned projects and highway construction projects within their boundaries (e.g., Steele City, Nebraska). In addition, limited road networks in certain areas may hinder access to a pipeline in the event of response to an incident.

Permanent impacts associated with the MAR and the projects listed in Section 6.3.1 would be the beneficial impacts associated with increased property tax revenues and increased employment and earnings associated with operations of the various projects. There is also the potential for some adverse property value impacts associated with changes in land use. This would be minimized for the MAR since so much of the proposed route lies within an existing utility corridor. However, it could be a concern for any residences near a proposed wind farm.

Cumulative impacts to environmental justice would be negligible to minor for the MAR and ancillary facilities. Environmental justice population within the MAR includes a few concentrated (i.e., exceeds meaningful greater population criterion) minority groups in Butler, Madison and Platte counties, and concentrated low-income population tracts in Pierre (included in the socioeconomics and environmental justice ROI for the MAR) and Stanton counties. Minority and low-income populations would experience temporary impacts during construction along the MAR, such as dust and noise, disruption to traffic patterns and increased competition for medical or health services in underserved population. However, they would not be disproportionately larger than those impacts experienced by other members of the general population. Cumulative impacts may occur from demands on local workforces, supplies, infrastructure and services in an area where overlapping construction projects (e.g., windfarms and highway improvement projects) may occur. Any combined impacts from construction would be temporary and would not be disproportionately high or adverse to minority or low-income populations. Mitigation measures that specifically target minority and low-income populations (e.g., linguistically appropriate public awareness materials relating to construction activities and schedule) would help minimize impacts. Environmental justice populations may benefit from the increased economic stimulus and local spending associated with the projects.

Overall cumulative impacts to transportation and traffic would be minor for the MAR pipeline and ancillary facilities. During construction, there would be a temporary increase in traffic from worker commutes and material deliveries, in addition to diversion of traffic to alternate routes (if applicable).

Vehicle trips for other planned projects, in conjunction with the proposed Project's approximately 106 one-way daily construction workers trips during peak construction would generate cumulative traffic impacts. In addition, the state highway construction projects would contribute to incremental effects on traffic and transportation in the vicinity through road detours and closures. However, cumulative impacts are expected to be temporary and would cease after construction.

6.3.9 Cultural Resources

The Department executed a Programmatic Agreement to take into account the effects of the Keystone XL Pipeline Project on historic properties listed in or eligible for listing in the NRHP resulting from construction, operations and maintenance of the Keystone XL Pipeline Project (U.S. Department of State 2014). The existing Programmatic Agreement would be implemented for the Keystone XL Pipeline portion of the MAR to implement the avoidance, if possible, or mitigation of adverse effects on historic properties. If impacts to NRHP-eligible properties could not be avoided, mitigation plans would be reviewed by the Department and the consulting parties to evaluate the submitted information following the protocols outlined in the amended Programmatic Agreement developed for the Keystone XL Pipeline.

Present and planned actions listed in Section 6.3.1 generally have caused, and may cause, minor impacts on heritage resources within the ROI. New construction projects within undisturbed locations would have the greatest potential to affect archaeological resources adversely; however, the majority of projects identified are existing projects. The planned highway construction projects would largely occur on existing roads and infrastructure. Known sensitive areas for archaeological sites primarily include areas adjacent to major water features.

Regulatory oversight under the NHPA and other statutes would limit potential impacts from proposed projects. To minimize development costs, project proponents would likely choose sites and routes within previously disturbed properties and ROWs, and they would avoid known historic sites to the extent practicable to comply with Section 106 of the NHPA during project implementation. Future projects could contribute to cumulative impacts on cultural resources to the extent that they would disturb known or currently unidentified archaeological sites and historic structures or degrade in-place mitigation for previously disturbed historic properties. However, as with past and ongoing projects, proponents would avoid known historic sites (preferred mitigation strategy) or mitigate impacts to resources (e.g., record and archive cultural artifacts) in compliance with Section 106.

6.3.10 Accidental Release

The potential impacts resulting from a spill would be generally the same as those described for the Proposed Action in Chapter 5, Environmental Consequences from Accidental Releases. However, the site-specific impacts with respect to a given resource area (primarily soils, biological resources, wetlands, land use and cultural resources) may differ depending on the location of a spill within the ROI.

When pipelines share the same corridor, as is the case with parallel pipelines or pipelines that cross, there is the potential for cumulative impacts from accidents or incidents to cause spills from multiple pipelines. Specifically, the Keystone Mainline shares a ROW with the proposed MAR. The impacts of individual spills resulting from separate incidents involving separate pipelines would be additive over time. However, for spills to have a cumulative effect, incidents would need to affect two or more pipelines, and the resulting spills would need to occur near and within timeframes such that the plumes from released product would overlap. The Department determined, in its analysis of another proposed pipeline, that such an incident would be unlikely (U.S. Department of State 2014).

7 SUMMARY OF CONSEQUENCES

7.1 INTRODUCTION

Table 7-1 provides a summary of the level of potential environmental impacts discussed within this SEIS. These conclusions are based on the best management practices and impact avoidance measures contained within the CMRP located in Appendix G of the 2014 Keystone XL Final SEIS and outlined in Table 7-2 and Table 7-3.

Table 7-1. Comparison Summary of Impact Ratings during Normal Operations

Resource[a]	No Action Alternative	Proposed Action Construction	Proposed Action Operations & Maintenance	Cumulative Effects
Land Use, Recreation and Visual Resources	None	Minor to Moderate	Negligible to Minor	Negligible
Geology and Soils	None	Negligible (geology) Minor (soils)	Negligible (geology) Minor (soils)	Minor
Air Quality and Greenhouse Gases	None	Minor	Minor	Minor
Noise and Vibration	None	Minor to Moderate	Negligible to Minor	Minor to Moderate
Water Resources	None	None (wild and scenic rivers) Negligible (groundwater and floodplains) Minor (surface water and wetlands)	None (floodplains and wild and scenic rivers) Negligible (groundwater) Minor (surface water and wetlands)	Minor to Moderate
Biological Resources	None	Minor to Moderate	None to Minor	Minor to Moderate
Socioeconomics and Environmental Justice	None	None to Minor Beneficial (Economic Base)	Negligible to Minor Beneficial (Economic Base and Tax Revenue)	Negligible to Minor Beneficial
Cultural Resources	None	Minor to Moderate	Negligible to Minor	Minor
Reliability[b]	None	–	–	–

a. Refer to Section 4.1, Introduction, for a discussion of impact ratings.

b. The impact intensity of an accidental release on a given resource is dependent on numerous factors including type of product released, size of the release, proximity of the resource to the point of release, weather conditions, response time and method of cleanup. Therefore, the analysis does not assign a specific impact rating. See Chapter 5, Environmental Consequences from Accidental Releases, for a more detailed description of impacts and the likelihood of an accidental release.

Table 7-2. Summary of Resource Protection Measures for the Proposed Action

Resource	Project Phase	Description
Land Use, Recreation and Visual Resources	Construction	• Segregating the upper 12 inches of agricultural topsoil during construction and replacing it during site restoration. • Avoiding functional loss (stopping or obstructing) of active irrigation ditches during construction or providing alternate sources of water. • Avoiding or minimizing potential damage to drain tile systems and repairing damaged drain tiles using original or new material. • Restoring disturbed areas as per the Con/Rec units and landowner agreements. • Minimizing construction noise in the immediate vicinity of herds of livestock. • Installing temporary fences with gates around construction areas to prevent injury to livestock or workers. • Leaving hard plugs (short lengths of unexcavated trench) or installing soft plugs (areas where the trench is excavated and replaced with minimally compacted material) to allow livestock and wildlife to cross the trench safely where required by landowner. • Maintaining all existing improvements such as fences, gates, irrigation ditches, cattle guards and reservoirs to the degree practicable where required by the landowner agreement. • Routing the proposed pipeline along existing ROWs in forest lands, when practicable. • Felling trees toward the pipeline centerline to minimize additional tree disturbance. • Providing construction shielding for certain land improvements (e.g., fences and sheds) and to preserve landscaping and mature trees. • Restoring all fences, landscaping improvements, shrubs, lawn areas and other structures to landowner-agreed requirements following construction.
Geology and Soils	Construction	• Construction of the pipeline to withstand probable seismic events within the seismic risk zones and in accordance with U.S. Department of Transportation regulations (49 CFR 195, Transportation of Hazardous Liquids by Pipeline) and all other applicable federal and state regulations. • Design and construction of the pipeline in accordance with 49 CFR 192 and 193, which require pipeline facilities to be designed and constructed in a manner to provide adequate protection from washouts, floods, unstable soils, landslides or other hazards that could cause the proposed pipeline facilities to move or sustain abnormal loads. Keystone also proposes to use specialized pipeline installation techniques, such as padding and the use of rock-free backfill, which are designed to effectively insulate the proposed pipeline from minor earth movements. • Installation of sediment barriers (e.g., silt fencing, straw or hay bales and sand bags), trench plugs, temporary slope breakers, drainage channels or ditches and use of mulching in areas of high erosion potential as outlined in the CMRP. • Restoration and revegetation of areas disturbed by construction along the pipeline ROW consistent with the CMRP and specific landowner requirements. • Implementation of compaction control measures, including ripping (loosening of compacted soils with a dozer equipped with a ripper blade or deep plow) to relieve compaction, particularly in areas where topsoil has been removed.
Geology and Soils (continued)	Construction	• Monitoring the ROW following construction for erosion, settling and landslide activity, and, in areas of prime farmland, monitoring for any

Table 7-2. Summary of Resource Protection Measures for the Proposed Action

Resource	Project Phase	Description
		degradation in soil productivity. • Removal and segregation of the top 8 to 12 inches of topsoil in non-forested agricultural areas located within prime farmland during excavation to a windrow along the edge of the ROW, with care taken to minimize the potential for mixing topsoil and subsoil. • Compensation of landowners in the event that agricultural productivity is impaired by vehicular compaction for demonstrated losses associated with decreased productivity.
	Operations	• Implementation of erosion and sediment control and reclamation (including revegetation) procedures similar to those described for construction activities and also as described in the CMRP for operations wherever soil is exposed and steep slopes are present or erosion potential is high.
Air Quality and Greenhouse Gases	Construction	• Employing water trucks, sprinklers or calcium chloride (limited to roads) to control dust levels during construction activities. • Controlling speed of all contractor vehicles in work areas and on roads. • Controlling emissions from construction equipment combustion, open burning and temporary fuel transfer systems and associated tanks to the extent required by state and local agencies through the permit process. • Prevention of wind-blown particles from sand blasting operations from reaching any residence or public building by placement of curtains of suitable material, as necessary. • Compliance with all applicable state regulations and local ordinances with respect to truck transportation and fugitive dust emissions.
Noise and Vibration	Construction	• Coordinating pipeline work schedules in areas near residences and businesses where construction activities or noise levels may be considered disruptive to minimize disruption. • Minimizing noise during non-daylight hours and within 1 mile of residences or other noise sensitive areas such as hospitals, motels, campgrounds or state and federal parks. • Providing advance notice to landowners within 500 feet of the ROW prior to construction, limiting the hours during which construction activities with high decibel noise levels are conducted, and ensuring construction proceeds quickly through such areas. • Minimizing noise in the immediate vicinity of herds of livestock or poultry operations, which are particularly sensitive to noise through use of noise control measures identified above. • Establishing a toll-free telephone line for landowners to report any construction noise-related issues and follow-up on appropriate mitigation measures, as necessary.
	Operations	• Implementing a three-step noise control plan for pump station operations in a progressive order when noise reductions are required: (1) install pipe lagging for all pipe suction pipes and discharge pipes; (2) install acoustic blankets for all pumps; and (3) upgrade enclosure for all motors, which would provide 3 decibels noise attenuation for each motor compared with a standard motor enclosure.

Table 7-2. Summary of Resource Protection Measures for the Proposed Action

Resource	Project Phase	Description
Water Resources	Construction	• Implementing the Project's SPCC Plan to avoid or minimize the potential impact of harmful spills and leaks during construction. • Compliance with requirements of all permits issued for the waterbody and wetland crossings by federal, state or local agencies. • Installation of sediment barriers immediately after initial disturbance of the waterbody, wetland or adjacent upland per the CMRP. • Selection of most appropriate method at each crossing based on site-specific conditions (i.e., environmental sensitivity of the waterbody, depth, rate of flow, subsurface soil conditions and the expected time and duration of construction) at the time of crossing. • Use of non-toxic drilling fluids and additives during HDD activities. • Development of a contingency to address a frac-out during a HDD. The plan shall include instructions for monitoring during the directional drill and mitigation in the event that there is a release of drilling fluids. Additionally, the waterbody shall be monitored downstream for any signs of drilling fluid. • Re-establishment of the streambank contour and stabilization of streambanks and installation of temporary sediment barriers following the measures provided in the CMRP and applicable permits. • Reduction of construction ROW crossing widths to 85 feet or less in standard wetlands unless non-cohesive soil conditions require utilization of a greater width and unless the USACE or other regulatory authority authorizes a greater width. • Limiting the duration of construction-related disturbance within wetlands in accordance with USACE Nationwide Permit requirements. • Performing all equipment maintenance and repairs upland locations at least 100 feet from waterbodies and wetlands. • As much as is feasible, replace topsoil and restore original contours with no crown over the trench. Remove excess spoil and stabilize wetland edges and adjacent upland areas by establishing permanent erosion control measures and revegetation, as applicable, during final clean up.
Biological Resources		• Limiting construction traffic to construction of the ROW, existing roads, newly constructed roads and approved private roads. • Clearly staking construction ROW boundaries, including pre-approved TWAs, to prevent disturbance to unauthorized areas. • Implementing reclamation and revegetation measures as described in the proposed CMRP, Con/Rec units and Biological Opinion. • Using certified seed mixes to limit the introduction of noxious weeds within 12 months of seed germination testing, and adjusting seeding rates based on test results per the Con/Rec units. • Seeding at a rate appropriate for the region and for the stability of the reclaimed surface based on pure live seed. • Develop and adhere to a weed control plan for Nebraska in consultation with County Weed Boards. • Using pre-construction treatment such as mowing prior to seed development or herbicide application (in consultation with county or state regulatory agencies, and landowners) for areas of noxious weed infestations prior to clearing grading, trenching or other soil disturbing work to weed infestation locations identified on construction drawings. • Stripping and storing topsoil contaminated with weed populations separately from clean topsoil and subsoil.

Table 7-2. Summary of Resource Protection Measures for the Proposed Action

Resource	Project Phase	Description
Biological Resources (continued)		• Using mulch and straw or hay bales that are free of noxious weeds for temporary erosion and sediment control. • Cleaning all construction equipment, including timber mats, with air or high-pressure washing equipment prior to moving equipment to the next job site; cleaning the tracks, tires and blades of equipment by hand or compressed air to remove excess soil prior to movement of equipment out of weed infested areas; or use cleaning stations to remove vegetative materials with high pressure washing equipment. • Implementing weed control measures as required by any applicable plan and in conjunction with the landowner. • Reseeding disturbed native range with native seed mixes after topsoil replacement consistent with applicable Con/Rec and landowner requirements. • Develop and implement a conservation plan, in consultation with the USFWS, consistent with the MBTA and the Bald and Golden Eagle Protection Act and consistent with provisions of Executive Order 13186 by providing avoidance and mitigation measures for migratory birds and bald and golden eagles and their habitats where the pipeline would be constructed, operated and maintained; • Develop construction timing restrictions and buffer zones through consultation with regulatory agencies; and • If construction would occur during the raptor nesting season during January to August, complete pre-construction surveys to locate active nest sites to allow for appropriate construction scheduling and buffer restrictions. • Installation of sediment barriers immediately after initial disturbance of waterbodies or adjacent uplands. • Maintaining the ROW width and limiting the extent of riparian vegetation loss. • Minimization of grading and grubbing along streambanks. • Minimizing in-stream use of equipment, locating workspaces at least 10 feet from waterbodies to the extent practicable. • Using dry-ditch techniques at crossings where the timing of construction does not adequately protect environmentally sensitive waterbodies, as determined by the appropriate regulatory authority.
Socioeconomics and Environmental Justice	Construction	• Identifying and documenting routes that would be used for moving materials and equipment, which would minimize potential impacts. • Crossing paved roads by boring beneath the roads, allowing traffic activity to continue. • During the construction phase, maintaining roads used for construction in a condition that is safe for both members of the public and the workforce. • After construction is complete, restoring the roads used to their preconstruction conditions or better. • Submitting a road use plan prior to mobilization and coordinating with the appropriate state and county representatives to develop a mutually acceptable plan.

Table 7-2. Summary of Resource Protection Measures for the Proposed Action

Resource	Project Phase	Description
Cultural Resources	Construction and Operations	• Implementation of the existing Programmatic Agreement for the Keystone XL Pipeline along the MAR to avoid, if possible, or mitigate adverse effects on eligible historic properties. If impacts to NRHP-eligible properties could not be avoided, mitigation plans would be reviewed by the Department and the consulting parties following the protocols outlined in the Programmatic Agreement. • Following the terms of the Unanticipated Discoveries Plan should any unanticipated discoveries of cultural resources be made during construction or operation of the pipeline.

CMRP = Construction Mitigation and Reclamation Plan; HDD = horizontal directional drill; MAR = Mainline Alternative Route; MBTA = Migratory Bird Treaty Act; SPCC = Spill Prevention, Control and Countermeasures; ROW = right-of-way; TWA = temporary workspace area; USFWS = United States Fish and Wildlife Service

Table 7-3. Specific Measures for Species Protected under the ESA

Species	Project Phase	Conservation Measures
Interior least tern (*Sterna antillarum)*	Construction	• Avoiding direct impacts to habitat and individuals through crossing the Platte River (preferred range of species) using the HDD method with a pipeline burial depth of 25 feet or greater below the river bed. • Conducting pre-construction surveys within 0.25 mile of suitable breeding habitat at the Platte River during the nesting season (from May 1 through September 1) to ensure that there are no nesting terns. Conducting daily surveys for nesting terns during the nesting season when construction activities occur within 0.25 mile of potential nesting habitat. If interior least tern nests are found at the crossings, Keystone would: (1) adhere to a 0.25-mile buffer of no pipeline construction activity and (2) continue to monitor nests if any are within 0.25 mile of the construction footprint until young have fledged. • Making minor adjustments to the pipeline corridor, if practicable, to avoid impacts to nesting interior least terns in coordination with USFWS. This may involve shifting the pipeline corridor away from nests to avoid disturbances to interior least tern nests or other modifications depending on the circumstances. • Down shielding of lights should HDD work occur at night if the HDD site lacks vegetative screening and an active interior tern nest is located within 0.25 mile from the HDD site. • Completion of interior least tern nest surveys by the NPPD for electrical line installation similar to pipeline construction. • Power provider to use BFDs, according to APLIC and NPPD standards, on the overhead shield wire at river crossings in areas of known habitat. • Implementation of measures identified in a required HDD contingency plan, including monitoring of the directional drill bore, monitoring downstream for evidence of drilling fluids and mitigation measures to address a frac-out should one occur. • Avoidance of temporary water reductions based on Keystone's plan to withdraw the volume needed at a rate less than 10 percent of the baseline daily flow and to return water back to its source within a 30-day period.
	Operations	• Power provider to use BFDs, according to APLIC and NPPD standards, on the overhead shield wire at river crossings in areas of known habitat.

Table 7-3. Specific Measures for Species Protected under the ESA

Species	Project Phase	Conservation Measures
Piping plover (*Charadrius melodus)*	Construction	• Conservation measures would be similar to those described as the least tern as these species share similar habitats. • Conducting pre-construction surveys within 0.25 mile of suitable nesting habitat at the Platte River to ensure that there are no nesting pairs within 0.25 mile of the construction area if construction were to occur during the piping plover nesting season (April 15 to September 1). Conducting daily surveys for nesting piping plovers when construction activities occur within 0.25 mile of potential nesting habitat during the nesting season. If a piping plover nest(s) is found at the crossings, Keystone would: (1) adhere to 0.25-mile buffer of no construction activity and (2) continue to monitor the nest(s) if it is within 0.25 mile of the construction footprint until the young have fledged.
	Operations	• Power provider to use BFDs, according to APLIC and NPPD standards, on the overhead shield wire at river crossings in areas of known habitat.
Rufa red knot (*Calidris canutus rufa)*	Construction and Operations	As the rufa red knot is rarely observed in Nebraska, it is unlikely the Project would adversely this species. General conservation measures used for listed species would be applicable to the rufa red knot.
Whooping crane (*Grus americana)*	Construction	• Using the HDD method with a pipeline burial depth of 25 feet or greater below the river bed at major river crossings (Platte and Elkhorn rivers) to prevent potential roosting and feeding habitat loss or alteration. • Revegetation (particularly within riparian zones and in wetland habitats) in accordance with the CMRP, Con/Rec units, and Nationwide Permit 12 requirements would reduce habitat impacts. • During spring and fall whooping crane migration periods, environmental monitors would complete a brief survey of any wetland or riverine habitat areas potentially used by whooping cranes in the morning before starting equipment and following the Whooping Crane Survey Protocol previously developed by the USFWS and NGPC. If whooping cranes were sighted within 0.5 mile of active construction during the morning survey or at any time of the day, the environmental monitor would immediately contact the USFWS and NGPC for further instruction and require that all human activity and equipment start-up be delayed or immediately cease. Work could proceed if whooping crane(s) leave the area. The environmental monitor would record the sighting, bird departure time and work start time on the survey form. The USFWS would notify the environmental compliance manager of whooping crane migration locations during the spring and fall migrations through information gathered from the whooping crane tracking program. • Down-shielding of lights should HDD occur at night during the spring and fall whooping crane migrations in areas that provide suitable habitat. • Prohibiting the use of helicopters within 0.5 mile of any whooping crane(s) observed during the daily preconstruction surveys. • Avoidance of temporary water reductions based on Keystone's plan to withdraw the volume needed at a rate less than 10 percent of the baseline daily flow and to return water back to its source within a 30-day period. • The NPPD would complete a field review with USFWS and NGPC to determine if any areas are present with a higher probability of whooping crane use (i.e., wetlands or large ponded areas [stock ponds], meadows and obvious flight corridors to and from such areas to feeding habitats). Power provider to use spiral BFDs, consistent with APLIC standards, in appropriate areas as identified in the field review. • The NPPD would complete daily presence/absence whooping crane surveys according to the Project's protocol described above if construction occurs during the spring and fall migration periods in areas where such surveys are agreed to be appropriate and necessary to avoid disturbance. Should a whooping crane be sighted within 0.5 mile of a work area, all work would cease until the whooping

Table 7-3. Specific Measures for Species Protected under the ESA

Species	Project Phase	Conservation Measures
		crane leaves that immediate area. USFWS and NGPC would be contacted immediately and notified of the presence of whooping crane.
Whooping crane (*Grus americana)* *(continued)*	Operations	• Power provider to use spiral BFDs, consistent with APLIC standards, in appropriate areas as identified in pre-construction field reviews.
Pallid sturgeon (*Scaphirhynchus albus)*	Construction	• Using the HDD method through crossing the Platte River with a pipeline burial depth of 25 feet or greater below the river bed to avoid direct impacts to habitat. • During construction of the HDD and hydrostatic testing, Keystone would ensure that the intake end of any pump for water withdrawal would be screened to prevent entrainment of larval fish or debris and the intake screens will be periodically checked for fish entrainment when pumping from the Platte River. Mesh size of the screen would be 0.125 inch and have an intake velocity of less than 0.5 foot per second to avoid larval entrainment and juvenile fish impingement and entrapment. Should a sturgeon become entrained, impinged or entrapped, all pumping operations would immediately cease and Keystone would contact USFWS to determine if additional protection measures would be required. • Maintaining at least a 100-foot setback from the water's edge for the HDD drill pads at the HDD crossings of the Platte River to reduce indirect impacts. • Implementation of measures identified in a required HDD contingency plan, including monitoring of the directional drill bore, monitoring downstream for evidence of drilling fluids and mitigation measures to address a frac-out should one occur. • Avoiding broadcast applications of pesticides or herbicides near aquatic habitat. • Ensuring that upstream and downstream fish passage is maintained in any areas where stream habitat disturbance occurs. • Avoidance of temporary water reductions based on Keystone's plan to withdraw the volume needed at a rate less than 10 percent of the baseline daily flow and to return water back to its source within a 30-day period for the Platte River.
	Operations	• Avoiding broadcast applications of pesticides or herbicides near aquatic habitat.
Topeka shiner (*Notropis topeka)*	Construction	• Using the HDD method through crossing Union Creek to avoid direct impacts. • Using an isolation flow dry crossing method for smaller tributaries if the species or suitable habitat is found. • Maintaining at least a 100-foot setback from the water's edge for the HDD drill pads at the HDD crossings of streams containing suitable habitat to reduce indirect impacts. • Implementation of measures identified in a required HDD contingency plan, including monitoring of the directional drill bore, monitoring downstream for evidence of drilling fluids and mitigation measures to address a frac-out should one occur. • Avoiding broadcast applications of pesticides or herbicides near aquatic habitat. • Ensuring that upstream and downstream fish passage is maintained in any areas where stream habitat disturbance occurs. • For HDD crossings, water will be sourced outside of the creek to make up drilling mud and for hydrotesting.
	Operations	• Avoiding broadcast applications of pesticides or herbicides near aquatic habitat.

Table 7-3. Specific Measures for Species Protected under the ESA

Species	Project Phase	Conservation Measures
American burying beetle (*Nicrophorus americanus)*	Construction	• Updating density information within the MAR as required for the pre-construction conditions imposed in the BiOp. The following measures would apply during construction: • When working in suitable American burying beetle habitat, confine vehicle traffic used in support of preconstruction activities to approved access roads. • Use construction methods involving sequential replacement of topsoil and re-establishment of natural vegetation to restore natural soil hydrology within the construction ROW and avoid long-term impacts to American burying beetle habitat. • Prior to construction disturbance and grading for the ROW in known American burying beetle habitat, implement trapping and relocating of American burying beetles where access is available to remove adult beetles from the construction ROW in accordance with the Nebraska American Burying Beetle Trapping Protocol. • Keystone would train all workers operating in American burying beetle habitat and would include discussion of American burying beetle habitat, biology, reasons for their decline and responsibilities of all workers for the protection of the American burying beetle (including removing food wastes from the ROW each day, reporting any American burying beetle sightings to an environmental inspector and avoiding bringing dogs and cats to the ROW). • Post signs at all access points to the ROW highlighting the areas as American burying beetle habitat and reminding workers to follow special restrictions in the area. • Keystone would reseed disturbed areas in prime, good, fair and marginal American burying beetle habitats with a seed mix that corresponds to the appropriate Construction/Reclamation unit for that property.
	Operations	• When performing maintenance activities in suitable American burying beetle habitat requiring use of vehicles and ground disturbance, follow similar conservation measures identified for construction (e.g., confine vehicle traffic, sequential replacement of topsoil, trapping and relocation of species prior to disturbance, worker training, posting of signs and reseeding areas of disturbance with appropriate seed mixes).
Northern long-eared bat *(Myotis septentrionalis)*	Construction	• Using the HDD method to cross major and sensitive rivers, thereby avoiding most riparian vegetation used by the northern long-eared bat. • Restricting tree removal near known hibernacula. Keystone and any associated utilities (i.e., power lines) would not remove any tree within a 0.25-mile buffer around known northern long-eared bat hibernacula or would remove them in the winter prior to construction. Known hibernacula would be determined using the Nebraska Natural Heritage Inventory database, field surveys and/or coordination with subject matter experts knowledgeable about the species. • Protecting maternity roosts and restricting tree removal near known maternity roosts during the pup season (June 1 through July 31). Keystone and any associated utilities (i.e., power lines) would protect known roosts and avoid cutting or destroying of any trees within 150-foot radius from known, occupied maternity roost trees during the pup season, and only remove trees outside the pup season. Habitat would be removed in the fall/winter prior to construction. Known roosts would be determined through use of the Nebraska Natural Heritage Inventory database, field surveys and/or coordination with subject matter experts knowledgeable about the species.
	Operations	• None identified.

Table 7-3. Specific Measures for Species Protected under the ESA

Species	Project Phase	Conservation Measures
Western prairie fringed orchid *(Platanthera praeclara)*	Construction	• Conduct surveys for the western prairie fringed orchid and suitable habitat prior to construction. If present, either the MAR would be realigned around any identified populations or identified individuals would be transplanted out of the ROW prior to any clearing and grading, if possible. • Salvaging and segregating topsoil appropriately where populations have been identified to preserve native seed sources in the soil for use in revegetation efforts in the ROW. • Implementation of a noxious and invasive weed control program consistent with the CMRP and Con/Rec units to reduce the potential for spread or invasion by weeds. • Restricting use of herbicides within 100 feet of areas where the species occurs. • Minimize the potential for altered hydrology (e.g., surface water flow, infiltration and groundwater levels) in suitable habitat in accordance with best management practices in the CMRP. • Providing compensation for impacts to suitable habitat in a Habitat Conservation Trust per Appendix G of the 2013 Biological Opinion. Funds would be used to acquire land though purchase by fee title or through perpetual conservation easements. Funds could also be used for habitat restoration projects. • Restoring and monitoring construction-related impacts to wet meadow habitats identified as suitable habitat consistent with USACE guidelines • The NPPD would complete field surveys during the appropriate bloom periods only in areas along the final line routes that are considered suitable. The NPPD would delineate and mark areas where habitat is present as “avoidance areas” where placement of structures and construction traffic would not occur. • Avoidance of temporary water reductions based on Keystone’s plan to withdraw the volume needed at a rate less than 10 percent of the baseline daily flow and to return water back to its source within a 30-day period.
	Operations	• Identifying populations of western prairie fringed orchid pre-treatment of ROW during maintenance and restricting use of herbicides where populations are present. Application would be conducted by spot spraying.

APLIC = Avian Power Line Interaction Committee; BFD = bird flight diverter; BiOp = Biological Opinion; CMRP = Construction Mitigation and Reclamation Plan; ESA = Endangered Species Act; HDD = horizontal directional drill; MAR = Mainline Alternative Route; NGPC = Nebraska Game and Parks Commission; NPPD = Nebraska Public Power District; ROW = right-of-way; USACE = United States Army Corps of Engineers; USFWS = United States Fish and Wildlife Service

8 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

8.1 INTRODUCTION

Irreversible or irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the use of these resources would have on future generations. Irreversible effects primarily result from use or destruction of a specific resource (e.g., energy from hydrocarbons and minerals) that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored after implementing a Proposed Action (e.g., extinction of threatened or endangered species).

For the construction and operation of the MAR portion of the Keystone XL Pipeline, some of the resource commitments would be irreversible and irretrievable. The land areas needed for the pipeline along the MAR would be cleared and graded as needed to accommodate pipeline construction. Although portions of the pipeline would be adjacent to an existing utility ROW and access roads, and the land areas and their associated resources could be reclaimed at some point in the future, it is unlikely that they would be restored to original conditions and functionality across the entire ROW. In addition, the new permanent aboveground features would result in land commitments that would be considered irreversible.

Raw materials needed for construction of the pipeline and associated facilities would include crushed stone and sand, water, diesel fuel, gasoline and steel, for example. Construction would consume these materials, which would constitute an irretrievable commitment.

The construction and operation of the pipeline would require the irreversible commitments of human resources that would not be available for other activities during the period of their commitment, but these commitments would not be irretrievable.

Finally, the implementation of the Proposed Action would require the commitment of financial resources for construction and operation. This commitment, however, would be consistent with Keystone's purposes of and needs for the Proposed Action as described in Chapter 1, Introduction.

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10 LIST OF PREPARERS

U.S. Department of State – Bureau of Oceans and International Environmental and Scientific Affairs

Jill Reilly – NEPA Coordinator, Project Manager
Office of Environmental Quality and Transboundary Issues
B.S., Environmental Conservation, University of New Hampshire

Marko Velikonja – Program Manager
Office of Environmental Quality and Transboundary Issues
M.A., Fletcher School of Law and Diplomacy

Potomac-Hudson Engineering, Inc.

Frederick Carey, P.E. – Principal in Charge/Senior Environmental Engineer
M.S., Environmental Engineering
B.S., Civil Engineering
25 years of experience

Robert Naumann – Project Manager/Senior Environmental Scientist
M.S., Environmental Science
B.S., Natural Resources
19 years of experience

Melissa Secor – Deputy Project Manager/Environmental Scientist
B.S., Meteorology
B.S., Business Management
11 years of experience

Andrea Wilkes – Document Manager/Senior Environmental Engineer
M.A., Science Writing
B.S., Civil and Environmental Engineering
B.S., English Literature
31 years of experience

Paul DiPaolo – Environmental Scientist
M.S., Environmental Planning and Management
B.S., Environmental Science and Policy
8 years of experience

Gregory Jackson – Environmental Scientist
B.S., Environmental Earth Science
3 years of experience

Erin Kouvousis – Environmental Scientist
M.S., Ecology
B.S., Conservation
8 years of experience

Pamela Lawson – Document Production
27 years of experience

Jamie Martin-McNaughton – Environmental Scientist
B.S., Geology-Biology
13 years of experience

Samir Qadir – Environmental Scientist
M.S., Environmental Policy
B.S., Electronics and Telecommunications Engineering
11 years of experience

Deborah Shinkle – GIS Analyst
B.A., Environmental Studies
15 years of experience

Susan Smillie – Environmental Scientist
M.En., Environmental Science
B.S., Biology
32 years of experience

Brian Whipple, P.E. – Senior Environmental Engineer
M.S., Information Systems
B.S., Environmental Engineering
23 years of experience

APPENDIX A
INDIAN TRIBE, AGENCY AND ELECTED OFFICIALS COORDINATION

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APPENDIX A – INDIAN TRIBE, AGENCY AND ELECTED OFFICIALS COORDINATION

This appendix includes the formal coordination letters that the U.S. Department of State (Department) sent to Indian tribes and federal agencies. It also contains coordination letters sent to state agencies and elected officials.

A.1 INDIAN TRIBES

Table A-1 provides a brief timeline of coordination efforts with Indian tribes regarding the MAR.

Table A-1. Department MAR Coordination Efforts with Indian Tribes

Date	Activity
December 23, 2013	The Department executed a Programmatic Agreement to take into account the effects of the Keystone XL Pipeline project on historic properties listed in or eligible for listing in the NRHP resulting from construction, operations and maintenance of the Keystone XL Pipeline project (see Appendix E of the 2014 Keystone XL Final SEIS [https://2012-keystonepipeline-xl.state.gov/documents/organization/221220.pdf]).
April 10, 2018	The Department sent a letter to the 67 Indian tribes who expressed interest in the heritage resources potentially affected by the Keystone XL Pipeline project. The letter stated the Department is continuing government-to-government consultation with the tribes and in accordance with the Programmatic Agreement (see Sample Letter 1).
May 1, 2018	In accordance with stipulation V.B.2 of the Programmatic Agreement, the Department sent letters to Indian tribe leaders and THPOs. In order to make a reasonable and good faith effort to complete the identification of historic properties before construction begins, the Department requested assistance in identifying Traditional Cultural Properties/properties of religious and cultural significance of the tribe that may be eligible for listing in the NRHP, and could be affected by construction of the MAR (see Sample Letter 2).
May 24, 2018	The Department sent a letter to the 67 Indian tribes who expressed interest in the heritage resources potentially affected by the Keystone XL Pipeline project announcing the decision to prepare an EA on the MAR and to establish a direct point of contact for each tribe interested in participation on the Draft EA (see Sample Letter 3). The Department received response letters from two Indian tribes (see Responses Received from Indian Tribes in this Appendix).
July 26, 2018	The Department sent a letter to tribes notifying them of the availability of the Draft EA and start of a 30-day comment period (see Sample Letter 4).

Department = United States Department of State; EA = Environmental Assessment; MAR = Mainline Alternative Route; NRHP = National Register of Historic Places; SEIS = Supplemental Environmental Impact Statement; THPO = Tribal Historic Preservation Officer

The following is a list of Indian tribes included in the coordination efforts summarized in Table A-1:

- Absentee-Shawnee Tribe of Indians of Oklahoma
- Alabama-Coushatta Tribe of Texas
- Apache Tribe of Oklahoma
- Assiniboine & Sioux Tribes of the Fort Peck Indian Reservation
- Blackfeet Tribe of the Blackfeet Indian Reservation of Montana
- Cherokee Nation
- Cheyenne and Arapaho Tribes
- Cheyenne River Sioux Tribe of the Cheyenne River Reservation
- Chippewa Cree Indians of the Rocky Boy's Reservation
- Confederated Tribes of the Goshute Reservation
- Crow Creek Sioux Tribe of the Crow Creek Reservation
- Crow Tribe of Montana

- Delaware Tribe of Indians
- Duckwater Shoshone Tribe of the Duckwater Reservation
- Eastern Band of Cherokee Indians
- Shoshone Tribe of the Wind River Reservation
- Ely Shoshone Tribe of Nevada
- Forest County Potawatomi Community
- Fort Belknap Indian Community
- Hannahville Indian Community
- Ho-Chunk Nation of Wisconsin
- Kaw Nation, Oklahoma
- Kialegee Tribal Town
- Kickapoo Traditional Tribe of Texas
- Kickapoo Tribe in Kansas
- Kiowa Tribe
- Lower Brule Sioux Tribe of the Lower Brule Reservation
- Lower Sioux Indian Community in the State of Minnesota
- Match-e-be-nash-she-wish Band of Pottawatomi Indians of Michigan
- Nez Perce Tribe
- Northern Arapaho Tribe of the Wind River Reservation
- Northern Cheyenne Tribe
- Nottawaseppi Huron Band of the Potawatomi
- Oglala Sioux Tribe of the Pine Ridge Reservation
- Omaha Tribe of Nebraska
- Otoe-Missouria Tribe of Indians
- Pawnee Nation of Oklahoma
- Poarch Band of Creeks
- Pokagon Band of Potawatomi Indians
- Ponca Tribe of Indians of Oklahoma
- Ponca Tribe of Nebraska
- Prairie Band of Potawatomi Nation
- Red Lake Band of Chippewa Indians
- Rosebud Sioux Tribe of the Rosebud Indian Reservation
- Sac and Fox Nation of Missouri in Kansas and Nebraska
- Sac and Fox Nation
- Sac and Fox Tribe of the Mississippi in Iowa
- Santee Sioux Nation
- Shakopee Mdewakanton Sioux Community of Minnesota
- Shoshone-Bannock Tribes of the Fort Hall Reservation
- Sisseton-Wahpeton Oyate of the Lake Traverse Reservation
- Skull Valley Band of Goshute Indians of Utah
- Southern Ute Indian Tribe
- Spirit Lake Tribe
- Standing Rock Sioux Tribe of North & South Dakota
- The Modoc Tribe of Oklahoma
- The Osage Nation
- Thlopthlocco Tribal Town
- Three Affiliated Tribes of the Fort Berthold Reservation
- Tonkawa Tribe of Indians of Oklahoma
- Turtle Mountain Band of Chippewa Indians of North Dakota
- Upper Sioux Community
- Ute Indian Tribe of the Uintah & Ouray Reservation
- Ute Mountain Ute Tribe
- Wichita and Affiliated Tribes
- Yankton Sioux Tribe of South Dakota
- Ysleta del Sur Pueblo

Sample Letter #1

United States Department of State

Bureau of Oceans and International Environmental and Scientific Affairs

Washington, D.C. 20520

April 10, 2018

Governor Edwina Butler-Wolfe
Absentee-Shawnee Tribe of Indians of Oklahoma
2025 South Gordon Cooper Drive
Shawnee, Oklahoma 74801

Re: Update on the Keystone XL Pipeline Project and the Section 106 Programmatic Agreement

Dear Governor Butler-Wolfe,

As you may be aware, TransCanada Keystone Pipeline, L.P. (Keystone) intends to begin vegetative clearing in preparation for construction of the Keystone XL Pipeline (Project) this fall.

In 2013, consistent with Section 106 of the National Historic Preservation Act, the Department of State (Department) executed a Programmatic Agreement (PA) to take into account the effects of the Project on historic properties listed in or eligible for listing in the National Register of Historic Places (National Register). The Department is designated as the Lead Federal Agency in the PA and is responsible for coordinating implementation of the terms of the PA in consultation with the consulting parties. Your tribe is a consulting party to the Project.

The purpose of this letter is to continue government-to-government consultation between the Department and your tribe on the Project. In accordance with the PA, consultation will focus on how to avoid, minimize, or mitigate the adverse effects of the Project on historic properties of concern to your tribe. Presented below for your information is an update on the Project and the cultural resources investigations that have been conducted to date, as well as future plans.

Project Update

The Project pipeline will transport crude oil 1,275 miles from Alberta, Canada to Steele City, Nebraska through a 36-inch pipe. On the U.S. side of the border, the Project pipeline will be 875 miles long and pass through portions of Montana, South Dakota, and Nebraska. Pipeline construction will be limited to a 110-foot wide temporary right-of-way (ROW). Power stations, electrical transmission lines and facilities, access roads, pipe yards, construction camps and other facilities will be built as part of the Project.

A Presidential approval is required for the Project because the pipeline crosses the international border. Keystone submitted a Presidential permit application for the current Project alignment in May, 2012; however, that permit application was denied in November, 2015. Keystone re-

April 10, 2018
Page 2

submitted the permit application to the Department in January, 2017 and on March 23, 2017, Under Secretary of State for Political Affairs, Thomas A. Shannon, Jr., determined that the Project was in the national interest and issued a Presidential permit to Keystone.

Approval of the Project pipeline alignment is also required by each state. The states of Montana and South Dakota approved the preferred alignment for the pipeline. The State of Nebraska, however, approved an alternative alignment further to the east in the state referred to as the Mainline Alternative Route.

Keystone intends to start clearing vegetation to build the construction camps and pipe yards this fall (2018) with pipeline construction to begin next year (2019).

Cultural Resources Investigation Update

Keystone has conducted cultural resources inventories for the Project since 2008. Supplemental survey work has also been conducted as segments of the pipeline alignment have been repositioned to avoid affecting cultural resources.

A total of 95 cultural resources have been identified within the Project ROW. Forty-eight of these meet the criteria for listing in the National Register or are unevaluated but will be treated as National Register eligible. However, forty-seven cultural resources do not meet the National Register criteria. Of the 48 National Register eligible properties, six have been recommended for treatment to mitigate adverse effects: two historic period canals, a historic period homestead, a prehistoric campsite, and two prehistoric stone feature/circle sites – all in Montana. To ensure that historic properties are not affected or adversely affected during construction 30 historic properties will be fenced and monitored, including those recommended for treatment. An additional 18 historic properties will not be affected and do not require avoidance measures to ensure their protection. Tribal consultation will continue regarding the effects of the Project to historic properties in the Project ROW.

Tribal consultation played an important role in drafting the 2013 Project PA. The Department identified 67 federally recognized tribes, including your tribe, as a consulting party to the Project. Eight tribes identified portions of the pipeline alignment in Montana and South Dakota as being culturally sensitive and provisions were added to the PA to ensure that the construction is monitored by tribal members in these areas. These culturally sensitive areas were identified through tribal consultation and also through traditional cultural property (TCP) studies that were conducted for individual tribes at their request.

Since the Mainline Alternative Route in Nebraska will follow a different ROW, additional cultural resources survey investigations will be conducted. The Department will consult with your tribe regarding new survey work to be conducted this spring and summer (2018). The Department will also consult with all tribal consulting parties to determine if there are culturally sensitive areas along the Mainline Alternative Route where construction should be monitored by tribal members following the tribal monitoring provisions in the PA.

April 10. 2018
Page 3

Summary and Closing

By this letter, the Department is informing your tribe that Keystone has received the Presidential permit needed to build the Keystone XL pipeline and intends to move forward with construction. As the lead federal agency for the PA, the Department wishes to continue consulting with your tribe on a government-to-government basis, to avoid, minimize, or mitigate any adverse effects of the Project on historic properties of concern to your tribe.

In order to ensure timely consultation, we request that you let the Department know if there are other members of your tribe that should be included in future consultations about the Project. Please provide a name and contact information.

The Department looks forward to continued consultation with your tribe in the spirt of mutual respect as the Project moves forward to construction. If you have any questions about the Project or the cultural resources investigations conducted to date, please contact me for further information.

Sincerely,

Ms. Jill E. Reilly
Acting NEPA Coordinator
Department of State
(202) 647-9798
ReillyJE@state.gov

Sample Letter #2

United States Department of State

Bureau of Oceans and International Environmental and Scientific Affairs

Washington, D.C. 20520

May 1, 2018

Governor Edwina Butler-Wolfe
Absentee-Shawnee Tribe of Indians of Oklahoma
2025 South Gordon Cooper Drive
Shawnee, Oklahoma 74801

Re: Request for information on traditional cultural properties along the Keystone XL Pipeline Mainline Alternative Route in Nebraska

Dear Governor Butler-Wolfe,

As you are aware, TransCanada Keystone Pipeline, L.P. (Keystone) intends to build the Keystone XL pipeline (Project) to transport crude oil from Alberta, Canada to Steele City, Nebraska. In November 2017, the Nebraska Public Service Commission approved a Project alignment through Nebraska that is referred to as the Mainline Alternative Route (MAR).

The Department of State (Department) is identified as the Lead Federal Agency responsible for coordinating implementation of the terms of the Keystone XL Programmatic Agreement (PA) in consultation with the consulting parties. Under the PA, cultural resources investigations along the MAR are required under Stipulation V.B. The Department wishes to continue to consult with your tribe and requests your assistance in identifying traditional cultural properties (TCPs)/properties of religious and cultural significance to your tribe that may be eligible for listing in the National Register of Historic Places, and could be affected by construction of the MAR.

The Mainline Alternative Route in Nebraska

The MAR alignment is described in a survey research design contained in the compact disc (CD) that accompanies this letter. The 2018 document is entitled, "Research Design and Methodology for a Phase I Cultural Resources Investigation of a Portion of the Proposed Keystone XL Pipeline Project's Mainline Alternative in Nebraska" and was prepared by American Resources Group, Ltd. The research design explains how the cultural resources survey of the pipeline corridor will be conducted prior to construction. It also contains detailed maps of the MAR alignment, along with information about previously identified archaeological sites and other cultural resources. The Department is sending you this CD because of the large size of the document; if, however, you require a paper copy, please let me know and a copy will be sent to

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you. It is our hope that this report may help you and your tribe identify those areas along the MAR where you would like access, should you desire to conduct TCP studies.

Figure 1 on page 2 of the MAR survey research design is a map showing three possible Project alignments in Nebraska. The earlier Preferred Alignment, which was analyzed in the 2014 Final Supplemental Environmental Impact Statement, is shown in green; the MAR is shown in red. The Sandhills Alternative Route, shown in yellow, is no longer a viable option. The MAR follows the Preferred Alignment from Keya Paha County through Holt County to a point in Antelope County, where is runs southeastward through Madison County into Stanton County, and then joins the existing Keystone Mainline Route (Phase 1) corridor shown in gray. The MAR extends to the south where it diverges from the Keystone mainline pipeline corridor in Seward County, rejoins the original Keystone mainline pipeline corridor, and terminates in Steele City, Jefferson County. You may recall that the original Keystone mainline pipeline was completed in 2010 and was inventoried for cultural resources for that project. The Area of Potential Effects (APE) for the MAR in some locations will overlap with the APE for the original Keystone mainline pipeline. Although no new cultural resource surveys will be conducted where the two pipeline APEs entirely overlap; new surveys will be conducted in the newly proposed alignment where cultural resource inventories have not yet taken place and where the two pipeline corridors are side by side. In addition, the Department will conduct tribal consultation regarding potential TCPs in areas where the MAR deviates from the Preferred Alignment and the original Keystone Mainline Route.

Traditional Cultural Property Studies

Stipulation V.B.2 of the PA says that the Department will make a reasonable and good faith effort to complete the identification of historic properties before construction begins. In doing so, the Department will consider information submitted by the tribes about historic properties to which the tribes may attach religious and cultural significance that may be located within the MAR corridor where it deviates from the Preferred Alignment and the Keystone Mainline Route. The Department asks your tribe to consider (1) whether there are, or could be, TCPs/historic properties of religious and cultural significance to your tribe along the MAR corridor, and if so, (2) does your tribe want to conduct a TCP study to identify these properties.

The Department is working with Keystone to compensate consulting tribes for conducting studies that seek to identify possible TCPs/historic properties of religious and cultural significance that may be located within the MAR corridor where it deviates from the Preferred Alignment and the Keystone Mainline Route. Compensation will be provided for a maximum of $20,000 per tribe, given the scope of work, schedule, and anticipated level of work. The payment will be made in two installments. The first payment will be issued following receipt of a Department-approved scope-of-work, schedule, and budget regarding survey of the applicable portions of the MAR APE for TCPs/historic properties of religious and cultural significance to the tribes. The second payment will be issued upon receipt of the survey report(s) and final report.

This offer of compensation extends to activities directly related to the identification of TCPs/historic properties of religious and cultural significance to the tribes within relevant portions of the MAR APE. Expenses capture in the budget may include costs associated with

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expert consultants employed to identify historic properties; field visits by tribal members and elders to provide information about specific places or sites; research associated with Project-level historical investigations; report production; and travel expenses. These identification and evaluation efforts will be guided by the *Guidelines for Evaluating and Documenting Traditional Cultural Properties* (National Register Bulletin 38, 1990 revised 1998), other applicable National Register Bulletins, Secretary of the Interior's Standards and Guidelines for Identification and Evaluation (e.g., https://www.nps.gov/history/local-law/arch_stnds_3.htm), and any related tribal publications and/or standards/guidance materials.

In order to consider potential Project effects upon TCPs/historic properties of religious and cultural significance, the Department must receive a scope of work, schedule, and budget (via email, fax, or hard copy) from consulting party tribes by May 31, 2018, at 5:00 pm Eastern Standard Time (EST). Should your tribe require additional time to submit your proposal, the Department will grant a two-week extension to June 11, 2018; however, the request for extension must be made before the May 31, 2018 submittal deadline.

The compensation will be disbursed to the appropriate Tribal representative as follows,

- The first payment of 50% of the total budget will be disbursed upon receipt of a Department-approved scope of work, schedule, and budget;

- The second and final payment of 50% of the total budget will be disbursed upon receipt of the survey report(s) and final report.

Please respond with your acceptance of the TCP study offer by May 14, 2018. If we do not hear from you by then, the Department will understand that your tribe declines the offer to conduct a TCP study on the MAR where it deviates from the Preferred Alignment and the Keystone Mainline Route. If you accept this offer, the Department must receive all surveys and a final report documenting the TCP analysis by 5:00 pm EST on August 15, 2018.

The Department understands that some tribes may require Tribal Council approval for this work and that due dates and our timeline may be difficult to meet for some Councils. Any effort to obtain an expedited approval by your Tribal Council would be greatly appreciated by the Department. Due to the sensitive nature of these studies, the Department is committed to working with your tribe to resolve concerns about the confidentiality of information on historic properties or other important sites identified in these studies.

Summary

By this letter, Department is requesting the assistance of your tribe in identifying and evaluating TCPs/historic properties of religious and cultural significance along the MAR in Nebraska where it deviates from the Preferred Alignment and the Keystone Mainline Route. To this end, the Department is asking if your tribe wishes to conduct a TCP study, and if so, to respond with your acceptance of the TCP study offer by May 14, 2018. The Department asks you to submit a scope of work, schedule, and budget for the TCP study by May 31, 2018, at 5 pm EST. You should submit your TCP study plan, as well as the final deliverables, to me, Jill Reilly, with the Bureau

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of Oceans and International Environmental and Scientific Affairs (OES) and Environmental Quality and Transboundary Issues (EQT) within the U.S. Department of State. These materials may be transmitted via email (ReillyJE@state.gov), fax (202-647-5947), or hard copy (Jill Reilly, OES/EQT, U.S. Department of State, 2201 C Street, N.W., Suite 2726, Washington, D.C., 20520).

If you have any questions, please contact me.

Sincerely,

Ms. Jill E. Reilly
Acting NEPA Coordinator
Department of State
(202) 647-9798
ReillyJE@state.gov

Attachment: Compact disk (CD) containing the survey research design for the Keystone XL pipeline project Mainline Alternative Route (MAR)

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Sample Letter #3

United States Department of State

Bureau of Oceans and International Environmental and Scientific Affairs

Washington, D.C. 20520

May 24, 2018

Governor Edwina Butler-Wolfe
Absentee-Shawnee Tribe of Indians of Oklahoma
2025 South Gordon Cooper Drive
Shawnee, Oklahoma 74801

Re: Environmental Assessment for the Keystone XL Mainline Alternative Route in Nebraska

Dear Governor Butler-Wolfe,

In respect for our government-to-government relationship, the U.S. Department of State (Department) is inviting your participation in the preparation of the Environmental Assessment (EA) regarding the proposed Keystone XL Mainline Alternative Route (MAR) project. On November 20, 2017, the Nebraska Public Service Commission approved the MAR in Nebraska. Figure 1 shows the variance of the MAR from the preferred route analyzed in the 2014 Final Supplemental Environmental Impact Statement for the Keystone XL Project (2014 Keystone XL Final SEIS).

The Department is preparing the EA – consistent with the National Environmental Policy Act of 1969 (as implemented by the regulations of the Council on Environmental Quality, found at 40 CFR 1500–1508) – to evaluate the potential environmental impacts of the MAR in support of the Bureau of Land Management's review of a right-of-way grant pursuant to the Mineral Leasing Act of 1920. The EA will be used to determine if there are potentially significant impacts from the MAR and to identify any potential mitigation measures to avoid significant adverse effects. The EA will not affect the existing March 2017 Presidential permit authorizing the construction, connection, operation, and maintenance of pipeline facilities at the international border of the United States and Canada as part of the Keystone XL Pipeline project.

The proposed MAR is approximately 162 miles of new 36-inch-diameter pipeline and related ancillary facilities (pump stations, mainline valves, and permanent access roads) for transport of Western Canadian Sedimentary Basin and Bakken crude oil through the State of Nebraska to existing pipeline facilities near Steele City, Nebraska, for onward delivery to refineries in the Gulf Coast area. Construction would employ similar methods as discussed in the 2014 Keystone XL Final SEIS and require a 110-foot-wide temporary right-of-way and generally require a maintained a 50-foot-wide permanent right-of-way easement.

May 24, 2018
Page 2

We would like to establish a direct point of contact for your tribe so that notification of the Draft EA can be provided and to ensure that your tribe's questions, comments, and concerns are addressed. We request your engagement within 30 days of receipt of this letter. If you are interested in providing comments or desire additional information, please contact Ms. Jill Reilly, ReillyJE@state.gov. Thank you in advance for your assistance.

Sincerely,

Ms. Jill E. Reilly
NEPA Coordinator

Enclosures

May 24, 2018
Page 3

Supplementary Information: On January 26, 2017, TransCanada Keystone Pipeline L.P. resubmitted its Presidential Permit application to the Department for the proposed Keystone XL pipeline facilities. Subsequently, on March 23, 2017, Under Secretary of State for Political Affairs Thomas A. Shannon, Jr., issued a Presidential Permit to TransCanada Keystone Pipeline L.P. to construct, connect, operate, and maintain pipeline facilities at the international border of the United States and Canada as part of the Keystone XL Pipeline project. Subsequently, on November 20, 2017, the Nebraska Public Service Commission approved the MAR which differs from the preferred route analyzed in the 2014 Final Supplemental Environmental Impact Statement for the Keystone XL Project (2014 Keystone XL Final SEIS). Figure 1 shows the variance of the MAR from the preferred route analyzed in the 2014 Final 2014 Keystone XL Final SEIS.

The proposed MAR is approximately 162 miles of new 36-inch-diameter pipeline and related ancillary facilities (pump stations, mainline valves, and permanent access roads) for transport of Western Canadian Sedimentary Basin and Bakken crude oil through the State of Nebraska to existing pipeline facilities near Steele City, Nebraska, for onward delivery to refineries in the Gulf Coast area. Construction would employ similar methods as discussed in the 2014 Keystone XL Final SEIS and require a 110-foot-wide temporary right-of-way and generally require a maintained a 50-foot wide permanent right-of-way easement.

May 24, 2018
Page 4

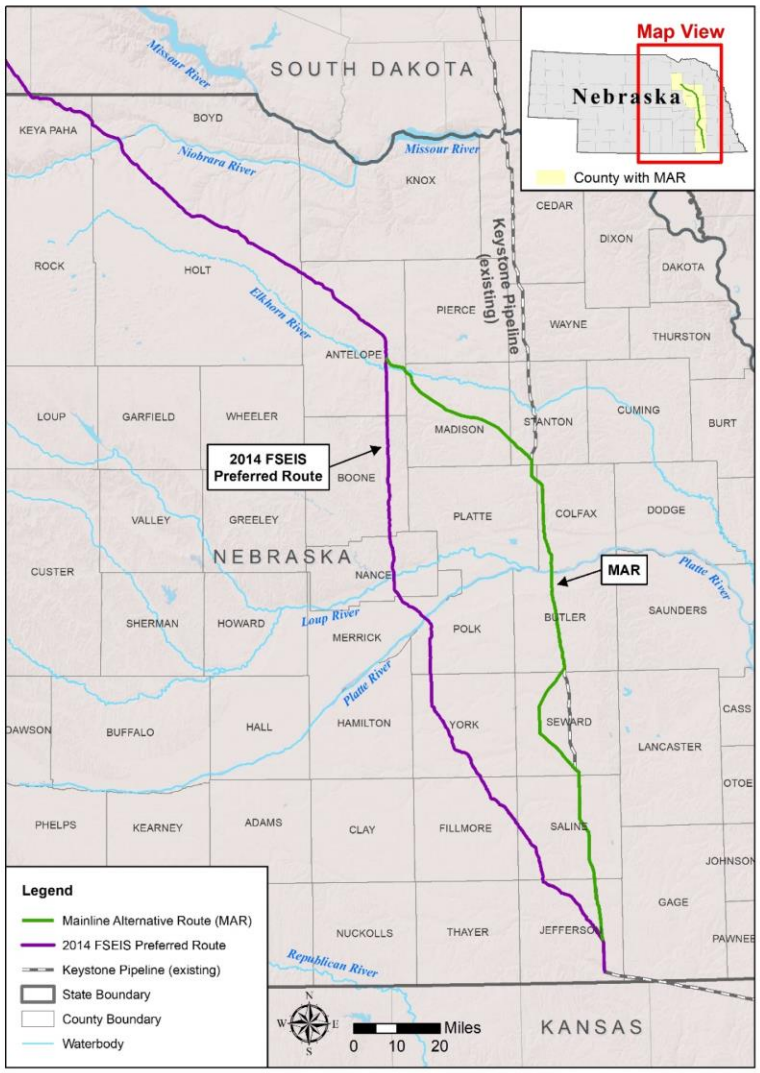

Figure 1. Mainline Alternative Route Overview Map

Sample Letter #4

United States Department of State

Bureau of Oceans and International Environmental and Scientific Affairs

Washington, D.C. 20520

July 26, 2018

Governor Edwina Butler-Wolfe
Absentee-Shawnee Tribe of Indians of Oklahoma
2025 South Gordon Cooper Drive
Shawnee, Oklahoma 74801

Dear Governor Butler-Wolfe,

This letter serves as notification that the United States Department of State (Department) Draft Environmental Assessment (EA) for the proposed Keystone XL Pipeline Mainline Alternative Route (MAR) in Nebraska is available online at the Department's website https://keystonepipeline-xl.state.gov/ for public review and comment. The Department has identified you as a point of contact for your organization, and as such, requests that you forward this notification to other interested individuals within your organization.

The Department prepared the Draft EA to evaluate the potential environmental impacts of the proposed Keystone XL MAR – consistent with the National Environmental Policy Act of 1969 – in support of the Bureau of Land Management's (BLM) review of TransCanada Keystone Pipeline, L.P.'s (Keystone) application for a right-of-way.

The MAR was included by Keystone as an alternative to its Preferred Route in their February 16, 2017 application to the Nebraska Public Service Commission (Nebraska PSC) seeking approval for the Keystone XL Project. Keystone's Preferred Route was considered in the Department's 2014 Final Supplemental Environmental Impact Statement for the Keystone XL Project (2014 Keystone XL Final SEIS). After reviewing Keystone's application, the Nebraska PSC approved the MAR on November 20, 2017. Keystone's application to BLM for a right-of-way remains pending with that agency. This EA will be used to determine if there are potentially significant impacts from the proposed MAR and to identify any potential mitigation measures to avoid significant adverse effects.

Under the Proposed Action, Keystone would construct the portion of the Keystone XL Project in Nebraska along the MAR. This would include approximately 162 miles of construction, connection, operation and maintenance along the MAR of the proposed new 36-inch diameter pipeline and related ancillary facilities within Nebraska that were not analyzed within the 2014 Keystone XL Final SEIS.

July 26, 2018
Page 2

The 30-day public comment period ends on August 29, 2018. Comments received or postmarked by August 29, 2018 will be considered in preparing the Final EA. Comments may be submitted online at http://www.regulations.gov by entering "Mainline Alternative Route" into the search field and following the prompts. Comments submitted by mail should be addressed to: Mr. Marko Velikonja, U.S. Department of State, Office of Environmental Quality and Transboundary Issues (EQT), Bureau of Oceans and International Environmental & Scientific Affairs (OES), 2201 C Street NW, Room 2726, Washington, DC 20520. Comments should be identified as intended for the Draft EA for the Keystone XL Mainline Alternative Route Project.

Comments are not private and may be posted online and/or published in the Final EA. The comments will not be edited to remove identifying or contact information, and the Department cautions against including any information that one does not want publicly disclosed.

If you require additional information or have any questions, please contact Mr. Velikonja at velikonjamg@state.gov.

Thank you for your interest in the MAR and the Draft EA.

Sincerely,

Mr. Marko Velikonja
Program Manager

Responses Received from Indian Tribes

From: Reilly, Jill E <ReillyJE@state.gov>
Sent: Thursday, June 14, 2018 1:22 PM
To: Robert Naumann; Melissa Secor
Cc: Velikonja, Marko G
Subject: Fw: Environmental Assessment for the Keystone XL Mainline Alternative in Nebraska

Follow Up Flag: Follow up
Flag Status: Flagged

Fyi
Sent from my BlackBerry 10 smartphone.

From: Whitehorn, Elsie [redacted]
Sent: Thursday, June 14, 2018 12:19 PM
To: Reilly, Jill E
Subject: Re: Environmental Assessment for the Keystone XL Mainline Alternative in Nebraska

Good morning Ms. Reilly,

In response to the subject above, the Otoe-Missouria Chairman and the Tribal Historic Preservation Officer will be the direct point of contact. We look forward to hearing more information about this subject, preferably electronically.

Thank you,

Elsie Whitehorn
Tribal Historic Preservation Officer
Otoe-Missouria Tribe
[redacted]

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Ysleta del Sur Pueblo

Tribal Council – Javier Loera (War Captain/Tribal Historic and Preservation Officer) E-mail jloera@ydsp-nsn.gov

117 South Old Pueblo Road * P.O. Box 17579 * El Paso, Texas 79917 * (915) 859-8053 * Cell [redacted]

June 21, 2018

Ms. Jill E. Reilly
United States Department of State
Bureau of Oceans and International
Environmental and Scientific Affairs
Washington, D.C. 20520

Dear Ms. Reilly

This letter is in response to Supplemental Environmental Assessment correspondence in which you provide Ysleta Del Sur Pueblo the opportunity to comment on The Environmental assessment for the Keystone XL Mainline Alternative in Nebraska.

The Ysleta Del Sur Pueblo does not have any comments nor does it request consultation on this project due to its location being outside of our Pueblos NAGPRA area of interest and/or relevance.

Thank you for allowing us the opportunity to comment on this project.

Sincerely,

Javier Loera
War Captain/Tribal Historic and Preservation officer
Ysleta Del Sur Pueblo
Phone:(915)859-8053

Tribal Council Assistant
Adam Nevarez

A.2 AGENCIES

The Department invited the following agencies to participate as cooperating agencies for preparation of this Draft SEIS:

Federal Agencies

- U.S. Bureau of Reclamation
- U.S. National Park Service (NPS)
- Pipeline and Hazardous Materials Safety Administration (PHMSA)
- U.S. Army Corps of Engineers (USACE)
- U.S. Bureau of Land Management (BLM)
- U.S. Department of Agriculture (USDA), Farm Service Agency
- USDA, Natural Resources Conservation Service
- USDA, Rural Utilities Service
- U.S. Department of the Interior
- U.S. Environmental Protection Agency (USEPA)
- U.S. Fish and Wildlife Service (USFWS)
- Western Power Area Administration

State Agencies

- Nebraska Department of Environmental Quality (NDEQ)

The following agencies accepted to participate as cooperating agencies: BLM, NDEQ, NPS, PHMSA, USACE, USDA Rural Utilities Service, USFWS, and Western Area Power Administration. The USEPA agreed to participate in this Draft SEIS as a coordinating agency. The Department coordinated with the USEPA during the development of the Draft EA and further coordinated telephonically and through email correspondence for this SEIS.

In addition, the Department sent scoping letters to the Advisory Council on Historic Preservation and the Nebraska State Historical Society.

The following letters provide a sample of the invitation and scoping letters sent. Also included is a sample of the letter notifying agencies of the availability of the Draft EA and the start of the 30-day comment period.

Sample Cooperating Agency Invitation Letter

United States Department of State

Bureau of Oceans and International Environmental and Scientific Affairs

Washington, D.C. 20520

May 24, 2018

Mr. Todd Yeager
U.S. Bureau of Land Management
Eastern Montana / Dakotas Office
Acting District Manager
111 Garryowen Road
Miles City, Montana 59301

Re: Cooperating Agency Request for the Environmental Assessment for the Keystone XL Mainline Alternative in Nebraska

Dear Mr. Yeager,

You are receiving this letter because your agency was a Cooperating Agency on the U.S. Department of State (Department) 2014 Final Supplemental Environmental Impact Statement for the Keystone XL Project (2014 Keystone XL Final SEIS). On March 23, 2017, Under Secretary of State for Political Affairs Thomas A. Shannon, Jr., issued a Presidential Permit to TransCanada Keystone Pipeline L.P. to construct, connect, operate, and maintain pipeline facilities at the international border of the United States and Canada as part of the Keystone XL Pipeline project. Subsequently, on November 20, 2017, the Nebraska Public Service Commission approved the Keystone XL Mainline Alternative Route (MAR) which differs from the preferred route analyzed in the 2014 Keystone XL Final SEIS. Figure 1 shows the variance of the MAR from the preferred route analyzed in the 2014 Final 2014 Keystone XL Final SEIS.

The Department is preparing an Environmental Assessment (EA) – consistent with the National Environmental Policy Act of 1969 [as implemented by the regulations of the Council on Environmental Quality, found at 40 CFR 1500–1508] – to evaluate the potential environmental impacts of the MAR in support of the Bureau of Land Management's review of a right-of-way grant pursuant to the Mineral Leasing Act of 1920. The EA will be used to determine if there are potentially significant impacts from the proposed MAR and to identify any potential mitigation measures to avoid significant adverse effects.

I am writing to invite your agency to become a Cooperating Agency on the EA. As a Cooperating Agency, you will be invited to participate in the reviews of the draft and final version of the document and included in any meetings (public or otherwise).

May 24, 2018
Page 2

Please notify me in writing within 15 days of receipt of this letter of your decision. I would appreciate both positive and negative responses in writing and, if you choose to participate as a Cooperating Agency, please designate a point of contact for project correspondence. If you have any questions, please contact me at 202-647-9798 or ReillyJE@state.gov.

Sincerely,

Ms. Jill Reilly
NEPA Coordinator

Enclosures

May 24, 2018
Page 3

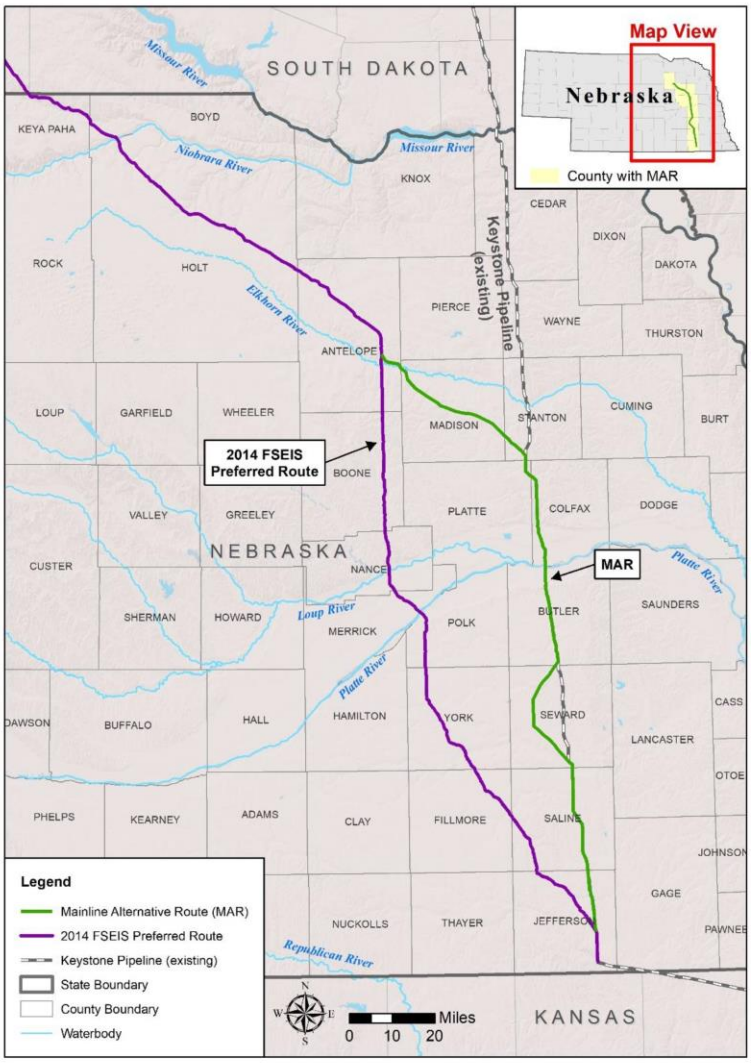


Figure 1. Mainline Alternative Route Overview Map

Sample Agency Scoping Letter

United States Department of State

Bureau of Oceans and International Environmental and Scientific Affairs

Washington, D.C. 20520

May 24, 2018

Mr. Trevor Jones
Nebraska State Historical Society
Director & State Historic Preservation Officer
P.O. Box 82554
Lincoln, Nebraska 68501-2554

Re: Environmental Assessment for the Keystone XL Mainline Alternative in Nebraska

Dear Mr. Jones,

On November 20, 2017, the Nebraska Public Service Commission approved the Mainline Alternative Route (MAR) in Nebraska. The U.S. Department of State (Department) is preparing an Environmental Assessment (EA) – consistent with the National Environmental Policy Act of 1969 [as implemented by the regulations of the Council on Environmental Quality, found at 40 CFR 1500–1508] – to evaluate the potential environmental impacts of the MAR in support of the Bureau of Land Management's review of a right-of-way grant pursuant to the Mineral Leasing Act of 1920.

I am writing to invite your agency to submit any scoping comments to assist the Department in identifying environmental and other relevant issues, any measures that might be adopted to reduce the proposed MAR's environmental impacts, and other information relevant to your agency's jurisdiction in determining the scope of the EA. Please provide me with any comments regarding the proposed MAR within 30 days of receipt of this letter. Additional background information and a project location map are provided within this letter.

If you have any questions, require additional information, or would like to discuss this matter further, please contact me at 202-647-9798 or ReillyJE@state.gov.

Sincerely,

Ms. Jill Reilly
NEPA Coordinator

Enclosures

May 24, 2018
Page 2

Supplementary Information: On January 26, 2017, TransCanada Keystone Pipeline L.P. resubmitted its Presidential Permit application to the Department for the proposed Keystone XL pipeline facilities. Subsequently, on March 23, 2017, Under Secretary of State for Political Affairs Thomas A. Shannon, Jr., issued a Presidential Permit to TransCanada Keystone Pipeline L.P. to construct, connect, operate, and maintain pipeline facilities at the international border of the United States and Canada as part of the Keystone XL Pipeline project. Subsequently, on November 20, 2017, the Nebraska Public Service Commission approved the MAR which differs from the preferred route analyzed in the 2014 Final Supplemental Environmental Impact Statement for the Keystone XL Project (2014 Keystone XL Final SEIS). Figure 1 shows the variance of the MAR from the preferred route analyzed in the 2014 Final 2014 Keystone XL Final SEIS.

The proposed MAR is approximately 162 miles of new 36-inch-diameter pipeline and related ancillary facilities (pump stations, mainline valves, and permanent access roads) for transport of Western Canadian Sedimentary Basin and Bakken crude oil through the State of Nebraska to existing pipeline facilities near Steele City, Nebraska, for onward delivery to refineries in the Gulf Coast area. Construction would employ similar methods as discussed in the 2014 Keystone XL Final SEIS and require a 110-foot-wide temporary right-of-way and generally require a maintained a 50-foot wide permanent right-of-way easement.

May 24, 2018
Page 3

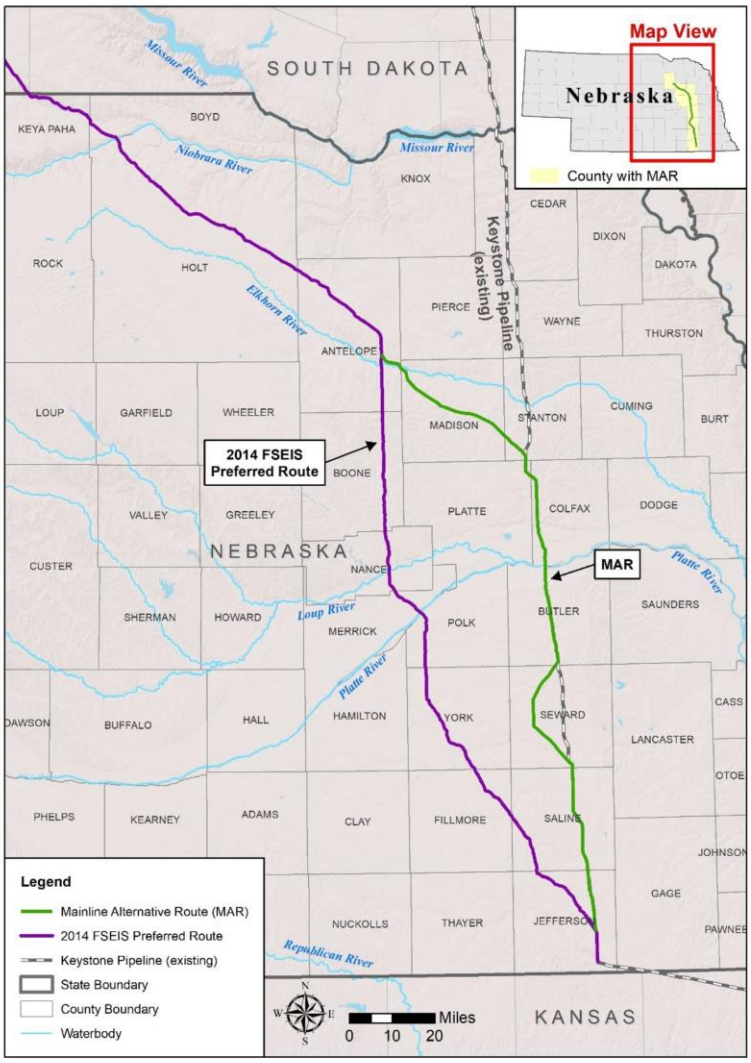


Figure 1. Mainline Alternative Route Overview Map

Sample Draft EA Notification Letter

United States Department of State

Bureau of Oceans and International Environmental and Scientific Affairs

Washington, D.C. 20520

July 26, 2018

Mr. Trevor Jones
Director & State Historic Preservation Officer
Nebraska State Historical Society
1500 R Street
Lincoln, Nebraska 68501-1651

Dear Mr. Jones,

This letter serves as notification that the United States Department of State (Department) Draft Environmental Assessment (EA) for the proposed Keystone XL Pipeline Mainline Alternative Route (MAR) in Nebraska is available online at the Department's website https://keystonepipeline-xl.state.gov/ for public review and comment. The Department has identified you as a point of contact for your organization, and as such, requests that you forward this notification to other interested individuals within your organization.

The Department prepared the Draft EA to evaluate the potential environmental impacts of the proposed Keystone XL MAR – consistent with the National Environmental Policy Act of 1969 – in support of the Bureau of Land Management's (BLM) review of TransCanada Keystone Pipeline, L.P.'s (Keystone) application for a right-of-way.

The MAR was included by Keystone as an alternative to its Preferred Route in their February 16, 2017 application to the Nebraska Public Service Commission (Nebraska PSC) seeking approval for the Keystone XL Project. Keystone's Preferred Route was considered in the Department's 2014 Final Supplemental Environmental Impact Statement for the Keystone XL Project (2014 Keystone XL Final SEIS). After reviewing Keystone's application, the Nebraska PSC approved the MAR on November 20, 2017. Keystone's application to BLM for a right-of-way remains pending with that agency. This EA will be used to determine if there are potentially significant impacts from the proposed MAR and to identify any potential mitigation measures to avoid significant adverse effects.

Under the Proposed Action, Keystone would construct the portion of the Keystone XL Project in Nebraska along the MAR. This would include approximately 162 miles of construction, connection, operation and maintenance along the MAR of the proposed new 36-inch diameter pipeline and related ancillary facilities within Nebraska that were not analyzed within the 2014 Keystone XL Final SEIS.

July 26, 2018
Page 2

The 30-day public comment period ends on August 29, 2018. Comments received or postmarked by August 29, 2018 will be considered in preparing the Final EA. Comments may be submitted online at http://www.regulations.gov by entering "Mainline Alternative Route" into the search field and following the prompts. Comments submitted by mail should be addressed to: Mr. Marko Velikonja, U.S. Department of State, Office of Environmental Quality and Transboundary Issues (EQT), Bureau of Oceans and International Environmental & Scientific Affairs (OES), 2201 C Street NW, Room 2726, Washington, DC 20520. Comments should be identified as intended for the Draft EA for the Keystone XL Mainline Alternative Route Project.

Comments are not private and may be posted online and/or published in the Final EA. The comments will not be edited to remove identifying or contact information, and the Department cautions against including any information that one does not want publicly disclosed.

If you require additional information or have any questions, please contact Mr. Velikonja at velikonjamg@state.gov.

Thank you for your interest in the MAR and the Draft EA.

Sincerely,

Marko Velikonja

Mr. Marko Velikonja
Program Manager

A.3 ELECTED OFFICIALS

The following is a list of Nebraska elected officials included in the Draft SEIS distribution notification:

Members of U.S. Congress

- Senator Deb Fischer
- Senator Mike Johanns
- Representative Don Bacon
- Representative Jeff Fortenberry
- Representative Adrian Smith

Members of Nebraska Legislature

- Senator Bruce Bostelman
- Senator Tom Briese
- Senator Laura Ebke
- Senator Mark Kolterman
- Senator Jim Scheer
- Senator Paul Schumacher

County Commissioners and Supervisors

- Jeffrey Bauman (Colfax Co.)
- Max Birkel (Butler Co. - District 4)
- John Culver (Seward - District 4)
- Michael Dux (Jefferson - District 3)
- Jerry Engdahl (Platte Co. - District 6)
- Whitney Fleischman (Seward - District 3)
- Diana Garske (Seward - District 2)
- Gene Gausman (Seward Co.- District 1)
- Roger Glawatz (Seward - District 5)
- Jerry Heard (Colfax Co.)
- Janet Hennig (Saline Co.)
- Gregory Janak (Butler Co. - District 6)
- Russ Karpisek (Saline Co.)
- Dennis Kment (Stanton Co. - District 2)
- Marvin Kohout (Saline Co.)
- Tony Krafka (Butler Co. – District 2)
- Stephanie Krivohlavek (Saline Co.)
- Robert Lloyd (Platte Co. - District 5)
- Willis Luedke (Saline Co.)
- David Mach (Butler Co. – District 1)
- Gerald Micek (Platte Co. - District 2)
- Thomas Martens (Platte Co. - District 1)
- Christian Ohl (Madison Co. - District 2)
- Hollie Olk (Platte Co. - District 7)
- Ronald Pfeifer (Platte Co. - District 4)
- Gale Pohlmann (Jefferson Co. - District 2)
- David Potter (Butler Co. - District 7)
- Jim Prauner (Madison Co. - District 3)
- Jerald Schwager (Antelope Co. - District 1)
- Ron Schmidt (Madison Co. - District 1)
- Mark Schoenrock (Jefferson Co. - District 1)
- James Scow (Platte Co. - District 3)
- Kevin Slama (Butler Co. - District 3)
- Scott Steager (Butler Co. - District 5)
- Gil Wigington (Colfax Co.)

A.4 SECTION 7 CONSULTATION

Table A-2 summarizes updates regarding Section 7 consultation since the 2014 Keystone XL Final SEIS.

Table A-2. Section 7 Consultation Updates

Date	Activity
July 9, 2015	The Department reinitiated consultation with USFWS regarding the rufa red knot determining the Keystone XL Project "may affect, but is not likely to adversely affect" the species (see Letter A).
August 27, 2015	USFWS concurred with the "may affect, but is not likely to adversely affect" determination for the rufa red knot (see Letter B).
March 15, 2017	The Department reinitiated consultation with USFWS regarding the northern long-eared bat determining the Keystone XL Project "may affect, but is not likely to adversely affect" the species (see Letter C). The letter also re-evaluated the conclusions drawn during the 2014 Keystone XL Final SEIS consultation process.
March 16, 2017	USFWS concurred with the "may affect, but is not likely to adversely affect" determination for the northern long-eared bat providing conservation measures listed in the March 15, 2017 letter are implemented (see Letter D). The USFWS also agreed with the Department that the conclusions for the species in the 2013 BiOp remain valid predicated on the completion of required pre-construction population surveys for the federally endangered American burying beetle to confirm the amount of take authorized in the Incidental Take Statement will not be exceeded for the species.
January 31, 2018	The Department reinitiated consultation with USFWS regarding the Keystone XL Project and analysis of the MAR, requesting any new information on potentially affected species along the MAR (see Letter E).

BiOp = Biological Opinion; Department = United States Department of State; MAR = Mainline Alternative Route; SEIS = Supplemental Environmental Impact Statement; USFWS = United States Fish and Wildlife Service

Letter A – Department Rufa Red Knot Determination

United States Department of State

Bureau of Oceans and International Environmental and Scientific Affairs

Washington, D.C. 20520

July 9, 2015

FWS-NE: 2013-164

Ms. Eliza Hines
Nebraska Field Supervisor
U.S. Fish and Wildlife Service
Nebraska Ecological Services
9325 South Alda Road
Wood River, Nebraska 68883

Subject: Request for Reinitiation of Section 7(a)(2) Consultation for the TransCanada Keystone XL Pipeline Project and Concurrence with Findings

Dear Ms. Hines,

The U.S. Department of State (the Department) requests to reinitiate consultation with the U.S. Fish and Wildlife Service (USFWS) Nebraska Field Office consistent with section 7(a)(2) of the Endangered Species Act of 1973, as amended (ESA), due to the recent (December 11, 2014) USFWS listing of the rufa red knot (*Calidris canutus rufa*) as threatened. In the May 15, 2013 transmittal of the FWS-NE: 2013-164 Biological Opinion (BO) on the Effects to Threatened and Endangered Species from the Issuance of a Presidential Permit to TransCanada Keystone XL Pipeline (Keystone) by the U.S. Department of State, the USFWS advised that the Department should reinitiate consultation if a new species is listed or critical habitat designated that may be affected by the action, consistent with 50 CFR § 402.16 (USFWS 2013a).

The rufa red knot is a sporadic and uncommon migrant that may appear throughout the regional action area of the proposed TransCanada Keystone XL Pipeline Project (Project). Based on the technical assistance provided by the USFWS, the information discussed during the Voluntary Conference Meeting between the Department and the USFWS[1] held on May 28, 2014 in Grand Island, Nebraska when the species was proposed for listing, the Department's attached analysis of effects, and the specific conservation measures described in the USFWS (2013a) and January 2014 Final Supplemental Environmental Impact Statement for the Keystone XL Project (Appendix Z, pp. 20-26 and 43-46), our assessment is that the Keystone XL project *may affect, but is not likely to adversely affect*, the rufa red knot.

[1] Other attendees included Bureau of Land Management (BLM), Montana Fish, Wildlife & Parks, Nebraska Game & Parks Commission, ERM, and Westech.

In reinitiating consultation, the Department is requesting concurrence with our assessment that the Keystone XL project *may affect, but is not likely to adversely affect*, the rufa red knot. The USFWS response to our request will serve to amend the May 15, 2013 BO, as appropriate.

If you have any questions, please contact me at: 202-647-7428 or HassellMD@state.gov. Thank you for your assistance.

Sincerely,

Mary D. Hassell

Mary D. Hassell
Office of Environmental Quality
and Transboundary Issues (EQT)
Bureau of Oceans and International
Environmental & Scientific Affairs (OES)
U.S. Department of State

Cc:

Robert R. Harms
Fish and Wildlife Biologist
U.S. Fish and Wildlife Service
9325 S Alda Rd
Wood River, NE 68883

Jim Stobaugh
Bureau of Land Management
1340 Financial Blvd
Reno, NV 89502

Jim White
TransCanada
4547 Rincon Pl
Montclair, VA 22025

Andrew Bielakowski
ERM
1218 3rd Avenue, Suite 1412
Seattle, WA 98101

Biological analysis of effect of the Proposed Keystone XL Pipeline Project on the Rufa red knot (*Calidris canutus rufa*)

Status of Species

The rufa red knot occurs as a sporadic and somewhat uncommon migrant throughout the proposed Project area. Rufa red knots are generally restricted to ocean coasts during winter, and occur primarily along the coasts during migration. However, small numbers of rufa red knots are reported annually across the interior United States during spring and fall migrations (eBird 2014 and Jorgensen 2014). There is no evidence that rufa red knots use any non-coastal sites as traditional stopover locations with the possible exception of a few lakes, primarily saline, in the northern-most portion of the Great Plains (Central Flyway Council 2013), which do not occur within the area of the proposed Project. On December 11, 2014, the USFWS issued a final rule listing the rufa red knot as a threatened species (USFWS 2014a). No critical habitat has been proposed at this time (USFWS 2014a).

Life History

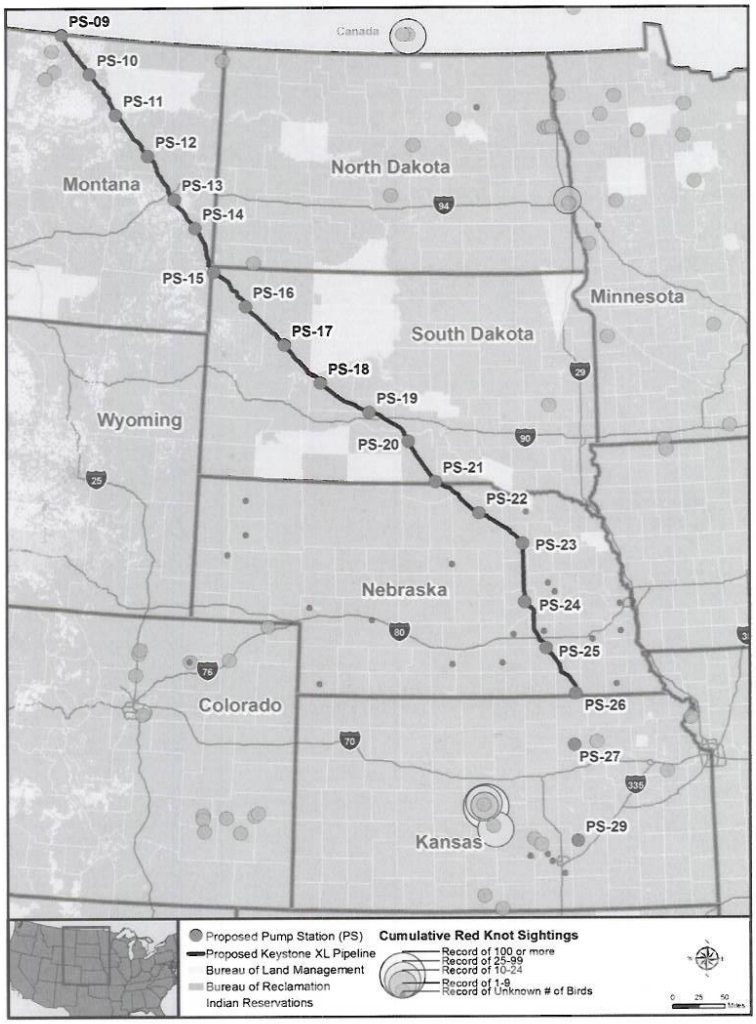
The rufa red knot is a large, bulky sandpiper, about 9 to 11 inches (23 to 28 centimeters) in length. It has a relatively short, straight bill tapering to its tip, and its legs are short and thick. Its head and breast are reddish during breeding plumage and gray the rest of the year. In breeding plumage, the female has light-colored feathers amongst the belly feathers and a less distinct eyeline. The sexes appear similar in winter. The female has slightly longer wings and bill. Immature birds are similar to adult winter plumage, but have gray back feathers outlined in white and black, giving it a scaly appearance (Cornell Lab of Ornithology 2014). The rufa red knot is usually quiet away from the breeding grounds, but it may make a subdued, somewhat nasal whine that increases in strength and scale for about one second (Cornell Lab of Ornithology 2014).

The rufa red knot winters in various locations ranging from the Tierra del Fuego and Patagonia areas in Argentina and Chile to Brazil, the Caribbean, and the southern United States. The research community generally makes a distinction between the populations of the rufa red knot based on their wintering location with the populations wintering in Argentina and Chile identified as the "southern-wintering" populations and those wintering further north in the United States, Brazil, and the Caribbean as the "northern-wintering" populations (USFWS 2014b). However, research data indicates that there is mixing that occurs during both the spring and fall migrations between the wintering populations (USFWS 2014b). The "southern-wintering" population of the rufa red knot makes one of the longest yearly migrations, travelling around 9,300 miles each way between its breeding grounds in the Canadian arctic to winter in South America (Cornell Lab of Ornithology 2014). During its migrations, this species generally feeds in coastal marine and estuarine habitat along the sand and muddy shorelines where intertidal invertebrates may easily be found and consumed. In North America, rufa red knots are commonly found along sandy, gravel, or cobble beaches, tidal mudflats, salt marshes, shallow coastal impoundments and lagoons, and peat banks (USFWS 2013b). The primary food items for the rufa red knot in non-breeding habitats include blue mussel, spat (juvenile mussels), clams, snails, polycheate worms, insect larvae, and crustaceans. During the spring breeding season, the eastern population of rufa red knot consumes horseshoe crab eggs, mussels, and spat; horseshoe crab eggs are disappearing because horseshoe crabs are overharvested for use as bait in conch

and eel pots. Without a sufficient supply of horseshoe crab eggs for food, many knots fail to complete their epic journey (American Bird Conservancy 2014).

Status and Distribution

The rufa red knot occurs as a sporadic and somewhat uncommon migrant throughout the proposed Project area.



Source: eBird 2012 and Jorgensen 2014.

Montana

The rufa red knot occurs as a migrant in Montana and has been identified in stopover areas in both the spring and fall. Although it has not been identified every year, approximately one to four individuals are regularly recorded each year (MNHP and MFWP 2014). There is no evidence for regular or critical migratory stopover habitat in Montana (Central Flyway Council 2013).

North Dakota

The observations of rufa red knots in North Dakota are scattered throughout the state. No sites are consistently used by rufa red knots, and none could be considered critical stopover habitat (Central Flyway Council 2013).

South Dakota

The South Dakota Ornithologists Union documents 26 sightings of the rufa red knot since 1974 in both the spring and fall migration seasons at Bennett, Brown, Clay, Deuel, Fall River, Faulk, Harding, Hughes, Kingsbury, Lake, Miner, Potter, Roberts, Sully, and Yankton counties. At one sighting in 2007, 30 individuals were identified; however, sightings are sporadic and uncommon (USFWS 2014b).

Nebraska

The rufa red knot occurs rarely in Nebraska, far less than annually, as a casual spring and fall migrant found in mudflats and shorelines (Jorgensen 2014). The rufa red knot does not have a defined range in Nebraska (USFWS 2014c) but confirmed observations have been reported across the state from wetlands, river systems, and impoundments. Information within the state database for the rufa red knot is not available because it does not reproduce in Nebraska and therefore is not tracked (USFWS 2014d). However, a compilation of rufa red knot observations in Nebraska was prepared by Jorgensen (2014) and Lake McConaughy is the only site in the state where the species has been observed greater than three times.

Kansas

The rufa red knot occurs rarely in Kansas, far less than annually, and the Central Flyway Council recommends considering the species an irregular migrant or a vagrant in Kansas (Central Flyway Council 2013).

Impact Evaluation

Construction

Rufa red knots need to encounter favorable habitat, food, and weather conditions within narrow seasonal windows as the birds migrate along stopovers between wintering and breeding areas. For example, the rufa red knot population decline that occurred in the 2000s was caused primarily by reduced food availability from increased harvests of horseshoe crabs, exacerbated by small changes in the timing that rufa red knots arrived at the Delaware Bay on the U.S. east

coast (USFWS 2014b). Rufa red knots may also be particularly vulnerable to climate change, which is likely to affect the arctic tundra ecosystem where they breed; the quality and quantity of coastal and potentially inland habitats due to rising sea levels and reduced inland water locations; the quantity and timing of invertebrate food resources throughout the bird's range; and the severity, timing, and location of storm and weather patterns (USFWS 2013c). Since the rufa red knot nests in the Canadian arctic, nesting would not be impacted by proposed Project activities. The primary construction-related impacts would be direct in the reduction of potential stopover habitat in wetlands, riparian areas, and waterways during construction as well as indirect disturbance and potential exposure to fuel spills and leaks from construction machinery. The chance of construction-related impacts to migrating rufa red knots is minimal, particularly because there is no specific and consistent habitat used by the rufa red knot within the proposed Project area. Indirect impacts could result from increased noise and human presence at work site locations if migrating rufa red knots are within the vicinity of the proposed Project. General conservation measures from the May 2013 BO applicable to the rufa red knot are listed in Table 1.

Table 1. General Conservation Measures
All equipment maintenance and repairs will be performed in upland locations at least 100 feet from all water bodies and wetlands.
Refueling and lubrication of construction equipment will be restricted to upland areas at least 100 feet away from streams and wetlands.
All equipment would be parked overnight at least 100 feet from a watercourse or wetland.
Equipment will not be washed in streams or wetlands.
Spills of fuel and other hazardous materials will be cleaned-up immediately in accordance with the SPCCP and hazardous wastes associated with spills and leaks will be disposed of in accordance with applicable laws and regulations.
Each construction and cleanup crew will have on site, sufficient tools and materials to stop leaks including supplies of absorbent and barrier materials that would allow for rapid containment and recovery of spilled materials.
Keystone would mark and maintain a 100-foot area from river crossings, free from all hazardous materials, fuel storage, and vehicle fuel transfers. These buffers would be maintained during construction except when fueling and refueling the water pump near the river edge that is required for the horizontal directional drill (HDD) crossing and hydrostatic test water withdrawal. Water pump fueling will be completed by trained personnel, secondary containment will be used, and a spill kit will be onsite.

In addition, conservations measures established for the interior least tern, whooping crane and piping plover would be applicable to the rufa red knot and are in Tables 2 through 4.

Table 2. Interior Least Tern Conservation Measures
Major rivers that contain interior least tern habitat including the Platte, Loup, and Niobrara rivers in Nebraska; Cheyenne River in South Dakota; and Yellowstone and Missouri rivers in Montana, will be crossed using the HDD method.
HDD boring under the Platte, Loup, and Niobrara rivers in Nebraska; Cheyenne River in South Dakota; and Yellowstone River in Montana will result in a pipeline burial depth of 25 feet or greater below the river bed.
Pre-construction surveys will occur within 0.25-mile from suitable breeding habitat at the Platte, Loup, and Niobrara rivers in Nebraska; the Cheyenne River in South Dakota; and the Yellowstone and Missouri rivers in Montana during the nesting season (from May 1 through September 1) to ensure that there are no nesting terns within 0.25-mile of the construction area. Daily surveys for nesting terns would be conducted during the nesting season when construction activities occur within 0.25-mile of potential nesting habitat.
If interior least tern nests are found at the crossings, then Keystone would: 1) adhere to the 0.25-mile buffer of no pipeline construction activity and 2) continue to monitor nests if any are within 0.25-mile of the construction footprint until young have fledged.
Keystone commits to making minor adjustments to the pipeline corridor to avoid impacts to nesting interior least terns in coordination with USFWS. This may involve shifting the pipeline corridor away from nests to avoid disturbances to interior least tern nests or other modifications depending on the circumstances.
Down shielding of lights will be used should HDD occur at night should the HDD site lack vegetative screening, and an active interior tern nest is located within 0.25 mile from the HDD site.
Pump Station 24 (Nebraska): The Nebraska Public Power District agrees to complete nest surveys for interior least terns within an area 0.25-mile upstream and downstream of the proposed river crossing location if construction is expected to take place during the nesting period. Construction would halt if active nests are identified within 0.25-mile of the Platte River crossing area until such time that chicks and adults leave the nest area and nesting is concluded.
The Nebraska Public Power District will install spiral bird flight diverters on the shield wire on the line span between the banks at the Platte River crossing and one span on each side of the crossing.

Table 3. Whooping Crane Conservation Measures
During spring and fall whooping crane migration periods, environmental monitors will complete a brief survey of any wetland or riverine habitat areas potentially used by whooping cranes in the morning before starting equipment following the Whooping Crane Survey Protocol developed by the USFWS and NGPC (Nebraska Game and Parks Commission) and applied to all projects when located near whooping crane habitat. If whooping cranes are sighted during the morning survey or at any time of the day, the environmental monitor will immediately contact the USFWS and respective state agency in Nebraska, South Dakota, North Dakota, and/or Montana for further instruction and require that all human activity and equipment start-up be delayed or immediately cease. Work could proceed if whooping crane(s) leave the area. The environmental monitor would record the sighting, bird departure time, and work start time on the survey form. The USFWS would notify the compliance manager of whooping crane migration locations during the spring and fall migrations through information gathered from the whooping crane tracking program.
Lights will be down-shielded should HDD occur at night during the spring and fall whooping crane migrations in areas that provide suitable habitat.
Pump Station 9 (Montana): Big Flat Electric Cooperative will install avian markers and deflectors within 0.25-mile of the Milk River that will be traversed by the power line to pump station 9. The USFWS will be contacted should a whooping crane be spotted in the area of the proposed power line construction site.
Pump Station 10 (Montana): NorVal Electric Cooperative will install bird flight diverters (BFD) in all locations where the power line comes within 0.25-mile on either side of the Milk River. Additionally, BFDs will be installed for 0.25-mile on either side of two unnamed reservoirs crossed by the proposed power line.
Pump Station 14 (Montana): Montana Dakota Utilities will install BFDs on the static line at 50 foot spacing within 0.25-mile of Pennel Creek and within 0.25-mile of a pond located in the northwest corner of section 35, T9 North, Range 58 East. If a whooping crane is sighted on the ground within the transmission line project area during construction, Montana Dakota Utilities will cease construction and contact the USFWS.
Pump Station 12 (Montana): McCone Electric Cooperative will install avian markers within 0.25-mile of Buffalo Springs Creek and the Redwater River in accordance with Avian Power Line Interaction Committee (APLIC) standards. If whooping cranes are sighted during fall and spring migrations, McCone Electric Cooperative will delay all work activity until whooping cranes have left the area and immediately contact the USFWS and MFWP for further instruction.
Pump Station 20 (South Dakota): A total of 636 BFDs will be installed by Rosebud Electric Cooperative Inc. at three wetland areas located along the proposed power line alignment to avoid

and minimize risk of collision by whooping cranes near wetland foraging and roosting habitats. Installation of BFDs will be done in accordance with specific marking locations as previously recommended by the USFWS at these three wetland areas located at Township 101 North, Range 77 West, Section 17 and the SE ¼ Section 32, and Township 100 N Range 78 West, section 10, NW1/4 Section 15.
Pump Station 21 (South Dakota): A total of 557 BFDs will be installed by Rosebud Electric Cooperative Inc. to avoid and minimize risk of collision by whooping cranes near wetland foraging and roosting habitats. Installation of BFDs will be done in accordance with specific marking locations as previously recommended by the USFWS at these wetland areas located at Township 97 North, Range 73 West SW ¼ of section 25 and Township 95 North, Range 73 West, Sections 16 and 17.
Pump Station 22, 23, 24, and 26 (Nebraska): The Nebraska Public Power District will complete a field review with USFWS and NGPC to determine if any areas are present with a higher probability of whooping crane use (i.e., wetlands or large ponded areas (stock ponds), meadows, and obvious flight corridors to and from such areas to feeding habitats). Spiral BFDs will be installed, consistent with APLIC standards (APLIC 2012), in appropriate areas as identified in the field review. The Nebraska Public Power District will complete daily presence/absence whooping crane surveys according to protocol if construction occurs during the spring and fall migration periods in areas where such surveys are agreed to be appropriate and necessary to avoid disturbance. Should a whooping crane(s) be sighted within 0.5-mile of a work area, all work will cease until the whooping crane(s) leaves that immediate area. The USFWS and NGPC will be contacted immediately and notified of the presence of whooping crane(s).
Pump Station 27 (Kansas): Westar Energy will install BFDs to prevent avian collisions where the power line crosses the Republican River even though an evaluation of whooping crane use indicated that it was unlikely that the species would be found in this area.

Table 4. Piping Plover Conservation Measures
The Platte, Loup, and Niobrara rivers in Nebraska; the Cheyenne River in South Dakota; and the Yellowstone and Missouri rivers in Montana will be crossed using the HDD method which would result in a burial depth of 25 feet or greater below the river bed.
If construction were to occur during the piping plover nesting season (from April 15 through September 1), Keystone would conduct pre-construction surveys within 0.25-mile from suitable nesting habitat at the Platte, Loup, and Niobrara rivers in Nebraska; the Cheyenne River in South Dakota; and the Yellowstone and Missouri rivers in Montana to ensure that there are no nesting pairs within 0.25-mile of the construction area. Daily surveys for nesting plovers will be

conducted when construction activities occur within 0.25-mile of potential nesting habitat during the nesting season.
If a piping plover nest(s) are found at the crossings, then Keystone will: 1) adhere to the 0.25-mile buffer of no construction activity and 2) continue to monitor nests if any are within 0.25-mile of the construction footprint until the young have fledged.
Keystone commits to making minor adjustments to the pipeline corridor to avoid impacts to nesting piping plovers in coordination with the USFWS. This may involve shifting the pipeline corridor away from nests to avoid disturbances to piping plover nests or other modifications depending on the circumstances.
Down shielding of lights will be used should HDD occur at night, should the HDD site lack vegetative screening, and an active piping plover nest is located within 0.25 mile from the HDD sites.
Pump Station 9 (Montana): Big Flat Electric Cooperative designed and located the power line to this pump station so that it is 3 miles east of any piping plover nesting or habitat areas. If nesting piping plovers are found to be present based on surveys for the species, all construction would cease until piping plover chicks fledge from the site.
Pump Station 10 (Montana): NorVal Electric Cooperative will install BFD in all locations where the power line comes within 0.25-mile on either side of the Milk River. Additionally, BFDs will be installed for 0.25-mile on either side of two unnamed reservoirs crossed by the proposed power line.
Pump Station 24 (Nebraska): The Nebraska Public Power District agrees to complete nest surveys for piping plovers within an area 0.25-mile upstream and downstream of the proposed river crossing location if construction is expected to take place during the nesting period. Construction would halt if active nests are identified within 0.25-mile of the Platte River crossing area until such time that chicks and adults leave the nest area. The Nebraska Public Power District will install spiral BFDs on the shield wire on the line span between the banks at the Platte River crossing and one span on each side of the crossing.

Operations

Operations of the proposed Project are expected to have little, if any, effect on the species. Travel to and from pump stations or valves will be along established roads that do not provide habitat for rufa red knot, particularly as a sporadic and uncommon migrant. Overflights by aircraft to monitor the pipeline would be at an elevation that should not negatively affect the species.

Direct contact with a crude oil spill is unlikely, but could result in adverse effects to rufa red knots due to plumage oiling and crude oil ingestion from contaminated plumage and prey. While these exposure routes have the potential to cause adverse effects to individuals, the probability of adverse effects to rufa red knot are unlikely due to the low probability of a spill, low probability of the spill coinciding with the presence of rufa red knot individuals, and low probability of the spill reaching a major waterbody in sufficient amounts to cause toxic effects. The magnitude of spill effects varies with multiple factors, the most significant of which include: 1) the amount of material released, 2) the size of the spill dispersal area, 3) the type of spills, 4) the species assemblage present, 5) climate, and 6) the spill response tactics employed.

Red knots migrate during the day and night. Birds that migrate at night can sometimes be attracted to artificial lights subjecting them to collisions with structures. Outdoor lighting, however, is not expected to affect the rufa red knot because only one bulb would be used at each pump station above the entry door, none of which are located closer than five miles to a river with suitable stopover habitat. Communication towers would be below the height that requires lighting by the Federal Aviation Administration and below the height where guy wires would be required for tower stability to avoid collision by red knots on guy wires and other structures during their spring and fall migrations.

Connected Actions

Impacts to the rufa red knot as a result of construction and operation of the Bakken Marketlink Project and the Big Bend to Witten 230-kV Transmission Line would be the same as, or similar to, the proposed Project. The construction of new power lines along the Project route by at least 20 power providers to provide electricity to 20 pumping stations could add to the incremental collision mortality of migrant rufa red knots, especially where these power lines are located near resting and/or foraging habitats used during migration. Rufa red knots are susceptible to collisions with power lines. In recognition of the risk that these power lines pose to whooping cranes, least terns, and piping plovers, implementation of several conservation measures were agreed upon in the May 15, 2013, BO. These measures primarily involve the installation of bird flight diverters on power lines when they cross rivers, streams, and wetlands or when they are located near these water features. The conservation measures are consistent with standard measures outlined in *Mitigating Bird Collision with Power Lines* (APLIC 1994). Power lines that will be marked with bird flight diverters are located in the same areas that would be used by the red knot during its migration. As such, the red knot will be a beneficiary of these conservation measures.

Keystone would not construct or operate these electrical distribution lines, but have informed electrical power providers of the requirement to consult with USFWS on federal threatened, endangered, proposed and candidate species, BLM sensitive species, state threatened and endangered species, and species of conservation concern for the electrical infrastructure components constructed for the proposed Project. As a result, power providers have committed to avoidance and conservation measures, in coordination with the USFWS, for species that may be affected by service lines and/or pump stations.

Cumulative Impacts

The Department has concluded that implementation of conservation measures in Tables 1 through 4 would avoid potential effects of the proposed Project to the rufa red knot. Thus, there is limited potential for effects of these impacts to be cumulative with other projects. Existing conservation measures proposed for other migratory bird species (i.e., whooping crane *(Grus americana)*, piping plover (*Charadrius melodus)*, and interior least tern *(Sternula antillarum),* which include protection of migration stopover habitats through use of HDD crossing methods to avoid disturbance to migration stopover habitats, and installation of bird flight diverters on power lines would also reduce impacts to the rufa red knot. Habitat and disturbance impacts at major river crossings from future linear projects would likely incorporate similar conservation measures to avoid and minimize affects to these birds.

Implementation of appropriate conservation measures as determined through consultation with the USFWS, and discussions with other federal, state, and local agencies for the species for the proposed Project and for future projects would include impact avoidance and minimization, which would mitigate long-term cumulative impacts.

Determination

Effect on Critical Habitat

The proposed Project would not result in the destruction or adverse modification of federally proposed critical habitat for the rufa red knot as none has been identified for the species.

Effect on the Species

Based on our evaluation, we have determined that the proposed Project *may affect, but is not likely to adversely affect*, the rufa red knot. This determination is based on the rarity of the species, its status as a sporadic and somewhat uncommon migrant through the proposed Project area, and Keystone's commitment to implementing avoidance and conservation measures described above. Although it is possible that a large spill event could result in an adverse effect on this species and its migration habitat, the probability of adverse effects to the rufa red knot are unlikely due to the low probability of a spill, low probability of the spill coinciding with the presence of rufa red knots, and low probability of a rufa red knot contacting the spilled product.

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Letter B – USFWS Rufa Red Knot Concurrence

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Nebraska Field Office
9325 South Alda Road
Wood River, Nebraska 68883

August 27, 2015

FWS-NE: 2013-164

Ms. Mary D. Hassell
Office of Environmental Quality and
Transboundary Issues (EQT)
Bureau of Oceans and International
Environmental and Scientific Affairs (OES)
U.S. Department of State
Washington, D.C. 20520

RE: Request for Reinitiation of Section 7(a)(2) Consultation for the TransCanada Keystone XL Pipeline Project and Concurrence with Findings

Dear Ms. Hassell:

This is in response to your letter dated July 9, 2015, requesting reinitiation of section 7 consultation and concurrence that the proposed Keystone XL Pipeline Project (Project) may affect, but is not likely to adversely affect, the federally threatened Rufa Red Knot *(Calidris canutus rufa)*. After reviewing your July 9, 2015, letter and attached Biological Analysis of the effect of the Project on the species, the U.S. Fish and Wildlife Service (Service) has concluded that it concurs with the U.S. Department State's (Department) determination of effect.

This concludes section 7 consultation pursuant to the Endangered Species Act. Consultation should be reinitiated, however, if new information reveals impacts of the Project that may affect listed species, a new species is listed, new critical habitat is designated, or the Project is subsequently modified.

The Service appreciates the opportunity to work cooperatively with the Department in assuming a shared responsibility for protecting federal trust fish and wildlife resources along the proposed Project route in Montana, South Dakota, Nebraska, and Kansas.

2

If you have any questions or require technical assistance, please do not hesitate to contact Mr. Robert Harms at robert_harms@fws.gov; (308) 382-6468, extension 208.

Sincerely,

Eliza Hines
Nebraska Field Supervisor

Cc: USFWS, Denver CO (Attn: Clint Riley)
USFWS, Denver CO (Attn: Doug Laye)
USFWS, Helena, MT (Attn: Jeff Berglund)
USFWS, Pierre, SD (Attn: Charlene Bessken)
USFWS, Manhattan, KS (Attn: Dan Mulhern)
USDOI, Denver CO (Attn: Kate Williams-Shuck)
BLM, Reno, NV (Attn: Jim Stobaugh)

Letter C – Department Northern Long-Eared Bat Determination / Keystone XL Final SEIS Consultation Process Conclusions

United States Department of State

Washington, D.C. 20520

March 15, 2017

FWS-NE: 2013-164

Ms. Eliza Hines
Nebraska Field Supervisor
U.S. Fish and Wildlife Service
Nebraska Ecological Services
9325 South Alda Road
Wood River, Nebraska 68883

Subject: Request for Reinitiation of Section 7(a)(2) Consultation for the TransCanada Keystone XL Pipeline Project and Concurrence with Findings

Dear Ms. Hines,

On January 26, 2017, TransCanada Keystone Pipeline, L.P., resubmitted an application to the U.S. State Department ("Department") for a Presidential Permit authorizing the construction, connection, operation, and maintenance of pipeline facilities for the importation of crude oil to be located at the international border between the United States and Canada at Phillips County, Montana. The Department is reviewing the application as well as the proposed plans for the construction of 20 power lines to serve 20 pumping stations along the proposed route ("Project") previously analyzed in the May 15, 2013 biological opinion ("BO"). After reviewing the relevant information, the Department is requesting reinitiation of consultation with the U.S. Fish and Wildlife Service (USFWS) Nebraska Field Office consistent with section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended. In particular, the Department is reinitiating section 7 consultation on the Project because of the listing of the northern long-eared bat (*Myotis septentrionalis*) as threatened and seeks concurrence of its findings that the Project may affect but is not likely to adversely affect the northern long-eared bat, as set forth in the attached effects analysis.

The northern long-eared bat was listed as a federally threatened species on April 2, 2015 and thus, was not a species that was considered in the BO.[1] Because the species is significantly affected by white-nose syndrome, the USFWS published an ESA Section 4(d) rule in the Federal Register on January 14, 2016, which specifically defines take prohibitions in order to protect maternity colonies and hibernaculum when a federal or non-federal action is located within the

[1] The rufa red knot was also listed as threatened after the issuance of the May 2013 BO. The Department reinitiated consultation for the rufa red knot which was completed in August 2015 with the USFWS concurring in a "may affect, but is not likely to adversely affect" determination.

white-nose syndrome zone. The northern long-eared bat's range is located within the regional action area of the proposed Project. In particular, a portion of the Project is located within the white-nose syndrome zone in Kansas and Nebraska where specific actions have been outlined by the USFWS to protect maternity colonies and hibernaculum for the species. Proposed Project segments in Montana and South Dakota occur outside of the currently delineated white-nose syndrome zone.

Technical assistance provided by the USFWS; a review of the 4(d) rule, information discussed during the Voluntary Conference Meeting between the Department and the USFWS[2] held on May 28, 2014, in Grand Island, Nebraska; and information received by the Department from USFWS in the past month helped to inform the Department's attached analysis of effects and determination. The Department commits, in coordination with the applicant, TransCanada Keystone Pipeline, L.P., that, should the Presidential Permit be granted, to abide by the requirements outlined in *Endangered and Threatened Wildlife and Plants; 4(d) Rule for the Northern Long-Eared Bat,* ((50 CFR Part 17, Federal Register Notice, January 14, 2016 (81 Fed. Reg. 1900)) and summarized in the key for federal projects (https://www.fws.gov/midwest/endangered/mammals/nleb/pdf/KeyFinal4dNLEB_FedAgencies17Feb2016.pdf).

- **Conservation Measure 1: Tree Removal Near Known Northern Long-eared Bat Hibernacula**
  TransCanada and the associated utilities responsible for the construction of power lines to pump stations, will not remove any trees within a 0.25-mile (0.4-km) buffer around known northern long-eared bat hibernacula (as determined by coordination with State Natural Heritage Inventory databases in Kansas and Nebraska, field surveys, and/or coordination with subject matter experts knowledgeable about the species).

- **Conservation Measure 2: Tree Removal Near Known Maternity Roost Trees**
  Known roosts (as determined by coordination with State Natural Heritage Inventory databases in Kansas and Nebraska, field surveys, and/or coordination with subject matter experts knowledgeable about the species) will be protected and TransCanada and the associated utilities responsible for the construction of power lines to pump stations, will avoid cutting or destroying of any other trees within a 150-foot (45-meter) radius from the known, occupied maternity roost trees during the pup season (June 1 through July 31).

Given these commitments, the Department is requesting written concurrence with our assessment that the Keystone XL project *may affect, but is not likely to adversely affect*, the northern long-eared bat.

The Department has evaluated the status of other species to determine whether further ESA consultation may be required. The Dakota Skipper *(Hesperia dacotae)* was listed as federally threatened on November 24, 2014. The species is found in mesic and upland native tall grass prairie habitat in the upper Midwest, including northeast South Dakota. The Project is located in

[2] Other attendees included U.S. Bureau of Land Management, Montana Fish, Wildlife & Parks, Nebraska Game and Parks Commission, ERM, Inc., and WESTECH Environmental Services, Inc.

southern and southwest South Dakota, approximately 150 miles southwest of the area where the Dakota Skipper is found in South Dakota. Additionally, suitable habitat is unavailable for the Dakota Skipper in the area of proposed Project. For these reasons, the Department has concluded that the Project would have no effect on the Dakota Skipper and has determined that reinitiation of Section 7 consultation with the USFWS for this species is unnecessary.

The 2013 BO reached a determination of *"no jeopardy"* for the endangered American burying beetle (*Nicrophorus americanus)* and concurred with our determinations that the Project *"may affect, but is not likely to adversely affect"* the endangered black-footed ferret (*Mustela nigripes)*, interior least tern (*Sternula antillarum athalassos)*, whooping crane (*Grus americana)*, and pallid sturgeon (*Scaphirhynchus albus)*; and the threatened piping plover (*Charadrius melodus)* and western prairie fringed orchid (*Platanthera praeclara)*. Additionally, in August 2015, we determined, and USFWS concurred, that the Project "*may affect, but is not likely to adversely affect"* the rufa red knot (*Calidris canutus rufa*). The Department has considered whether reinitiation of consultation might be required for any species previously addressed in the 2013 Biological Opinion, or in the 2015 consultation which resulted in a "not likely to adversely affect" determination for the rufa red knot (*Calidris canutus rufa*). The Department has reviewed the proposed route for the Project, including proposed plans for the construction of the power lines to serve pumping stations located along the 875-mile-long route. The Department has concluded that the proposed pipeline route, which follows the same 200-foot-wide corridor analyzed in the BO, and power lines have not been modified to the extent that the Project now may have an effect on federally listed species that were not previously considered in the BO and the 2015 consultation. The Department further concludes that there is no new information that reveals an effect of the proposed Project on the listed species or critical habitat in a manner not previously considered in the BO and 2015 consultation. Accordingly, the Department determines that reinitiation of consultation on these species is not required under 50 C.F.R. § 402.16.

Please also note the USFWS determined that the greater sage-grouse (*Centrocercus urophasianus*) was not warranted for listing in October 2015. In April 2016, the listing of the candidate species Sprague's pipit (*Anthus spragueii*) was determined to be not warranted. As such, we request confirmation from the USFWS that the conservation measures identified for these species in the BO are no longer in force. However, we recognize that the greater sage-grouse and possibly the Sprague's pipit require further coordination with the Bureau of Land Management and States of Montana (per the State of Montana's Sage-Grouse Executive Order 12-2015) and South Dakota.

The Department recognizes that the incidental take statement, which authorizes take of the American burying beetle as outlined in the BO, was issued to the Department. The Department will provide the appropriate oversight of the applicant to ensure implementation of reasonable and prudent measures and conservation measures for the American burying beetle as well as other conservation measures outlined in the BO for other federally listed species. The Department understands that the incidental take statement also covers any incidental take caused by TransCanada, provided it is in compliance with the terms and conditions of the incidental take statement.

If you have any questions, please contact me at: 202-736-7428 or HassellMD@state.gov. Thank you for your assistance.

Sincerely,

Mary D. Hassell

Mary D. Hassell, CEP
Bureau of Oceans and International
Environmental & Scientific Affairs (OES)
U.S. Department of State

Attachment (1)

1. Northern Long-Eared Bat Habitat Assessment on the Proposed Keystone XL Pipeline Project

Cc:

Mr. Robert R. Harms
U.S. Fish and Wildlife Service
9325 S Alda Rd.
Wood River, NE 68883

Mr. James Stobaugh
National Project Manager (WO350)
BLM Nevada State Office
1340 Financial Blvd.
Reno, NV 89502

Mr. Dennis Rankin
Rural Utilities Service
1400 Independence Avenue, SW
Room 2244, Stop 1571
Washington, DC 20250-1571

Ms. Shane Kimbrough
Western Area Power Administration
P.O. Box 281213
Lakewood, CO 80228-8213

Mr. Jim White
TransCanada Corporation
450 1st Street SW
Calgary
Alberta, Canada T2P 5H1

Biological Analysis of Effect of the Proposed Keystone XL Pipeline Project on the Northern Long-Eared Bat (*Myotis septentrionalis*)

Life History

The northern long-eared bat is a medium-sized mammal, about 3 to 3.7 inches (7.6 to 9.4 centimeters) in length, and has a wingspan measuring between 9 and 10 inches (23 and 26 centimeters) (USFWS 2015a). The bat is identifiable from other *Myotis* species because of its long ears that extend beyond the tip of its nose when laid forward, a long, narrow, and sharp pointed tragus (part of external ear), and a calcar (cartilage spur at ankle) that lacks a keel. Females tend to be larger and heavier than males. It has medium to dark brown fur on its back and dark brown ears and wing membranes (Caceres and Barclay 2000).

The northern long-eared bat uses high-humidity caves and mines for hibernation, which can begin as early as August and continue through the winter months. During the summer, this species utilizes forested habitats for roosts and reproduction. The northern long-eared bat can be migratory, and travel up to 30 miles or more between winter hibernation sites and summer roost sites. The species primarily roosts under the bark of dead and dying trees or on tree species with peeling bark or bark containing many crevices. Forested areas, including riparian corridors provide habitat (e.g., decaying trees, loose bark, tree snags, and stumps) for roosting, feeding, and maternity colonies of northern long-eared bats (Menzel et al. 2002, Owen et al. 2002, Foster and Kurta 1999). The northern long-eared bat appears to be opportunistic in roost selection and will use a variety of tree species for roosts throughout its range as long as the tree forms suitable cavities or retains bark. In addition to natural habitats, the northern long-eared bat may occasionally roost in human structures (e.g., buildings). Northern long-eared bats are known to switch roosts often, typically using one site for 2 to 3 days. Beginning in late-summer to early-fall, males swarm near hibernacula to begin breeding. Females have delayed fertilization, and a gestation period ranging between 50 and 60 days. Females give birth to a single pup the following May to July, depending on where the colony is located within the species' range (USFWS 2015b).

The northern long-eared bat typically forages on the edge and understory of heavily forested areas and along hillsides, ridges, water, and clearings. These opportunistic insectivores forage 1 to 2 hours after dusk and before dawn (USFWS 2013b). The diet for the northern long-eared bat is diverse and varied according to season and geographical occurrence. However, the diet generally consists of moths, flies, leafhoppers, caddisflies, beetles, and spiders. These bats catch insects by hawking (i.e., catching in flight) and gleaning (i.e., emitting a high-frequency echolocation call to locate on vegetation) (Henderson and Broders 2008). The gleaning call of the northern long-eared bat is of a higher frequency than other *Myotis* bat species, and is higher than the hearing frequency of many moth species, thereby giving it a foraging advantage within its feeding habitat (Caceres and Barclay 2000).

Status and Distribution

The northern long-eared bat is distributed throughout portions of the proposed Project area. Of primary concern for this consultation is the portion of the Project located within the white-nose syndrome positive counties/districts in Kansas and Nebraska (https://www.fws.gov/midwest/endangered/mammals/nleb/pdf/WNSZone.pdf) Other counties of

interest include Keya Paha, Boyd, and Rock Counties in Nebraska as they have geologic formations (i.e. exposed bed rock, possibly cliff faces) suitable for use as hibernacula. These counties are located on the edge of the white nose syndrome zone and could be included within the zone should positive detection of the fungus that causes white nose syndrome be detected in additional Nebraska Counties in the future.

Nebraska

Northern long-eared bat concentrations occur in the northern tier of the state along the Niobrara River and its tributaries, and in deciduous forests in the eastern one-third of the state (USFWS 2014a). This species may also be found throughout the state in opportunistic roosts when traveling between hibernacula and summer use areas (USFWS 2014a). They are also known to summer in the northwestern parts of Nebraska, specifically the Pine Ridge in Sheridan County, where only males have been documented. Acoustic surveys and mist netting demonstrate that the species can be found in eastern-Nebraska (Robert Harms, personal communication, March 6, 2017). This species is often found in areas with exposed bedrock and limestone mines in Nebraska; these areas are used as hibernaculum in the winter (Robert Harms, personal communication, March 6, 2017).

Kansas

The northern long-eared bat has been documented in Ellis, Graham, Marshall, Osborne, Phillips, Rooks, Russell, Washington, and Leavenworth Counties, although habitat exists for this species in 58 counties (Michele McNulty, personal communication, May 28, 2014). Before this, the species was thought to only migrate through parts of the state (USFWS 2013b).

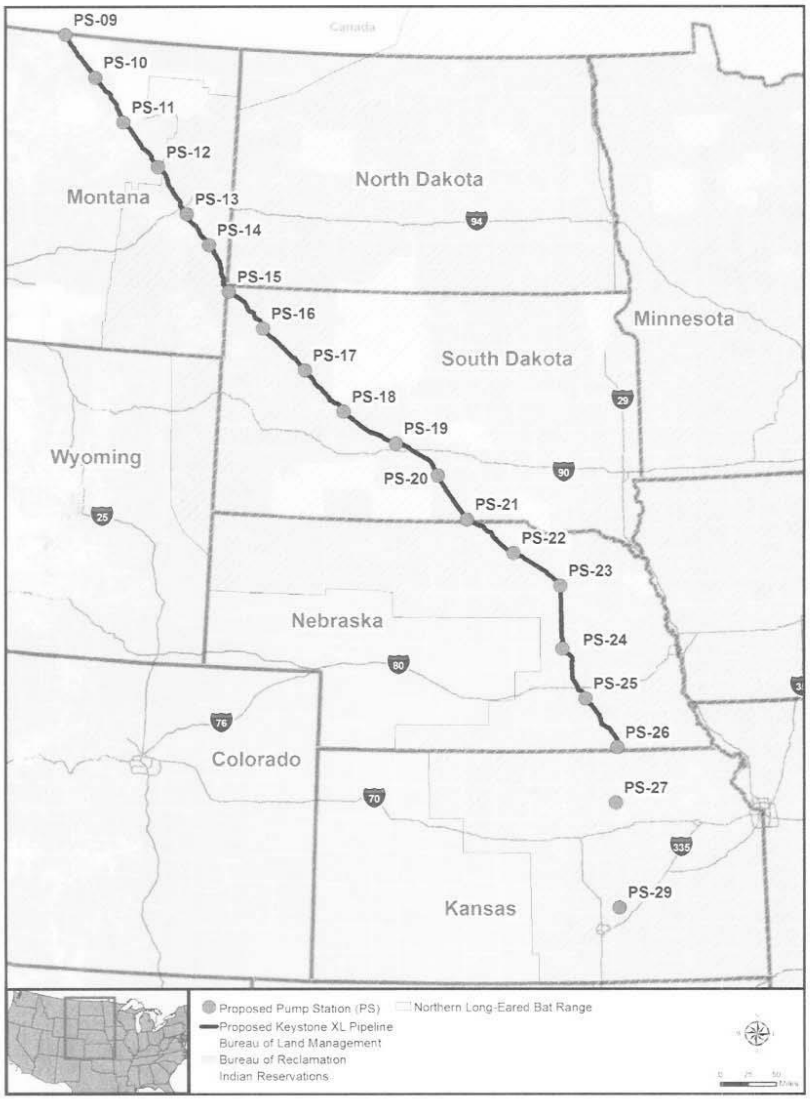
The 4(d) Rule and Conservation Measures

Within the boundaries of the white nose syndrome buffer zone, the 4(d) rule exempts take of the species due to forestry management activities, maintenance and limited expansion of transportation and utility rights-of-way, prairie habitat management, and limited tree removal projects, provided these activities include certain conservation measures. The majority of the proposed Project is outside of the white nose syndrome buffer zone, and so the 4(d) rule would exempt non-purposeful incidental take from all activities in these areas (USFWS 2015c). However, a portion of the proposed Project is located in Nebraska and Kansas and within the white nose syndrome buffer zone. The project could result in habitat loss and fragmentation that may impact maternity roosts and winter hibernacula. As such, the following conservation measures would be put in place consistent with the 4 (d) rule to avoid and minimize impact to the northern long-eared bat:

Conservation Measure 1: Tree Removal Near Known Northern Long-eared Bat Hibernacula
TransCanada and associated utilities responsible for the construction of power lines to pump stations will not remove any trees within a 0.25-mile (0.4-km) buffer around known northern long-eared bat hibernacula (as determined by coordination with State Natural Heritage Inventory databases in Kansas and Nebraska, field surveys, and/or coordination with subject matter experts knowledgeable about the species).

Conservation Measure 2: Tree Removal Near Known Maternity Roost Trees

Known roost will be protected and TransCanada and associated utilities responsible for the construction of power lines to pump stations will avoid cutting or destroying of any other trees within a 150-foot (45-meter) radius from the known, occupied maternity roost trees during the pup season (June 1 through July 31) (as determined by coordination with State Natural Heritage Inventory databases in Kansas and Nebraska, field surveys, and/or coordination with subject matter experts knowledgeable about the species) .



Determination

Effect on Critical Habitat

The proposed Project would not result in the destruction or adverse modification of federally designated or proposed critical habitat for the northern long-eared bat as none has yet been identified for the species. The USFWS has determined that critical habitat for the northern long-eared bat is not determinable at this time since information regarding the biological needs of the species is not sufficiently well known to permit identification of areas as critical habitat (USFWS 2015a).

Effect on the Species

The proposed Project *may affect, but is not likely to adversely affect,* the northern long-eared bat. This determination is based on Keystone's commitment to follow recommended conservation measures as identified by the USFWS in its 4(d) rule for pipeline construction, including ancillary project components (e.g., power lines to pump stations). As a result, no direct or indirect impacts are expected to result from the Project.

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Letter D – USFWS Northern Long-Eared Bat / Keystone XL Final SEIS Consultation Process Conclusions Concurrence

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Nebraska Field Office
9325 South Alda Road
Wood River, Nebraska 68883

IN REPLY REFER TO
FWS/R6/NEFO
DCN 065165

March 16, 2017

FWS-NE: 2013-164

Ms. Mary D. Hassell
Office of Environmental Quality and
Transboundary Issues (EQT)
Bureau of Oceans and International
Environmental and Scientific Affairs (OES)
U.S. Department of State
Washington, D.C. 20520

RE: Request for Reinitiation of Section 7(a)(2) Consultation for the TransCanada Keystone XL Pipeline Project

Dear Ms. Hassell:

This is in response to your letter dated March 15, 2017, requesting reinitiation of section 7 consultation and concurrence that the proposed Keystone XL Pipeline Project (Project) may affect, but is not likely to adversely affect, the federally threatened northern long-eared bat *(Myotis septentrionalis)*. The March 15, 2017, letter also evaluates the potential for Project effects on the federally threatened Dakota skipper *(Hesperia dacotae)* and reevaluates conclusions drawn for several species, including applicability as previously considered in section 7 consultation documents. Section 7 consultation documents include the Biological Opinion (Opinion) dated May 15, 2013, the U.S. Department of State's (Department) request to reinitiate section 7 consultation for the rufa red knot (*Calidris canutus rufa*), and the U.S. Fish and Wildlife Service's (Service) August 27, 2015, concurrence with a finding of not likely to adversely affect for that species. It should be noted that the Department's request to reinitiate section 7 consultation and our response represents the culmination of many productive discussions between our agencies; this collaboration began in 2015 when the rufa red knot was listed and resumed in February 2017 with discussion about the northern long-eared bat.

Northern Long-eared Bat
The Service has reviewed the Department's March 15, 2017, letter and attached analysis of Project effects on the northern long-eared bat. In that letter, the Department and its applicant TransCanada commit to ensuring implementation of two conservation measures designed to

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protect maternity roost trees and hibernacula for the species consistent with *Endangered and Threatened Wildlife and Plants; 4(d) Rule for the Northern Long-Eared Bat,* ((50 CFR Part 17, Federal Register Notice, January 14, 2016 (81 Fed. Reg. 1900)). Given the commitment to implement these conservation measures, the Service concurs with the Department's determination that the proposed Project may affect, but is not likely to adversely affect, the northern long-eared bat. Please note that the northern long-eared bat is state-listed as threatened in the States of Kansas, Nebraska, and Montana. We recommend coordination with the Nebraska Game and Parks Commission, Kansas Department of Wildlife and Parks, and Montana Fish, Wildlife, and Parks as other state requirements may apply.

Dakota Skipper

The Department completed an evaluation of the potential effects of the Project on the Dakota skipper and concluded there would be no effect on the species as there is no habitat available in the area of the Project. The Service has reviewed this evaluation as well as the best available information for the species including survey and habitat information for the Dakota skipper in South Dakota. Based on that review, we agree with the rationale utilized by the Department as it is based on a reasoned analysis of the best available information and we acknowledge the no effect determination.

Previously Considered Species

We acknowledge and appreciate the reevaluation of the species previously considered in the May 15, 2013, Opinion in addition to the rufa red knot, which was the subject of the Department's request to reinitiate section 7 consultation, dated June 9, 2015, following listing of this species as federally threatened. The Department's reevaluation was based on whether Project modifications or new information about the Project might indicate new effects to the previously considered species to the extent that reinitiation of section 7 consultation may be necessary. Based on the results of the reevaluation, the Department confirmed that the conclusions of the previous section 7 consultation documents regarding anticipated Project effects on listed species remain valid and that reinitiation of section 7 consultation is unnecessary. We agree with the Department's conclusions based on a review of the available information including Project maps and our knowledge of Project effects on these species. This is predicated on the completion of required pre-construction population surveys for the federally endangered American burying beetle *(Nicrophorus americanus)* to confirm that the amount of take authorized in the Incidental Take Statement (ITS) will not be exceeded for this species as annual populations are cyclic and dependent on weather conditions.

Greater Sage-grouse and Sprague's Pipit

The Service determined that the greater sage-grouse (*Centrocercus urophasianus*) and Sprague's pipit (*Anthus spragueii*) were not warranted for listing in October 2015 and April 2016, respectively. The May 15, 2013, Opinion identified several conservation measures for these species. Given the current status of these species, however, we confirm that these conservation measures are no longer in force. We appreciate the Department's commitment to coordinate with the Bureau of Land Management and the States of Montana and South Dakota as other requirements for these species may still apply.

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The Service acknowledges the Department's recognition of its responsibilities as the recipient of the ITS as outlined in your letter and included in the May 15, 2013, Opinion. We appreciate the Department's commitment to provide the appropriate oversight of the applicant TransCanada to ensure implementation of reasonable and prudent measures, which continue to remain in force, and encourage implementation of conservation measures for the listed species. We confirm that the ITS covers incidental take caused by the applicant TransCanada provided that such take is in compliance with the ITS terms and conditions.

This concludes section 7 consultation pursuant to the Endangered Species Act. As provided in 50 C.F.R. § 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control is authorized by law and if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion. The Service views the Department's March 13, 2017, request for reinitiation and this response as supplements to the May 15, 2013, Opinion.

The Service appreciates the opportunity to work cooperatively with the Department in assuming a shared responsibility for protecting federal trust fish and wildlife resources along the proposed Project route in Montana, South Dakota, Nebraska, and Kansas. If you have any questions or require technical assistance, please do not hesitate to contact Mr. Robert Harms at robert_harms@fws.gov; (308)382-6468, extension 208.

Sincerely,

Eliza Hines
Nebraska Field Supervisor

Cc: TransCanada Corporation, Alberta, Canada (Attn: Jim White)
BLM, Reno, NV (Attn: Jim Stobaugh)

Letter E – Department Reinitiation of Consultation with USFWS Regarding the Keystone XL Project and Analysis of the MAR

United States Department of State

Bureau of Oceans and International Environmental and Scientific Affairs

Washington, D.C. 20520

January 31, 2018

FWS-NE: 2018-139

Ms. Eliza Hines
Nebraska Field Supervisor
U.S. Fish and Wildlife Service
Nebraska Ecological Services
9325 South Alda Road
Wood River, Nebraska 68883

Subject: Request for Reinitiation of Section 7(a)(2) Consultation for the TransCanada Keystone XL Pipeline Project

Dear Ms. Hines,

On November 20, 2017, the Nebraska Public Service Commission approved the Mainline Alternative Route (MAR) in Nebraska for the TransCanada Keystone XL Pipeline. On January 18, 2018, TransCanada announced that it would be obtaining easements in advance of construction along the MAR.

The U.S. State Department is reviewing the MAR in light of TransCanada's announcement, and has decided to request reinitiation of consultation with the U.S. Fish and Wildlife Service (USFWS) Nebraska Field Office consistent with section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended, and having regard to the May 15, 2013, FWS NE: 2013 164 Biological Opinion (BO), as supplemented on March 16, 2017. The attached map shows the route that was addressed in the Biological Opinion in green (identified as the "Preferred Route") and the MAR in yellow (identified as the "Keystone Mainline Alternative Route").

The State Department requests any new information on potentially affected species along the MAR. We also request that the Service consider that new information, or other relevant matters as appropriate, as it proceeds with this reinitiated consultation.

January 31, 2018
Page 2

We request a meeting or conference call so we can discuss next steps in the consultation process.

If you have any questions, please contact me at: 202-647-9798 or ReillyJE@state.gov. Thank you for your assistance.

Sincerely,

Jill Reilly
Office of Environmental Quality
and Transboundary Issues (EQT)
Bureau of Oceans and International
Environmental & Scientific Affairs (OES)
U.S. Department of State

Enclosure

Cc:

Mr. Robert R. Harms
Fish and Wildlife Biologist
U.S. Fish and Wildlife Service
9325 S Alda Rd
Wood River, NE 68883

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