Final Environmental Assessment

TransCanada Keystone Pipeline, LP's

Gulf Coast Pipeline Project

(ABB Range in Oklahoma)

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List of Abbreviations and Acronyms

ABB	American Burying Beetle
APE	Area of Potential Effect
AQCR	Air Quality/Control Regions
BA	Biological Assessment
BGEPA	Bald and Golden Eagle Protection Act
bgs	below ground surface
bpd	barrel per day
BO	Biological Opinion
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CMR	Construction, Mitigation, and Reclamation
CWA	Clean Water Act
DOS	Department of State
EA	Environmental Assessment
EES	Electric Equipment Shelter
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ERP	Emergency Response Plan
ESA	Endangered Species Act
FEIS	Final Environmental Impact Statement
GHG	Greenhouse Gases
HAP	Hazardous Air Pollutant
HCA	High Consequence Areas
HCP	Habitat Conservation Plan
HDD	Horizontal directional drilling
ITP	Incidental Take Permit
MBTA	Migratory Bird Treaty Act
MLV	Mainline Valve
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NRCS	National Resources Conservation Service
NRHP	National Register of Historic Places

NSPS	New Source Performance Standards
NWP	Nationwide Permit
OCC	Operations Control Center
ODEQ	Oklahoma Department of Environmental Quality
ODWC	Oklahoma Department of Wildlife Conservation
OPA 90	Oil Pollution Act of 1990
PHMSA	Pipeline and Hazardous Materials Safety Administration
PMP	Pipeline Maintenance Program
PSD	Prevention of Significant Deterioration
QA	Quality Assurance
ROD	Record of Decision
ROW	Right-of-Way
SCADA	Supervisory Control and Data Acquisition
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
tpy	tons per year
TWA	Temporary Workspace Area
USACE	U.S. Army Corps of Engineers
U.S.C.	U.S. State Code
USDOT	U.S. Department of Transportation

Executive Summary

Proposed Action

Per the National Environmental Policy Act (NEPA), the U.S. Fish and Wildlife Service (Service) has developed this Environmental Assessment (EA) to evaluate the effects of issuing a proposed incidental take permit (ITP) under Section 10(a)(1)(B) of the Endangered Species Act (ESA) of 1973, as amended, to TransCanada Keystone Pipeline, LP (Keystone) related to the Gulf Coast Pipeline Project (Project). The "Proposed Action" is the Service's decision regarding the ITP application.The Project would occur within the range of the American burying beetle (*Nicrophorus americanus*, ABB) in Oklahoma. Keystone is applying to the Service for an ITP for a 50-year period authorizing incidental take of the ABB, which is listed as endangered under the ESA. The requested 50-year term would allow for incidental take of the ABB during the construction and operational activities, as well as for potential emergency response activities necessary for the life of the Project after construction and after the pipeline is placed in-service. If the Project continues to operate past the 50-year term, Keystone would request a renewal of the permit prior to its expiration.

The Service's issuance of the ITP would be contingent on Keystone's commitment to implementing the Habitat Conservation Plan (HCP) developed in coordination with the Service. The HCP includes measures to minimize and mitigate the potential take of ABBs resulting from construction and operation of the Project within the Permit Area. The Permit Area is defined as all lands over which the permittee has direct control, as well as all areas where take of Covered Species will be authorized by the ITP within the Service's identified ABB Range, including Conservation Priority Areas, along the Project route in Oklahoma.

If the requested permit is issued within the anticipated timeframe, Keystone would begin construction of the Project within the Permit Area in November 2012 and all facilities would be in service by November 2013. This EA analyzes a permit term of 50 years.

Background

The U.S. Department of State (DOS) served as the lead Federal agency for the environmental review of the Keystone XL Project from November 2008 through November 2011. DOS undertook an Environmental Impact Statement (EIS) review for the entire project from the Canadian border to the Texas gulf coast. DOS issued the Final Environmental Impact Statement (FEIS) on August 26, 2011. A Record of Decision (ROD) regarding the FEIS was not issued. In conjunction with the EIS process, DOS, as the lead Federal agency under Section 7 of the ESA, completed a Biological Assessment (BA) in May, 2011. The ABB was initially analyzed in the Biological Opinion (BO) dated September, 2011.

On January 18, 2012, the President denied issuance of a Presidential Permit for the Keystone XL project, citing unresolved environmental concerns in Nebraska. On March 22, 2012, the president endorsed construction of the "southern portion of the Keystone XL pipeline," which encompasses the current Project. Keystone decided to move forward with construction of the Project because it has independent utility from the original Keystone XL project that is currently under NEPA review by DOS.

The environmental analyses and conclusions addressed in the Keystone XL FEIS, which includes the segment now constituting the Gulf Coast Project, remain pertinent and up-to-date. This EA incorporates the Keystone XL FEIS by reference. Similarly, the analyses and conclusions presented in the ESA Section 7 BA and BO regarding the ABB is also pertinent to the Project, pending certain updates in Oklahoma for new species information.

Minimization and Conservation Measures

Through consultation with the Service in preparation of the original Keystone XL Project FEIS and BO, several minimization and conservation measures were considered for the ABB. Additionally, through further consultation with the Service in Oklahoma, Keystone has agreed to implement additional measures to minimize impacts to the ABB. The following minimization and conservation measures will be implemented under the HCP:

- Presence/Absence Surveys Prior to Ground Disturbance Activities;
- Conduct carrion surveys according to the Service's most recent Carrion Survey Protocol prior to regularly scheduled maintenance,
- Limited Clearing in Temporary Workspace Areas
- Limited Use of Artificial Lighting
- Educational Program for Construction Personnel;
- Re-Establishment of Vegetation;
- Relief of Soil Compaction;
- Erosion Control; and,
- Funding to a Third-Party Entity for ABB Habitat Conservation.

1.0 INTRODUCTION AND PROJECT OVERVIEW

TransCanada Keystone Pipeline, LP (Keystone) proposes to construct and operate the Gulf Coast Pipeline Project (Project), which consists of approximately 485 miles of 36-inch crude oil pipeline extending from Cushing, Oklahoma to near Nederland, Texas (Figure 1-1). Approximately 156.2 miles of pipeline traverses Oklahoma and approximately 328.8 miles will be built in Texas. In addition to the pipeline right-of-way (ROW), the Project footprint also includes various other onsite and offsite ancillary facilities that include:

- Cushing Tank Farm;
- Pump Stations;
- Mainline Valve Sites;
- Access Roads;
- Additional Temporary Workspace Areas;
- Pig Launchers and Receivers;
- Pipe Storage Sites, Railroad Sidings, and Contractor Yards; and
- Fuel Transfer Stations.

1.1 Proposed Federal Action

The Proposed Action for this Environmental Assessment (EA) is the U.S. Fish and Wildlife Service's (Service) issuance of an Incidental Take Permit (ITP) for the American Burying Beetle ((*Nicrophorus americanus*, ABB). The ITP would authorize take resulting from the Keystone's Project for a 50-year term within the Permit Area.

1.2 Purpose and Need

The purpose of the proposed action is for the U.S. Fish and Wildlife Service (Service) to respond to Keystone's application for an ITP under section 10(a)(1)(B) of the Endangered Species Act (ESA) of 1973, as amended, and all relevant implementing regulations and policies, for the ABB. The proposed action is needed to ensure that Keystone's Project, where there is potential to impact the ABB, is in compliance with the ESA. The Habitat Conservation Plan (HCP) associated with this EA specifies what steps Keystone will take to avoid, minimize, and mitigate potential impacts to the ABB resulting from construction, operation, and maintenance of the pipeline, including response to potential emergencies (excluding crude oil spills). Under provisions in the HCP and requested ITP, Keystone will establish and implement long-term protection of the ABB and its habitat within the Conservation Priority Area in Oklahoma, while constructing and operating the Project in the Permit Area. The Permit Area is defined as all lands within the Service's identified ABB Range, including Conservation Priority Areas, along the Project route in Oklahoma over which the permittee has direct control, as well as all areas where take of ABB will be authorized by the ITP.

1.3 Project Background

The U.S. Department of State (DOS) served as the lead Federal agency for the environmental review of the proposed Keystone XL Project from November 2008 through November 2011. DOS undertook an Environmental Impact Statement (EIS) review for the Keystone XL Project from the Canadian border to the Texas Gulf Coast. The DOS issued the Final Environmental Impact Statement (FEIS) on August 26, 2011. A Record of Decision (ROD) regarding the FEIS was not issued. In conjunction with the EIS process, DOS completed a Biological Assessment (BA) in May 2011 and entered into, formal Section 7 consultation with the Service that resulted in a Biological Opinion (BO) dated September 2011. The ABB was analyzed in the BO.

On January 18, 2012, President Obama denied issuance of the Presidential Permit for the Keystone XL Project, citing unresolved environmental concerns in Nebraska. On March 22, 2012, the President endorsed construction of the southern portion of the Keystone XL pipeline, which encompasses the Project as defined in Section 1.0 above. Keystone elected to move forward with construction of the Gulf Coast Project and seek an ITP for take authorization because the Project has independent utility from the original Keystone XL Project.

The environmental analyses and conclusions addressed in the Keystone XL FEIS, which includes the segment now constituting the Project as defined herein, remain pertinent and up-to-date, pending some updates in Oklahoma for new species information collected since the publication of the FEIS. Similarly, the analyses and conclusions presented in the ESA Section 7 BA and BO for Oklahoma are also pertinent to the Project. Within the Permit Area, the pipeline route has not changed from that evaluated in the FEIS. Only small workspace changes and other very minor alterations within Oklahoma have occurred since the publication of the FEIS. The small scale changes are reflected in the acreages and footprint used to describe ABB impacts in this EA.

The following sections present the environmental impact analyses that have been completed for the Permit Area in Oklahoma. Figures 1-3 and 1-4 depict the Project footprint overlaid on the ABB habitat range in Oklahoma and the Conservation Priority Areas, respectively.

1.4 Regulatory Framework

The Service is responsible for ensuring compliance with the ESA. Section 10(a)(1)(B) of the ESA (16 U.S.C. § 1539 (a)(1)(B)) authorizes the Service to issue a permit allowing take that is "…incidental to, and not the purpose of, the carrying out of an otherwise lawful activity."

The Service is also responsible for the implementation of the provisions of the Migratory Bird Treaty Act (MBTA, 16 U.S.C. § 703) and the Bald and Golden Eagle Protection Act (BGEPA, 16 U.S.C. § 668).

1.4.1 National Environmental Policy Act (NEPA)

The issuance of an ITP is a Federal action subject to the requirements of the National Environmental Policy Act (NEPA, 42 U.S.C. § 4321–4327). NEPA requires federal agencies to:

- Study proposed projects to determine if they will result in significant environmental impacts to the human environment, and

- Review the alternatives available for the project and consider the impact of those alternatives on the human environment (42 U.S.C. § 4332(c)).

In complying with NEPA, the potential impacts of the federal action are often first examined by a federal agency through preparation of an EA. In light of the exhaustive review of the Project addressed by DOS' FEIS and the minor nature of the expected impacts associated with implementation of the HCP in the Permit Area, an EA to assess potential environmental impacts associated with construction and operation of the Project within the Permit Area in Oklahoma is appropriate for issuance of the requested Section 10(a)(1)(B) permit.

This EA is prepared to satisfy the obligations of the Service under NEPA, and to comply with regulations implementing NEPA that have been adopted by the Council on Environmental Quality (CEQ). The scope of this EA is consistent with the policies contained in the Habitat Conservation Planning Handbook, adopted by the Service in November 1996.

This EA addresses Keystone's HCP and the requested ITP regarding the plan to construct the Project through areas of Oklahoma that are known habitat for the ABB. This EA describes the direct and indirect effects of the issuance of a permit under ESA section 10 for the proposed incidental take, as well as the mitigation and minimization measures that form an important aspect of implementing the HCP as approved by the Service. These effects are tied to the authority of the Service under the ESA, and the EA is intended to inform the Service decision-makers and the public.

The only other federal permitting associated with the Project relates to determinations by the U.S. Army Corps of Engineers (USACE) that Keystone may appropriately avail itself of Nationwide Permit (NWP) 12 to address its obligations to comply with section 404 of the Clean Water Act (CWA). Because the USACE has verified Keystone's use of NWP 12, it is not necessary for this EA to address matters within USACE's jurisdiction involving the Project's potential impacts to waters of the United States.[1]

With respect to cumulative impacts, this EA incorporates by reference pertinent sections of the FEIS issued by DOS on August 26, 2011 for the Keystone XL Project. The route in Oklahoma that is subject to the HCP/ITP is the same route that was studied by DOS and evaluated in the FEIS. After reviewing those portions of DOS' FEIS involving cumulative impacts, the Service finds the effects would be the same today. Because the science, the location of the ABB in Oklahoma, and the Project route remain unchanged in all important respects, the Service therefore references the analysis in that document, pursuant to 40 CFR § 1506.3 and the Council on Environmental Quality's (CEQ) Memorandum of March 6, 2012.

1.4.2 Endangered Species Act

Section 9 of the ESA prohibits take of any federally listed endangered wildlife species (16 U.S.C. § 1538(a)). The ESA defines "take" as "…to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." (16 U.S.C. §

[1]This conclusion is also consistent with the NEPA practices of other federal agencies including the USACE and the Federal Energy Regulatory Commission. See, e.g. 33 CFR § 325, App. B, ¶ 7 b. 2, and 18 CFR § 380.12(c)(2)(ii).

1532(19)). "Harm" is not defined in the statute, but the Service's regulations define it as "an act which actually kills or injures wildlife and may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering" (50 CFR § 17.3 (2005)).

As previously stated, Section 10(a)(1)(B) of the ESA (16 U.S.C. § 1539(a)(1)(B)) authorizes the Service to issue a permit allowing take that is "incidental to, and not the purpose of, the carrying out of an otherwise lawful activity." The Service is obligated to issue an ITP where all requirements have been met. The applicant must satisfy several substantive criteria (16 U.S.C. § 1539(a)(2)(A)), including submission of an HCP that identifies:

- The impact that will likely result from the taking;
- The steps the applicant will take to minimize and mitigate the impacts and the funding available to implement those steps;
- What alternative actions to taking were considered and the reasons the alternatives were not selected; and
- Other measures that the Service may require as necessary or appropriate for purposes of the conservation plan.

Also, in order to issue a permit, after opportunity for public comment with respect to a permit application and the related conservation plan, the Secretary must find that (16 U.S.C. § 1539(a)(2)(B)):

- the taking will be incidental;
- the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking;
- the applicant will ensure that adequate funding for the plan will be provided;
- the taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild; and
- other measures, if any, will be met and he has received such other assurances as he may require that the plan will be implemented

In addition, HCPs are also required to comply with the Five Points Policy (Addendum to the HCP Handbook: 5-Point Policy (65 FR 35242; June 1, 2000) by including:

1. Biological goals and objectives, which define the expected biological outcome for each species covered by the HCP;
2. Adaptive management, which includes methods for addressing uncertainty and also monitoring and feedback to inform management decisions regarding biological goals and objectives;
3. Monitoring for compliance, effectiveness, and effects;
4. Permit duration, which is determined by the time-span of the project and designed to provide the time needed to achieve biological goals and address biological uncertainty; and

5. Public participation according to NEPA.

1.4.3 Bald and Golden Eagle Protection Act (BGEPA)

The BGEPA prohibits taking, possession, and commerce of bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) or any part, nest, or eggs without a permit issued by the Secretary of the Interior. "Take" under the BGEPA is defined as to "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb." "Disturb" is defined in 50 CFR § 22.3 as the act of agitating or bothering a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, the following:

1. Injury to an eagle;
2. A decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or
3. Nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior. Furthermore, "disturb" also includes impacts that result from human-induced alterations occurring near a nest site, which was used previously by eagles, during a time when eagles are absent from the area, and if, when the eagle returns, these alterations agitate or bother an eagle to the extent that it interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death, or nest abandonment.

The golden eagle was never listed as a threatened or endangered species under the ESA, and on August 8, 2007, the Service removed the bald eagle from the List of Threatened and Endangered Wildlife due to the species' recovery (Service 2007c). Neither species is protected under the ESA, but the BGEPA provides protection for bald and golden eagles.

The Service found that a mechanism should be available to authorize certain types of take of bald and golden eagles pursuant to the BGEPA (Service 2009c). On November 10, 2009, the Service authorized limited take of bald and golden eagles under BGEPA for cases where the take to be authorized is associated with otherwise lawful activities (Service 2009c, 50 CFR § 22.26). However, the Project will not require a BGEPA permit.

1.4.4 Migratory Bird Treaty Act (MBTA)

The MBTA of 1918 (16 U.S.C. § 703-712) prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Service. There is a Special Purpose permit for incidental take under MBTA (50 CFR § 21.27), however, the Project will not require such a permit.

1.4.5 Clean Water Act Section 404

The Clean Water Act (CWA) is a 1977 amendment to the Federal Water Pollution Control Act of 1972, which set the basic structure for regulating discharges of pollutants to waters of the United States. The USACE and the U.S. Environmental Protection Agency (EPA) have final authority in determining whether a given site possesses waters of the United States and the limits of those waters.

Under Section 404 of the CWA, the USACE regulates the discharge of dredged or fill material into waters of the United States, including wetlands. Activities that discharge dredged or fill material or include mechanized land clearing, grading, leveling, ditching, and redistribution of material in a water of the United States require a Section 404 permit from the USACE. Applicants for Section 404 permits must demonstrate that they have avoided or minimized adverse effects to the extent practicable.

1.4.6 National Historic Preservation Act (NHPA)

The NHPA of 1996, specifically Section 106 of the NHPA and associated regulations at 36 CFR § 800, requires federal agencies to take into account the effect that certain undertakings may have on any district, site, building, structure, or object that is included in, or eligible for inclusion in, the National Register of Historic Places (NRHP). NRHP eligibility criteria may be found at 36 CFR § 60.4(a–d). Such criteria may include elements significant to American history, architecture, archaeology, and culture as found in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association.

Pursuant to NHPA and its implementing regulations, the federal action agency, in consultation with the relevant state historic preservation office, must determine, with respect to the undertaking, the Area of Potential Effect (APE); review, seek, and gather information about historic properties within the vicinity; and, based on the information gathered and reviewed, identify any historic properties within the APE. Historic properties are defined by 36 CFR § 800.16[l][1] as "any prehistoric district, site, building, structure, or object included in or eligible for inclusion in the NRHP maintained by the Secretary of the Interior."

1.5 Decisions Needed

The Service will decide whether the Project application for the requested ITP and the associated HCP meets the requirements set forth in ESA section 10(a)(1)(B) and relevant regulations. The Service will also determine whether preparation of an EIS is appropriate in this circumstance. An EIS is necessary where the proposed federal action will "significantly" affect the quality of the human environment" (42 U.S.C. § 4332). As set forth in NEPA and relevant regulations and guidance, preparation of an EA is appropriate where a federal agency determines that the proposed action, including, where applicable, any mitigation proposed as part of the action, will have no significant impact on the quality of the human environment.

1.6 Scope of the Environmental Assessment

1.6.1 NEPA Scoping Process

No scoping was conducted prior to developing this EA. Scoping is not required under NEPA when developing an EA. However, the scoping process, which is conducted early in a project and invites the public to comment and help identify the range or scope of issues to be addressed during the development and analysis of an EIS was conducted for the Keystone XL Project .

During the Keystone XL Project NEPA review, the DOS and Keystone engaged governmental agencies, elected officials, the Tribes, and the general public in an extensive coordination effort during scoping and at further junctures in the review process to inform and involve them by

soliciting their participation and comments throughout the DEIS and FEIS planning process. Scoping was completed for the Keystone XL Project and summaries of project scoping can be found in Appendix A in Sections 3 and 4 of the FEIS.

Coordination with the Service resulted in the identification of habitat within the ABB Range and Conservation Priority Areas along the Project route in Oklahoma (see Table 1.6.2 and Figures 1-2 through 1-4). Collectively, these two areas, which will be impacted by the Project, are referred to as the Permit Area.

Table 1.6.2
American Burying Beetle Range and Conservation Priority Areas along the Project Route in Oklahoma (per mile post marker (MP)

ROW Segment Milepost	Consultation Determination
MP 17.42 - MP 61.66	ABB Range
MP 61.66 - MP 131.91	ABB Range and Conservation Priority Area
MP 131.91 - MP 137.48	ABB Range
MP 137.48 - MP 152.53	ABB Range and Conservation Priority Area
MP 152.53 - MP 156.14	ABB Range

1.6.2 Connected Actions

Connected actions are those actions that are "closely related" and "should be discussed" in the same NEPA document (40 CFR § 1508.25 (a)(i)). Actions are connected if they automatically trigger other actions that may require an EIS; cannot or will not proceed unless other actions are taken previously or simultaneously; or if the actions are interdependent parts of a larger action and depend upon the larger action for their justification (40 CFR § 1508.25 (a)(i, ii, iii)). Connected actions are limited to actions that are currently proposed (ripe for decision). Actions that are not yet proposed are not connected actions, but may need to be analyzed in the cumulative effects analysis if they are reasonably foreseeable. The only connected actions to the Project are those related to power providers to the ancillary facilities and are described below.

1.6.2.1 Electrical Distribution Lines and Substations

Electrical power for the Project would be obtained from local power providers. These power providers would construct the necessary substations and transformers and would either use existing service lines or construct new service lines to deliver electrical power to the specified point of use. The electrical power providers would be responsible for obtaining the necessary permits, approvals, or authorizations from federal, state, and local governments.

1.7 Permit Area

For the purpose of this EA, the defined Permit Area is that area of the Project that impacts the ABB Range in Oklahoma as provided by the Service (Figure 1-2). The conservation priority area for ABB was identified by the Service and is a smaller subset within the Permit Area or ABB Range in Oklahoma. Unsuitable habitat within the Permit Area was assessed utilizing the Service's latest "ABB Unsuitable Habitat Guidelines for Oklahoma", dated May 14, 2009. The estimate of habitat for ABB in this document is conservative as only a small percentage of

Figure 1 1

Project Overview Route Map

Figure 1 2

American Burying Beetle Range in Oklahoma

Figure 1 3

American Burying Beetle Range Along the Gulf Coast Project Route in Oklahoma

Figure 1 4

American Burying Beetle Conservation Priority Areas Along the Project Route in Oklahoma

potential unsuitable habitat within the larger ABB Range in Oklahoma was evaluated for suitability. Specifically, the analyses were specific to identifying developed lands, agricultural lands, and wetlands as stated in the Service's guidelines. Other areas of potentially unsuitable habitat were not assessed and are assumed to be suitable for this assessment.

2.0 PROPOSED ACTION AND ALTERNATIVES

An EA examines the environmental impacts of a proposed major Federal action, the "Proposed Action," where potential impacts to the human environment may be significant (42 U.S.C. § 4332(C)). In this case, the Proposed Action is issuance of an ITP to Keystone to authorize potential incidental take of the Covered Species that may result from the Covered Activities.

NEPA regulations require, among other things, the examination of all reasonable alternatives to the Proposed Action (Preferred Alternative), including taking no action (40 CFR § 1502.14). The No Action alternative in this case demonstrates the consequences of not issuing an ITP to Keystone. With respect to this EA, the Service has analyzed in detail the Preferred Alternative, the Proposed HCP for Construction with a 5-year term Alternative, and the No Action Alternative.

In discussing the development of the HCP Keystone considered and rejected various alternatives that would avoid take of the ABB, but would not fulfill their purpose and need. These alternatives included re-routing the Project to the west of the current proposed ROW. This alternative would have avoided take of the ABB but may have resulted in take of other listed species. Furthermore, re-routing to the west would have added significantly to the cost of the Project and would add significant miles to the route when the least environmental impact would be to reduce mileage. The exact cost of re-routes and species that may have been affected cannot be accurately estimated because an alternative route was not identified. The selection of pipeline routes is a complex process that involves consideration of a wide range of factors in addition to impacts to listed species. Design alternatives, such as elevating the pipeline, may have removed some minor negative effects (i.e., soil heating) but would not have significantly reduced ground disturbance associated with construction or fragmentation of habitat. Additionally, construction of an elevated pipeline would most likely have resulted in a greater area of permanent ABB habitat loss because of the placement of piers or other supports required to elevate the pipe. Similarly, elevated pipe may have resulted in take of other listed species. Elevating pipelines is not a construction technique typically employed for safety and reliability reasons. Other Alternatives, including not constructing the pipeline and finding another way to secure incidental take authorization were discussed and rejected because they did not meet Keystone's needs.

2.1 No Action Alternative

Under the No Action Alternative, Keystone would not apply for and the Service would not issue an ITP to Keystone.

2.2 Proposed Alternative

Proposed alternative with 50-year term: The Proposed Action, issuance of an ITP, would authorize incidental take of listed ABB during construction, operation, and maintenance of the Keystone Pipeline Project for a 50-year term. Issuance and continuation of the ITP would be contingent on the full implementation of the HCP developed by the applicant that includes a series of conservation or mitigation measures related to the interim operation of the Project (see Project Description below).

2.3 Proposed HCP for Construction with 5-year term Alternative

The 5-year term Alternative would include the issuance of an ITP for the construction phase of the project (see construction phase of the project description below), but would not include incidental take of ABB that could occur during the operational phase of the Project. Subsequently, the applicant would likely have to prepare a separate HCP for operational activities associated with the Project.

2.4 Project Description

The Project would commence at the crude oil supply hub at Cushing, Oklahoma and terminate at existing crude oil storage terminal facilities near Nederland, Texas. The primary purpose of the Project is to transport growing North American crude oil production to serve Gulf Coast refinery demand which is currently being met through foreign imports of crude oil.

2.4.1 Pipeline Construction Overview

Construction of the Project would commence once engineering surveys of the ROW centerline have been finalized, the acquisition of ROW easements and any necessary acquisitions of property in fee have been completed, and all required permits have been obtained. As proposed, the pipeline through Oklahoma would be constructed in a single construction spread (group of contractors and equipment tasked with constructing the pipeline segment). Construction of the 485-mile-long Project would be accomplished using 3 spreads ranging from about 150 to 200 miles in length, only one of which would be located in the Permit Area and evaluated as part of this EA (See Figure 2-1).

Pipeline construction would generally proceed as a moving assembly line composed of specific activities, as described in section 2.3.9 below, including surveying and staking of the ROW, clearing and grading, trenching, pipe stringing or connecting pipe segments end to end, bending, welding, installing, backfilling, hydrostatic testing, and clean-up, as described in the subsections below (See Figure 2-2). In addition, special construction techniques would be used for specific site conditions such as rugged terrain, waterbodies, wetlands, paved roads, highways, and railroads. The construction spread in Oklahoma would employ approximately 700 construction personnel and 40 inspection personnel.

2.4.2 Ancillary Facilities Summary

Ancillary Facilities include above-ground appurtenances or work sites that are apart from the pipeline itself and used to facilitate construction and operation of the pipeline system. Ancillary facilities associated with the Project are described below and more thoroughly described in the Keystone XL FEIS (see Sections 2.2.7), to include:

- Pipeline Construction ROW;
- Additional Temporary Workspace Areas;
- Access Roads;
- Pipe Storage Sites, Railroad Sidings, and Contractor Yards; and
- Fuel Transfer Stations.

2.4.3 Land Requirements

Construction of the Project would require a 110-foot-wide construction ROW. In certain sensitive areas, which may include wetlands, cultural sites, residential areas, or commercial/ industrial areas, the construction ROW would be reduced to 85 feet in width to minimize impacts to these resources.

Approximately 2,272 acres of land (permanent and temporary) within the ABB Range in Oklahoma would be disturbed during construction. The areas of surface disturbance due to construction and operation of the Project are listed in Table 2.3.3 and includes the total acreage of impact regardless of suitability of habitat for the ABB.

Table 2.3.3
Surface Disturbance Impacts by Project Facilities within the ABB Range in Oklahoma

CONSTRUCTION IMPACT	CONSERVATION PRIORITY AREA (CPA) (acres)	ABB RANGE IN OK (acres)
PERMANENT IMPACTS		
Access Roads	3.78	4.33
Pump Stations	17.08	28.04
MLVs	0.45	0.72
TOTAL:	**21.31**	**33.09**
TEMPORARY IMPACTS		
Access Roads	17.42	44.63
Contractor Yards	53.14	69.59
TWAs	99.84	170.85
Permanent Easement	515.24	837.97
Pipe Yards	124.01	124.01
Rail Sidings	24.00	24.00
Shoofly Roads	0.99	1.90
Temporary Easement	592.78	966.26
TOTAL:	**1,427.42**	**2,239.21**

Following construction, the temporary ROW would be restored consistent with applicable Federal and state regulations and permits, the easement agreements negotiated between Keystone and individual landowners or land managers, and the construction methods and environmental protection procedures described in the Keystone Construction, Mitigation, and Reclamation (CMR) Plan (Appendix A). Those measures would be incorporated into the Project to mitigate for potential impacts of construction. The permanent ROW would also be restored as described above and to allow access to the ROW for the life of the Project to support surface and aerial inspections and any repairs or maintenance as necessary. Table 2.3.3 summarizes the surface disturbance impacts by each Project facility within the Permit Area during construction and operations.

2.4.4 Pipeline ROW

Construction would require a 110-foot wide construction ROW in most areas. A 50-foot-wide permanent ROW easement would be maintained along the proposed route during operation.

2.4.5 Additional Temporary Workspace Areas (ATWAs)

ATWAs would be needed for some construction staging areas and where special construction techniques are to be used. These areas would include river, wetland, and road/rail crossings; horizontal directional drilling (HDD) entry and exit points; steep slopes (20° to 60°); and rocky soils. The setback distances of ATWAs adjacent to wetland and waterbody features would be established on a site-specific basis, consistent with applicable permit requirements and the appropriate procedures listed in the CMR Plan (Appendix A).

2.4.6 Pipe Stockpile Sites, Railroad Sidings, and Contractor Yards

Construction would require establishment and use of pipe storage sites, railroad sidings, and contractor yards. Pipe storage sites would be required at 30 to 80-mile intervals and contractor yards would be required at approximately 60-mile intervals. Keystone proposes to use 5 pipe storage yards/railroad sidings and 5 contractor yards for construction of the Project in the Permit Area within Oklahoma. Table 2.3.6 provides the locations and acreages of potential pipe storage yards and contractor yards.

Each pipe storage site would occupy approximately 30 to 40 acres and would typically be located close to railroad sidings. Contractor yards would occupy approximately 70 acres in total. Keystone would select existing commercial/industrial sites or sites that were used for construction of other projects as preferred sites for the storage sites.

Existing public or private roads would be used to access the yards. Pipe storage sites and contractor yards would be used on a temporary basis and would be restored to pre-construction conditions upon completion of construction. The acres in the following table include the total number of acres expected to be impacted, regardless of its suitability for ABB.

Table 2.3.6
Locations and acreages of potential pipe storage yards and contractor yards

Types and Numbers of Yards	Counties	Temporary Impact	
		ABB CONSERVATION PRIORITY AREA	***ABB PERMIT AREA***
Contractor Yards (5)	Bryan, Atoka, Hughes	53.14	69.59
Railroad Sidings (1)	Hughes	24.00	24.00
Pipe Stockpile Sites (4)	Hughes	124.01	124.01
Combined Acreage		**201.15**	**217.60**

2.4.7 Access Roads

2.4.7.1 Development of Access Roads

Existing public and private roads would be used to provide access to most of the construction ROW. Paved roads would not likely require improvement or maintenance prior to or during construction. However, the road infrastructure would be inspected prior to construction to ensure that the roads, bridges, and cattle guards would be able to withstand oversized vehicle use during construction. Gravel roads and dirt roads may require maintenance during the construction period due to high use. Unpaved road improvements such as blading and filling would generally be restricted to the existing road footprint; however, some roads may require widening in some areas.

To the extent Keystone is required to conduct maintenance of any county roads, it would be done pursuant to an agreement with the applicable county. In the event that oversized or overweight loads would be needed to transport construction materials to the Project work sites, Keystone would submit required permit applications to the appropriate state regulatory agencies.

The final locations of new permanent access roads have been identified. At a minimum, construction of new permanent access roads would require completion of biological and cultural resources surveys and approvals of the State Historic Preservation Officer (SHPO) and the Service. Keystone has already completed consultation with the Oklahoma SHPO for the Project. Other state and local permits could also be required prior to construction. Maintenance of newly created access roads would be the responsibility of Keystone as described below.

The acreages of access roads are included in the listing of lands affected in Table 2.3.6. Temporary and permanent access road disturbance estimates are based on a 15 foot roadway width required to accommodate oversized vehicles. In developing the acreages of disturbance, all non-public roads were conservatively estimated to require upgrades and maintenance during construction.

2.4.7.2 Roadway Maintenance, Repair, and Safety

Keystone intends to work with state and local road officials, the pipeline construction contractor, and a third-party road consultant to identify routes that would be used for moving materials and equipment between storage and work yards to the pipeline, valve, and pump station construction sites. When these routes are mutually agreed upon, the road consultant would document the existing conditions of roads, including a video record. When construction is completed, the same parties would review the road conditions and Keystone would restore the roads to their preconstruction condition or better. This restoration would be paid for by Keystone as standard practice.

Keystone will also perform a preliminary evaluation to determine the design-rated capacity of bridges anticipated to be used during construction and would inspect all bridges it intends to use prior to construction and confirm that the capacity of the bridges is adequate for the anticipated weights. In cases where the bridges are not adequate to handle the maximum weight, an alternate route would be used. Keystone would also inspect cattle guard crossings prior to their use. If they are determined to be inadequate to handle anticipated construction traffic, Keystone may place mats on crossings, establish an alternate crossing, enhance existing structures, or

install new infrastructure with the landowner's approval. All such actions would be paid for by Keystone as standard practice.

During construction, Keystone and the pipeline contractor would maintain roads used for construction in a condition that is safe for both the public and work force. Local road officials would be actively engaged in the routine assessment of road conditions.

Keystone will follow all federal, state, and local safety plans and signage as set forth in current Manuals of Uniform Traffic Control for streets and highways, or in similar documents issued by regulatory agencies along the proposed route. This includes compliance with all state and local permits pertaining to road and crossing infrastructure usage.

Keystone will require that each construction contractor submit a road use plan prior to mobilization, coordinate with the appropriate state and county representatives to develop a mutually acceptable plan, and obtain all necessary road use permits. The road use plans would identify potential scenarios that may occur during construction based on surrounding land use, known recreational activities, and seasonal influences (such as farming), and would establish measures to reduce or avoid inconvenience to local communities. Keystone will also have inspection personnel monitor road use activities to ensure that the construction contractors comply with the road use plans and stipulations applicable to the road.

2.4.8 Aboveground Facilities

Within the Permit Area, the Project would require approximately 28.76 acres of land for aboveground facilities, including 3 pump stations and mainline valves (MLVs). MLVs allow for the isolation of a pipeline segment for maintenance activities or in the event of a failure. During operations, Keystone would use standard agricultural herbicides to control the growth of vegetative species at above ground sites, as necessary. Only EPA approved herbicides will be used. All use of herbicides will be done in compliance with the herbicide label requirements for dilution, application, disposing of rinse water, and disposing of empty containers. Herbicides or herbicide rinsate will not be disposed of in or near any water bodies (White 2004).

2.4.8.1 Pump stations

A total of 3 new pump stations, occupying a combined 28.04 acres of land, would be constructed within the Permit Area in Oklahoma. The locations of the proposed pump stations are based on hydraulic analyses of the flow in the pipeline and other relevant variables and cannot be moved from the Permit Area. Table 2.3.8.1 lists the locations of the pump stations by milepost.

Each new pump station would consist of up to six pumps driven by electric motors, an electrical equipment shelter, a variable frequency drive equipment shelter, an electrical substation, 1 sump tank, 2 MLVs, a communication tower, a small maintenance and office building, and a parking area for station maintenance personnel. The electrical shelter would house the electrical systems and the communication and control equipment.

Table 2.3.8.1
Proposed Project Pump Station Locations within the Permit Area in Oklahoma

Segment/State	Approximate Milepost	Impact
Pump Station 33	49.1	*ABB PERMIT AREA*
Pump Station 34	95.6	*ABB CONSERVATION PRIORITY AREA*
Pump Station 35	147.7	*ABB CONSERVATION PRIORITY AREA*

The pipe entering and exiting the pump station sites would be below grade. There would be a MLV installed on the entry pipe and on the exit pipe as required by 49 CFR § 195.260 to allow isolation of the pump station equipment in the event of an emergency. The manifold connecting the pipeline to the equipment at each pump station would be above-ground and entirely within the pump station boundaries.

Down-lighting would be used at the pump stations wherever possible to minimize impacts to wildlife and a security fence would be installed around the entire pump station site. Inspection and maintenance personnel would access the pump stations through a gate that would be locked when no one is at the pump station.

The pump stations would operate on locally purchased electric power and would be fully automated for unmanned operation. If there is an electrical power outage, batteries would be used to maintain power to all communication and specific control equipment. Backup generators would not be installed at pump stations, and therefore, no fuel storage tanks will be located at the pump stations. Communication towers at pump stations generally would be approximately 33 feet high, but the antenna height at some pump stations may be greater based on final detailed engineering studies. In no event would antennae exceed a maximum height of 190 feet.

2.4.8.2 Mainline Valve Sites

Keystone would install 11 intermediate MLVs within the Permit Area.

Block valves can block oil flow in both directions and divide up the pipeline into smaller segments that can be isolated to minimize and contain the effects of a line rupture. The block valves can be either manually or remotely operated. Check valves are designed to be held open by flowing oil and to close automatically when oil flow stops or is reversed. Each MLV would be within a fenced site that would be approximately 40 feet by 50 feet. Inspection and maintenance personnel would access the MLVs through a locked gate.

EPA suggested considering the placement of additional intermediate mainline valves, particularly in areas of shallow groundwater and at river crossings of less than 100 feet where sensitive aquatic resources may exist. Remotely operated intermediate MLVs would be located at major river crossings, upstream of sensitive waterbodies, and at other locations required by 49 CFR § 195.260 and as required by Special Condition 32 developed by the U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) and agreed to by Keystone. Project-specific Special Condition 32, as set forth in Appendix U of the FEIS for the Keystone XL Project, states:

> *"Keystone must design and install mainline block valves and check valves on the Keystone XL system based on the worst case discharge as calculated by 49 CFR § 194.105. Keystone shall locate valves in accordance with 49 CFR § 195.260 and by taking into consideration elevation, population, and environmentally sensitive locations, to minimize*

the consequences of a release from the pipeline. Mainline valves must be placed based on the analysis above or no more than twenty (20) miles apart, whichever is smaller."

The requirement to take into consideration elevation, population, and environmentally sensitive locations to minimize consequences of a release, and the maximum valve spacing of 20 miles is more restrictive than is currently required in 49 CFR § 195.260.

Keystone would be able to operate the valves remotely to isolate a section of pipeline in the event of an emergency to minimize environmental impacts if an accidental release occurs. MLVs must be capable of closure at all times. Special Condition 32 also requires that the remotely operated valves must have remote power back-up to ensure communications are maintained during inclement weather. Each motor-operated valve station would include a diesel-fired emergency generator and a diesel fuel tank with secondary containment.

2.4.8.3 Inline Inspection (Pigging) Facilities (launchers, receivers)

Keystone would use high-resolution internal line inspection, maintenance, and cleaning tools known as "pigs" during operation of the Project. The Project would be designed to allow full pigging of the entire pipeline, with minimal interruption of service. Pig launchers and receivers would be constructed and operated completely within the boundaries of the pump stations and have already been included in the land disturbance associated with those facilities.

2.4.9 Construction Procedures

2.4.9.1 General Pipeline Construction Procedures

Surveying and Staking

Before construction begins, the construction ROW boundaries and any additional temporary workspace areas would be marked to identify the limits of the approved work area. The locations of approved access roads and existing utility lines would be flagged. Wetland boundaries and other environmentally sensitive areas would be marked or fenced for protection. A survey crew would stake the centerline of the trench and any buried utilities along the ROW.

Some landowner fences would be crossed or paralleled by the construction ROW, requiring fence cutting and modifications. Each fence would be braced and secured before cutting to prevent the fence from weakening or slacking. Openings created in the fences would be temporarily closed to contain livestock when construction crews leave the area. In addition, gaps through natural livestock barriers would be fenced according to landowners' or land managers' requirements. If livestock is present, temporary gates and fences would be installed.

Clearing and Grading

Prior to vegetation removal along slopes leading to wetlands and riparian areas, temporary erosion control measures such as silt fences or straw bales would be installed. The work area would be cleared of vegetation, including crops and obstacles such as trees, logs, brush, or rocks.

Grading would be performed wherever necessary to provide a reasonably level work surface or where required by landowners or land managers. Where the ground is relatively flat and does not require grading, rootstock would be left intact. More extensive grading would be required in steep slope areas to safely construct the pipeline along ROWs. Where grading occurs and topsoil

is present, topsoil would be removed from the entire area to be graded and stored separately from the subsoil.

Trenching

Trenching may be carried out before or after stringing, bending, and welding depending upon several factors such as soil characteristics, water table, presence of drain tiles, and weather conditions at the time of construction.

In areas of rocky soils or bedrock, tractor-mounted mechanical rippers or rock trenchers would fracture the rock prior to excavation. In areas where topsoil segregation would be required, the actual depth of topsoil would be removed up to a maximum depth of 12 inches and segregated from the subsoil. In most areas where soil would be removed from only the trench, topsoil would be piled on the near-side of the trench and subsoil on the far side of the trench.

These procedures segregating topsoil are intended to reduce the potential for mixing of subsoil and topsoil. In addition, the excavated subsoil and topsoil (spoil piles) would be spaced to accommodate storm water runoff. On agricultural land, rocks that are exposed on the surface due to construction activity would be removed from the ROW prior to and after topsoil replacement. Rock removal would also occur in rangeland to ensure that the productive capability of the land is maintained. In some landscapes, thin soils overlay bedrock, or exposed bedrock exists at the surface. In these cases, rock would be replaced to the extent practicable. Clearing of rocks could be carried out either manually or with a mechanical rock picker and topsoil would be preserved. Rocks that are similar in size to those occurring in the undisturbed landscape would be left in place to the extent practicable. Rock removed from the ROW would be either hauled away for disposal in appropriate facilities or placed in a location acceptable to the landowner.

Trench excavation would typically be to depths of between 7 and 8 feet, with a trench width of approximately 4 to 5 feet. In most areas, there would be a minimum of 4 feet of cover over the pipeline after backfilling. The depth of burial would be consistent with PHMSA Special Condition 19 which states the following:

> *"Depth of Cover: Keystone shall construct the pipeline with soil cover at a minimum depth of forty-eight (48) inches in all areas, except in consolidated rock. The minimum depth in consolidated rock areas is thirty-six (36) inches."*

In addition, the depth of burial at waterbodies, ditches, drainages, and other similar features would be 60 inches, except in rocky areas where the minimum burial depth would be 36 to 48 inches. Where major waterbodies are crossed using the HDD method, the depth from the streambed to the top of the pipe would be substantially greater than 60 inches.

Pipe Stringing, Bending, and Welding

After the individual pipe sections (joints) are bent, they are lined up and held in position with clamps until welding. The joints would be welded together to create long "strings" that would be placed on temporary supports. All welds would be inspected using non-destructive radiographic, ultrasonic, or other methods that provide a level of safety that is equivalent to or better than those required in 49 CFR § Part 195.

All aspects of welding, including reporting, would be conducted consistent with the requirements of 49 CFR § 195.228 and PHMSA Special Conditions 4, 5, 6, 12, 18, and 20 (see Appendix U of the FEIS). Welds that do not meet established specifications would be repaired or removed and replaced. Once the welds are approved, a protective epoxy coating would be applied to the welded joints to inhibit corrosion.

Lower-in and Backfilling

Prior to installing the pipe into the trench, the trench would be cleared of rocks and debris that might damage the pipe or the pipe coating. If water has entered the trench, dewatering may be required prior to installation. Discharge of water from dewatering would be accomplished in accordance with applicable discharge permits. On sloped terrain, trench breakers (e.g., stacked sand bags or foam) would be installed in the trench at specified intervals to prevent subsurface water movement along the pipeline.

In some cases sand or gravel padding material may be placed in the bottom of the trench to protect the pipeline from damage during installation. In no case would topsoil be used as a padding material. In areas of rocky soils or bedrock, the bottom of the trench would be padded with borrow material such as sand or gravel. Where rock occurs within the trench perimeter, abrasion resistant coatings or rock shields would be used to protect the pipe prior to installation.

The pipeline would be lowered into the trench and the trench would first be backfilled using the excavated subsoil material. In rocky areas, excavated rock would be used to backfill the trench to the top of the existing bedrock profile. After the initial backfilling, topsoil would be returned to its original position over the trench.

Hydrostatic Testing

In addition to hydrostatic testing at the pipe manufacturing sites, the pipeline would be cleaned and hydrostatically tested prior to putting the pipe into service, and after backfilling and after all other construction work that could directly affect the pipe is complete. The testing would be conducted in pipeline sections approximately 30 to 50 miles long. Hydrostatic testing would provide assurance that the system is capable of withstanding the maximum operating pressure and would be conducted in accordance with the regulatory requirements of 49 CFR § Part 195, Subpart E (Pressure Testing) and the stipulations in PHMSA Special Conditions 5, 20, 22, and 23 (Appendix U of the FEIS). The process would be conducted as follows:

- Isolate the pipe section being tested with test manifolds;
- Fill the section with water;
- Pressurize the section to a pressure that would produce a hoop stress of a minimum of 100% of the specified minimum yield strength for the mainline pipe and 1.39 times the maximum operating pressure for pump stations; and
- Maintain that pressure for a period of 8 hours.

Pipe Geometry Inspection, Final Tie-ins, and Commissioning

After hydrostatic testing is complete, the pipeline would be dewatered and inspected using an electronic caliper (geometry) pig to check for dents or other deformations and where appropriate,

pipe sections would be replaced in accordance with the requirements of 49 CFR § 195 and PHMSA's Special Conditions for the Project. The final pipeline tie-ins would then be welded and inspected.

After the final tie-ins are complete and inspected, the pipeline would be commissioned through the verification of proper installation and function of the pipeline and appurtenant systems, including control and communication equipment, based on the requirements of 49 CFR § 195 and the relevant PHMSA Special Conditions.

Cleanup and Restoration

Cleanup would include the removal of construction debris, final contouring, and installation of erosion control features. The cleanup process would begin as soon as possible after backfilling, but the timing would be dependent on weather conditions. Preliminary cleanup would be completed within approximately 20 days after the completion of backfilling, assuming appropriate weather conditions prevail. Removed construction debris would be disposed in existing, permitted disposal facilities in accordance with relevant federal, state, and local regulations.

Reseeding of the ROW would occur as soon as possible after completion of cleanup to stabilize soil. Procedures would depend on weather and soil conditions and would follow recommended rates and seed mixes provided by the landowner, the land management agency, or the Natural Resources Conservation Service (NRCS). Access to the permanent easement would be restricted using gates, boulders, or other barriers to minimize unauthorized access by all-terrain vehicles, if requested by the landowner.

All existing fencing and grazing structures, such as fences, gates, irrigation ditches, cattle guards, and reservoirs would be repaired to pre-construction conditions or better upon completion of construction activities as standard practice.

Pipeline markers would be provided for identification of the pipeline location for safety purposes in accordance with the requirements of 49 CFR § 195.410 (Line Markers) and PHMSA Project-specific Special Condition 40 including the following:

- Pipeline markers would be installed on both sides of all highways, roads, road ROWs, railroads, and waterbody crossings and in areas where the pipeline is buried less than 48 inches;
- Pipeline markers would be made from industrial strength materials to withstand abrasion from wind and damage from cattle;
- Pipeline markers would be installed at all fences;
- Pipeline markers would be installed along the ROW to provide line-of-sight marking of the pipeline, providing it is practical to do so and consistent with the type of land use, such that it does not hinder the use of the property by the landowner. Pipeline markers would be installed at all angle points, and at intermediate points, where practical, so that from any marker, the adjacent marker in either direction would be visible;
- Consideration would be given to installing additional markers, except where they would interfere with land use (e.g., farming);

- Aerial markers showing identifying numbers would be installed at approximately 5-mile intervals; and
- At each MLV site and pump station, signs would be installed and maintained on the perimeter fence where the pipeline enters and exits the fenced area.

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

Post-Construction Reclamation Monitoring and Response

The ROW would be inspected after the first growing season to determine the success of revegetation and noxious weed control. Eroded areas would be repaired and areas where vegetation was unsuccessfully re-established would be revegetated by Keystone or Keystone would compensate the landowner for reseeding. The CMR Plan (Appendix A) provides information on revegetation and weed control procedures that Keystone would incorporate into the proposed Project.

2.4.9.2 Non-standard Construction Procedures

Non-standard or special construction techniques would be used when 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. These special techniques are described below.

Road, Highway, and Railroad Crossings

Construction across paved roads, highways, and railroads would be in accordance with the requirements of the appropriate road and railroad crossing permits and approvals. In general, all major paved roads, all primary gravel roads, all highways, and all railroads would be crossed by boring beneath the road or railroad. Boring would result in minimal or no disruption to traffic at road or railroad crossings. Each boring would take one to two days for most roads and railroads, and approximately 10 days for long crossings such as interstate or 4-lane highways.

Initially, a pit would be excavated on each side of the feature; boring equipment would be placed in the pit and a hole would be bored under the road at least equal to the diameter of the pipe and a prefabricated pipe section would be pulled through the borehole. For long crossings, sections would be welded onto the pipe string before being pulled through the borehole.

If permitted by local regulators and landowners, smaller gravel roads and driveways would likely be crossed using an open-cut method that would typically take between one and two days to complete. This would require temporary road closures and the establishment of detours for traffic. If no reasonable detour is feasible, at least one lane of traffic would be kept open in most cases. Keystone would post signs at these open-cut crossings and would implement traffic control plans to reduce traffic disturbance and protect public safety.

Pipeline, Utility, and Other Buried Feature Crossings

Keystone and its pipeline contractors would comply with U.S. Department of Transportation (USDOT) regulations, utility agreements, and industry Best Management Practices (BMPs) with

respect to utility crossing and separation specifications related to distances between the Project pipeline and other utilities. One-call notification would be made for all utility crossings to identify utilities. Similarly, private landowners would be notified of planned construction activities so that buried features, such as irrigation systems and other water lines, could be avoided or replaced. Prior to construction, each landowner with a stock watering or irrigation system or other water lines would be asked to provide the location of any waterlines in the construction area. The location of these waterlines would be documented and Keystone would lower some waterlines prior to construction. In the case of existing buried oil or gas pipelines, the owner of the facility would be asked to provide information on the locations of pipes in the construction area. Metallic pipelines would be physically located by a line-locating crew prior to construction.

Steep Terrain

Steep slopes traversed by the Project would be graded to reduce slope angles, thus allowing safer operation of construction equipment and reducing the degree of pipe bending required. In areas where the pipeline route crosses side slopes, cut-and-fill grading may be employed to obtain a safe working terrace. Prior to cut-and-fill grading on steep terrain, topsoil would be stripped from the ROW and stockpiled. If soil and slope conditions permit, soil from the high side of the ROW would be excavated and moved to the low side to create a safer and more level working surface. After pipeline installation, soil from the low side of the ROW would be returned to the high side and the contour of the slope would be restored to its pre-construction condition to the degree practicable.

Temporary sediment barriers, such as silt fences and straw bales, would be installed where appropriate to prevent erosion and siltation of wetlands, waterbodies, or other environmentally sensitive areas. During grading, temporary slope breakers consisting of mounded and compacted soil would be installed across the ROW. In the cleanup phase, permanent slope breakers or diversion terraces would be installed where appropriate to limit erosion for sheet flow of storm water. The CMR Plan (Appendix A) presents additional information on the use of sediment barriers and slope breakers including depictions of proper installation and use.

After regrading and installation of erosion control devices, seed would be applied to steep slopes and mulch consisting of hay or non-brittle straw would be placed on the ROW, or the ROW would be protected with erosion control geofabrics. Where appropriate to avoid animal entanglement, geofabric mesh size would be 2 inches or greater. Sediment barriers would be maintained across the ROW until permanent vegetation is established. Additional temporary workspaces may be required for storage of graded material and/or topsoil during construction.

Unstable Soils

Special construction techniques and environmental protection measures would be applied to areas with unstable soils and to areas with high potential for landslides, erosion, and mass wasting. Construction in these areas could require ATWAs.

Topsoil piles would be protected from erosion through matting, mulching, watering, or using a tackifying compound (i.e., glue) to the extent practicable. Photodegradable matting would be placed on steep slopes or areas prone to extreme wind exposure, such as north- or west-facing

slopes and ridge tops. Biodegradable pins would be used in place of metal staples to hold the matting in place.

Reseeding would be carried out using native seed mixes that are certified noxious weed-free, where possible, dependent on landowner or land manager preference. Land imprinting may be employed to create impressions in the soil to reduce erosion, improve moisture retention, and create micro-sites for seed germination. Keystone would work with landowners to evaluate fencing the ROW from livestock, or alternatively, to provide compensation if a pasture needs to be rested until vegetation can become established.

Waterbody Crossings

Perennial waterbody crossings for the proposed pipeline were assessed by qualified personnel regarding the potential for channel aggradation or degradation and lateral channel migration, and was incorporated into the crossing designs.

Based on stream width, adjacent topography, adjacent infrastructure, and sensitive environmental areas, six rivers and one creek in the Permit Area in Oklahoma would be crossed using the HDD techniques. These rivers include the Deep Fork River, North Canadian River, Little River, Canadian River, Fronterhouse Creek, Clear Boggy Creek, the Red River, and Fronterhouse Creek

The remaining waterbodies would be crossed using open-cut crossing methods.

The pipeline would be installed as necessary to address any hazards identified by the assessment. The pipeline would be installed at the design crossing depth for at least 15 feet beyond the design lateral migration zone, as determined by qualified personnel. The design of the crossings also would include the specification of appropriate stabilization and restoration measures. The actual crossing method employed at a perennial stream would depend on permit conditions from USACE and other relevant regulatory agencies, as well as additional conditions that may be imposed by landowners or land managers at the crossing location. Additional information on the types of crossing methods proposed for use on the Project is presented in the subsections below.

In addition to the proposed pipeline crossings of waterbodies, there would be temporary equipment bridges installed across many waterways. Prior to the start of clearing for the Project pipeline within the Permit Area, temporary bridges (e.g., subsoil fill over culverts, timber mats supported by flumes, railcar flatbeds, or flexi-float apparatus) would be installed across all perennial waterbodies to allow construction equipment to cross with reduced disturbance. Clearing crews would be allowed only one pass through the waterbodies prior to temporary bridge construction. All other construction equipment would be required to use the bridges.

Proposed Waterbody Crossing Methods

Waterbodies would be crossed using either open-cut methods or the HDD method. These waterbody crossing methods are described below.

Wetland Crossings

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.

Over most of the ROW, clearing of vegetation in wetlands would be limited to flush-cutting of trees and shrubs and their subsequent removal from wetland areas. Stump removal, grading, topsoil segregation, and excavation would be limited to the area immediately over the trench line. During clearing, sediment barriers, such as silt fences and staked straw bales, would be installed and maintained on slopes adjacent to saturated wetlands and within ATWAs as necessary to reduce sediment runoff. Tall-growing vegetation would be allowed to regrow in riparian areas in the temporary ROW, but not in the permanent ROW.

In areas with unsaturated soils that are able to support construction equipment without equipment mats, construction would occur in a manner similar to conventional upland cross-country construction. Topsoil removed from the trench line would be segregated and replaced after backfilling the trench with subsoil.

In areas where wetlands overlie rocky soil, the pipe would be padded with rock-free soil or sand before backfilling with native bedrock and soil.

Where wetland soils are saturated or inundated, the pipeline could be installed using the push-pull technique. The push-pull installation process would involve stringing, or connecting end by end, and welding the pipeline outside of the wetland, and excavating and backfilling the trench using a backhoe supported by equipment mats or timber riprap. Trench breakers would be installed where necessary to prevent the subsurface drainage of water from wetlands. The pipeline segment would be installed in the wetland by equipping it with floats and pushing or pulling it across the water-filled trench. After the pipeline is floated into place, the floats would be removed and the pipeline would sink into place. Most pipes installed in saturated wetlands would be coated with concrete or installed with set-on weights to provide negative buoyancy. Where topsoil has been segregated from subsoil, the subsoil would be backfilled first followed by the topsoil. Restoration of contours would be accomplished during backfilling because little or no grading would occur in wetlands.

Construction equipment working in saturated wetlands would be limited to that area essential for clearing the ROW, excavating the trench, welding and installing the pipeline, backfilling the trench, and restoring the ROW. In areas where there is no reasonable access to the ROW except through wetlands, non-essential equipment would be allowed to travel through wetlands only if the ground is firm enough or has been stabilized to avoid rutting. ATWAs would be required on both sides of wide saturated wetlands to stage construction, weld the pipeline, and store materials. These ATWAs would be located in upland areas a minimum of 10 feet from the wetland edge. This distance is what a standard backhoe can reach and would avoid the need for additional equipment to transfer soil farther from the wetland.

Equipment mats, timber riprap, gravel fill, geotextile fabric, and straw mats would be removed from wetlands after backfilling except in the travel lane to allow continued, controlled access through the wetland until the completion of construction. Upon the completion of construction, these materials would be removed. Topsoil would be replaced to the original ground level leaving no crown over the trench line. Excess excavated material would be removed from the wetland and spread along the upland ROW, placed in a location as requested by a landowner, or disposed of at an existing authorized landfill.

Where wetlands are located at the base of slopes, permanent slope breakers would be constructed across the ROW in upland areas adjacent to the wetland boundary. Temporary sediment barriers

would be installed where necessary until revegetation of adjacent upland areas is successful. Once revegetation is successful, sediment barriers would be removed from the ROW and disposed of at an existing authorized landfill.

Open-Cut Crossing Methods

The non-flowing open-cut method would be used for all waterbodies with no visible flow at the time of construction. Prior to construction, timber matting and riprap would be installed in the entire area of the crossing to minimize compaction from equipment. The pipe section would be fabricated adjacent to the stream or in a staging area, the stream would be trenched, the pipe would be lowered into the trench, and the trench would be backfilled. After installation, the timber mats would be removed, the grade would be restored to as near pre-construction conditions as practical, topsoil would be replaced (unless saturated conditions exist), and permanent erosion control devices would be installed.

If there is flow at the time of construction, the flowing open-cut method would be used and the trench would be excavated through flowing water. Backhoes operating from one or both banks would excavate the trench within the streambed while water continues to flow through the construction work. In wider rivers, in-stream operation of equipment may be necessary. Keystone would trench through the stream, lower in a pipe that is weighted with concrete coating for negative buoyancy, then backfill. Material excavated from the trench generally would be placed at least 10 feet away from the water's edge unless stream width exceeds the reach of the excavation equipment. Sediment barriers would be installed where necessary to prevent excavated spoil from entering the water. Hard or soft trench plugs would be placed to prevent the flow of water into the upland portions of the trench. Trench plugs can be constructed using a number of different materials, but should be impervious to prevent the flow of water along the trench. After installation, the grade would be restored to as near pre-construction conditions as practical, topsoil would be replaced (unless saturated conditions exist), and permanent erosion control devices would be installed.

For both crossing types, pipe segments for each crossing would be welded and positioned adjacent to the waterbody. After the trench is excavated, the pipeline segment would be carried, pushed, or pulled across the waterbody and positioned in the trench. The trench would be backfilled with native material or with imported material if required by permits.

Keystone would minimize the time of in-stream construction to reduce impacts to waterbody channel and banks. For minor waterbodies (less than 10 feet wide at the water's edge), the trenching and backfill of the crossing would typically require no more than 24 hours; intermediate waterbodies (10 to 100 feet wide) would typically require no more than 48 hours. Major waterbodies (more than 100 feet wide) would be crossed as quickly as possible. It is possible that the time required to accomplish the crossings of major waterbodies could exceed 48 hours.

Horizontal Directional Drilling (HDD) Method

As currently proposed, the HDD crossing method would be used at the waterbody crossings listed in Table 2.3.9.1. The HDD method could also be used to bore beneath terrestrial areas that contain special resources that require avoidance.

Table 2.3.9.1
Waterbodies Crossed Using the Horizontal Directional Drilling Method within the Permit Area in Oklahoma

Waterbody	Approximate Milepost	Impact Area
Deep Fork River	22.2	*ABB RANGE*
North Canadian River	38.6	*ABB RANGE*
Little River	70.4	*ABB RANGE AND CONSERVATION PRIORITY AREA*
Canadian River	74.3	*ABB RANGE AND CONSERVATION PRIORITY AREA*
Fronterhouse Creek	122.8	*ABB RANGE AND CONSERVATION PRIORITY AREA*
Clear Boggy Creek	126.9	*ABB RANGE AND CONSERVATION PRIORITY AREA*
Red River	156.1	*ABB RANGE*

The HDD method involves drilling a pilot hole under the waterbody and banks, then enlarging the hole through successive ream borings with progressively larger bits until the hole is large enough to accommodate a pre-welded segment of pipe. Throughout the process of drilling and enlarging the hole, water-based bentonite slurry would be circulated to lubricate the drilling tools, remove drill cuttings, and provide stability to the drilled holes. Pipe sections long enough to span the entire crossing would be staged and welded along the construction work area on the opposite side of the waterbody and then pulled through the drilled hole. The welded drill pipe would be hydrostatically tested for 4 hours prior to being pulled into place.

As noted above, bentonite drilling mud would be used to reduce friction and provide lubrication and buoyancy for the pipe during the pull back, assuring minimal contact with the walls of the drill hole. A contingency plan must be developed in case of a "frac-out", or inadvertent return (release) of drilling lubricant (bentonite), during an 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 by the Contractor for any signs of drilling fluid. After installation, Keystone would conduct cathodic protection and in-line inspection surveys to determine if any pipe coating was damaged during the construction process.

Ripping

In areas where bedrock is within 84 inches (7 feet) of the surface and is expected to be dense or highly stratified, ripping could be required. Ripping would involve tearing up the rock with mechanical excavators. During ripping, Keystone would take extreme care to avoid damage to underground structures, cables, conduits, pipelines, and underground watercourses.

Keystone anticipates that blasting would not be required. If blasting is necessary, Keystone would prepare and file a blasting plan with the appropriate agencies.

Construction in Residential and Commercial Areas

Keystone would prepare site-specific construction plans to address the potential impacts of construction on residential and commercial structures located with 25 feet of the construction ROW.

2.4.9.3 Aboveground Facilities Construction Procedures

Pump Station Construction

Construction at each new pump station would begin with clearing of vegetation and removal of topsoil. After that the site would be graded as necessary to create a level working surface for the movement of construction vehicles and to prepare the area for building foundations. Foundations would be installed for the electrical equipment shelter (EES) and the pump equipment shelter. The EES would include electrical systems, communication, and control equipment. The structures to support the pumps, manifolds, pig receiving and pig launching equipment, and associated facilities would then be erected. This would include installation of a block valve into the mainline as well as two MLV block valves: one would be installed on the suction piping of the pumps and one would be installed on the discharge piping of the pumps as required by 49 CFR § 195.260.

The piping, both above-ground and below ground, would be installed and pressure tested using the methods employed for the main pipeline. After successful testing, the piping would be tied into the main pipeline. Piping installed below grade would be coated for corrosion protection as required by 49 CFR § 195 Subpart H (Corrosion Control) and the applicable Project-specific PHMSA special conditions. In addition, all below-grade facilities would be protected by a cathodic protection system as required by Subpart H and the applicable Project-specific PHMSA special conditions. Pumps, controls, and safety devices would be checked and tested to ensure proper system operation and activation of safety mechanisms before being put into service. After hydrostatic testing of the below-grade equipment, the site would be graded and surfaced with gravel and a security fence would be installed around the entire perimeter of each site.

Mainline Valve (MLV) Construction

MLV construction would occur during mainline pipeline construction. All MLVs would be within the permanent ROW. To facilitate year-round access, the MLVs would be located as near as practicable to existing public roads. The construction sequence would consist of clearing and grading followed by trenching, valve installation, fencing, cleanup, and site restoration. If necessary, new access roads would be constructed into the fenced MLV sites.

Construction Schedule and Workforce

Construction of the Project within the Permit Area would begin as soon as Keystone obtains all necessary permits, approvals, and authorizations. Based on the current permitting schedule, the Project is planned to be placed into service in 2013, with the actual date dependant on dates of receipt of all necessary permits, approvals, and authorizations.

As currently planned, the Project will be constructed using 3 pipeline construction spreads, with one spread in Oklahoma. The construction schedule may affect the final spread configuration which may result in the need for additional but shorter spreads. In general, about 700 construction and 40 inspection personnel would be required for each pipeline construction

spread. Each spread would require about 6 to 9 months to complete construction activities, including mobilization and demobilization.

Construction of new pump stations would require 20 to 30 additional workers at each site. Construction of all pump stations would be completed in 18 to 24 months.

It is estimated that a peak workforce of approximately 4,000 personnel would be required to construct the entire Project. All workers would be trained and certified for their specific field of work (e.g., welders would be qualified as required by 49 CFR § 195.222 and the Project-specific PHMSA special condition 18). Construction personnel would consist of Keystone employees, contractor employees, construction inspection staff, and environmental inspection staff. Keystone would attempt to hire construction staff from the local population through its construction contractors and subcontractors. Assuming that qualified personnel are available, up to 50% could be hired from the local work force, although this may not be possible in rural areas.

2.4.10 Operation and Maintenance

The Project would be operated, maintained, monitored, and inspected in accordance with 49 CFR § 194 and 195 and other applicable federal and state regulations. In addition to the requirements of 49 CFR § 195, Keystone has agreed to incorporate 57 PHMSA Project-specific special conditions that address Project operation, inspection, and monitoring. The operational requirements of 49 CFR § 195 and the PHMSA Project-specific Special Conditions related to operation of the proposed Project would be included in the Project operations, maintenance, and emergencies manual that is required by 49 CFR § 195.402, and they would also be incorporated into Keystone's existing Operations Control Center (OCC) in Calgary, Canada.

The remainder of this section addresses normal operation, routine maintenance, and abnormal operations.

Normal Operations and Routine Maintenance

Keystone would prepare the manuals and written procedures for conducting normal operations, maintenance, inspection, and monitoring activities required by the PHMSA regulations, particularly as required by 49 CFR § 195.402, and in the applicable PHMSA Project – specific special conditions. This would include development and implementation of an annual Pipeline Maintenance Program (PMP) to ensure the integrity of the pipeline. The PMP would include valve maintenance, periodic inline inspections, and cathodic protection readings to ensure facilities are reliable and in service. Data collected in each year of the program would be fed back into the decision-making process for the development of the following year's program.

The Project OCC would be manned by experienced and highly trained personnel 24 hours per day, every day of the year in Calgary. In addition, a fully redundant backup OCC would be constructed, operated, and maintained, also in Canada. Primary and backup communications systems would provide real-time information from the pump stations to field personnel. The control center would have highly sophisticated pipeline monitoring systems including a leak detection system capable of identifying abnormal conditions and initiating visual and audible alarms. Automatic shut-down systems would be initiated if a valve starts to shut and all pumps upstream would turn off automatically. All other pipeline situations would require human response.

The proposed Project would include a supervisory control and data acquisition (SCADA) system to constantly monitor the pipeline system. The SCADA system would be installed and operated in accordance with the requirements of 49 CFR § 195 and PHMSA Project-specific special conditions 24 through 31 (see Appendix U of the FEIS). SCADA facilities would be located in the OCC and along the pipeline system, and all pump stations and delivery facilities would have communication software that sends data back to the OCC. The pipeline SCADA system would allow the OCC to remotely read intermediate MLV positions, tank levels, and delivery flow and total volume. The OCC personnel would also be able to start and stop pump stations and open and close MLVs.

The pipeline ROW would be inspected via aerial and ground surveillance to provide prompt identification of possible encroachments or nearby construction activities, ROW erosion, exposed pipe, or any other conditions that could result in damage to the pipeline. The aerial surveillance of the pipeline ROW would be carried out at least 26 times per year at intervals not to exceed 3 weeks as required by 49 CFR § 195.412. Landowners would be encouraged to report any pipeline integrity concerns to Keystone or to PHMSA. Intermediate MLVs and MLVs at pump stations would also be inspected. As required by 49 CFR § 195.420(b), they would be inspected at intervals not to exceed 7.5 months but at least twice each calendar year.

PHMSA regulations at 49 CFR § 195.450 and Special Condition 14 require that pipeline operators identify areas along the proposed pipeline corridor that would be considered High Consequence Areas (HCAs). While some of these areas need to be defined through sophisticated risk modeling, in general they are specific locales where an accidental release from a hazardous liquid pipeline could produce significant adverse consequences as described in 49 CFR § 195.450. HCAs include navigable waterways, high population areas, and unusually sensitive areas. Keystone would need to identify the HCAs along the proposed route. Population changes along the route would be monitored throughout pipeline operation and any additional HCAs identified as necessary. Keystone would conduct a pipeline integrity management program in HCAs as required by 49 CFR § 195.452 (Pipeline Integrity Management in High Consequence Areas).

All maintenance work would be performed in accordance with PHMSA requirements, the applicable PHMSA Special Conditions, and the stipulations in environmental permits issued for the Project. Woody vegetation along the permanent easement would be cleared periodically, as needed to maintain accessibility for pipeline integrity surveys. Mechanical mowing or cutting would be carried out from time to time as needed along the permanent easement for normal vegetation maintenance. Mowing height will be no less than 8 inches.

Cultivated crops would be allowed to grow in the permanent easement, but trees would be removed from the permanent ROW in all areas. In areas constructed using the HDD method, trees would be cleared as required on a site specific basis.

Permanent erosion control devices would be monitored to identify any areas requiring repair. The remainder of the ROW would be monitored to identify areas where additional erosion control devices would be necessary to prevent future degradation. The ROW would be monitored to identify any areas where soil productivity has been degraded as a result of pipeline construction. In these areas, reclamation measures would be implemented to rectify the problems.

Operation and maintenance of the pipeline system would typically be accomplished by Keystone personnel. The permanent operational pipeline workforce would comprise about 20 U.S. employees strategically located along the length of the pipeline in the U.S.

Pipeline Integrity, SCADA, and Leak Detection

The following overlapping and redundant integrity systems and measures would be incorporated into the Project:

- Quality Assurance (QA) program for pipe manufacture and pipe coating;
- Fusion-Based Epoxy (FBE) coating;
- Cathodic protection;
- Non-destructive testing of 100% of the girth welds;
- Hydrostatic testing;
- Periodic internal cleaning and high-resolution in-line inspection;
- Depth of cover exceeding federal standards;
- Periodic aerial surveillance;
- Public awareness program;
- SCADA system; and
- An OCC with complete redundant backup, providing monitoring of the pipeline every 5 seconds, 24 hours per day, every day of the year.

SCADA facilities would be used to remotely monitor and control the pipeline system. This would include a redundant fully functional backup system available for service at all times. Automatic features would be installed as integral components within the SCADA system to ensure operation within prescribed pressure limits. Additional automatic features would be installed at the local pump station level and would provide pipeline pressure protection in the event communications with the SCADA host are interrupted.

Software associated with the SCADA monitoring system and volumetric balancing would be used to assist in leak detection during pipeline operations. If pressure indications change, the pipeline controller would immediately evaluate the situation. If a leak is suspected, the Emergency Response Plan (ERP), to be submitted and approved by PHMSA, would be initiated. If there is a pipeline segment shutdown due to a suspected leak, operation of the affected segment would not be resumed until the cause of the alarm (e.g., false alarm by instrumentation or a leak) is identified and repaired. In the case of a reportable leak, PHMSA approval would be required to resume operation of the affected segment.

Emergency Response Procedures

According to the CMR Plan for the Project (Appendix A of the HCP), Keystone will develop emergency response procedures for all incidents (e.g., spills, leaks, fires) involving hazardous materials, excluding crude oil spills, which could pose a threat to human health or the environment. The procedures shall address activities in all work areas. Hazardous materials,

chemicals, fuels, and lubricating oils will not be stored, staged, or transferred (other than possible refueling) within 100 feet of any surface water feature, wetland, storm drain, drop inlet, or high consequence area. Refueling and lubrication of construction equipment will generally be restricted to upland areas at least 100 feet away from streams and wetlands. Where this is not possible, the equipment would be fueled by designated personnel with special training in refueling, spill containment, and cleanup.

PHMSA requires that pipeline operators prepare and abide by more than one written emergency plan for responding to emergencies on their systems.

First, 49 CFR § 194, which resulted from the CWA as amended by the Oil Pollution Act of 1990 (OPA 90) and as implemented by Executive Order 12777, requires that pipeline operators have response plans that ensure resources are available to remove, mitigate, or prevent a discharge from an oil pipeline that could cause substantial or significant harm to the environment, including a worst case discharge. As stated in 49 CFR § 194.7(a), a pipeline operator "may not handle, store, or transport oil unless the operator has submitted a response plan meeting requirements of this part," and as stated in 49 CFR § 194.7(b), operators must also operate onshore pipeline facilities in accordance with the approved response plan.

In addition, 49 CFR § 194.107 requires that the response plan include "procedures and a list of resources for responding, to the maximum extent practicable, to a worst case discharge, and to a substantial threat of such a discharge." Keystone would submit an ERP to PHMSA prior to the initiation of Project operations in accordance with the requirements of 49 CFR § 194. The ERP would describe how spills would be responded to in the event of a release from the Project resulting from any cause (e.g., corrosion, third-party damage, natural hazards, materials defects, hydraulic surge). The plan would address the worst case discharge scenario and the procedures that would be in place to deal with the maximum spill. The ERP requires PHMSA review and approval; however, there is a 2-year grace period under which operations can proceed, thus allowing PHMSA time to review the document in light of as-built Project conditions and to require incorporation of any needed changes to ensure system safety prior to PHMSA approval.

As required by 49 CFR § 195.40, Keystone would also prepare and follow a manual of written procedures for conducting normal operations and maintenance activities and handling abnormal operations and emergencies. This manual would be reviewed by PHMSA at intervals not exceeding 15 months, but at least once each calendar year, and appropriate changes would be made as necessary to ensure that the manual is effective. This manual would be prepared before initial operations of the Project and appropriate sections would be kept at locations where operations and maintenance activities are conducted. The emergency section of this operations and maintenance plan would be prepared by Keystone in a separate document that Keystone refers to as the Operations and Maintenance Manual.

While EPA has authority under the CWA and OPA 90 with respect to regulation of onshore non-transportation related facilities and EPA requires the development and submittal of a Facility Response Plan for any such facility, it appears that none of the facilities or activities associated with the proposed Project would be non-transportation-related equipment or activities subject to the EPA regulatory authority.

Keystone would therefore be required to develop an ERP for review and approval by PHMSA and an Operations and Maintenance Manual for review by PHMSA for the proposed Project.

PHMSA may request EPA and U.S. Coast Guard consultation on the response elements of the PSRP. Keystone would share on its own volition portions of the ERP with community emergency responders along the proposed pipeline corridor to ensure an appropriate level of collaborative emergency response planning. However, based on a PHMSA advisory bulletin issued on November 3, 2010, Keystone would be required to share the relevant information from the ERP with local emergency responders in relevant jurisdictions along the proposed Project corridor.

Additional information regarding emergency response is available in the Keystone XL Project FEIS (August 26, 2011).

Remediation

Corrective remedial actions would be dictated by federal, state, and local regulations and enforced by the EPA, Operations, and appropriate state and/or local agencies. Required remedial actions may be large or small, dependent upon a number of factors including state-mandated remedial cleanup levels, potential effects to sensitive receptors, the volume and extent of the contamination, whether or not there is a violation of water quality standards, and the magnitude of adverse impacts caused by remedial activities. A large remediation action may include the excavation and removal of contaminated soil, for example, or could involve allowing the contaminated soil to recover through natural attenuation or environmental fate processes such as evaporation and biodegradation.

If there is an accidental release from the Project, Keystone would implement the remedial measures necessary to meet the federal, state, and local standards that are designed to ensure protection of human health and environmental quality.

Abnormal Operations

Keystone would implement Abnormal Operating Procedures in accordance with 49 CFR § 195.402(d). Those procedures would be developed and documented in a manual as required by 49 CFR § 195.402. The manual would include procedures to provide safety when operating design limits have been exceeded. That would include investigating and correcting the cause of unintended closure of valves or shutdowns, increases or decreases in pressure or flow rate outside normal operating limits, loss of communications, operation of any safety device, and any other malfunction of a component, deviation from normal operation, or personnel error which could cause a hazard to persons or property. Procedures would also include checking variations from normal operation after abnormal operation has ended at sufficient critical locations in the system to accomplish the following:

- Assure continued integrity and safe operation;
- Identify variations from normal operation of pressure and flow equipment and controls;
- Notify responsible operator personnel when notice of an abnormal operation is received;
- Periodically review the response of operator personnel to determine the effectiveness of the procedures controlling abnormal operation; and
- Take corrective action where deficiencies are found.

The operations manager on duty would be responsible for executing abnormal operating procedures in the event of any unusual situation.

Figure 2-1 Constructions Spreads

Figure 2-2 Typical Pipeline Construction Sequence

3.0 AFFECTED ENVIRONMENT

This chapter discusses the environmental setting of the Project. The description of the affected environment establishes the current environmental conditions considered by the Service to be potentially affected by the alternatives. The evaluated resources or components of the human environment that are likely to be affected or could potentially be affected by the authorized take, proposed mitigation, covered activities, or funding and administration of the Preferred Alternative (Alternative 1) are listed below.

3.1 Introduction

3.1.1 Regional Environmental Setting

In Oklahoma, the Project route connects to the southern terminus of the Cushing Extension of the existing operational Keystone pipeline. The Project begins at the border between Payne and Lincoln counties and continues in a south to south-easterly direction, where the proposed route enters Texas in southeast Bryan County. The Permit Area is a subset of the Project route in Oklahoma and encompasses the portion of the Project within the ABB Range in Oklahoma as defined by the Service and further described in Section 1.0.

The Project ROW traverses central Oklahoma and crosses three different ecoregions including the Cross Timbers, Arkansas Valley, and the South Central Plains. Each of these ecoregions is discussed in the following sections.

The Northern Cross Timbers subset of the Cross Timbers ecoregion of Oklahoma are naturally covered by oak savanna, scrubby oak forest, eastern red cedar (*Juniperus virginiana*), and tall grass prairie. Tall grass prairie occurs on fine-textured soils derived from shale or limestone. Livestock farming is the main land use and soils are highly erodible when disturbed. Streams are typically shallow and have sandy substrates (Woods et al., 2005).

The Lower Canadian Hills subset of the Arkansas Valley ecoregion of Oklahoma is underlain by Pennsylvanian-age shale, sandstone, and coal. This ecoregion is a transition between the dryer cross-timbers to the west and the more mesic Arkansas Valley to the east. Native vegetation is a mixture of oak woodland, tall grass prairie, oak-hickory forest, and oak-hickory-pine forest. Most streams are composed of a series of long pools that are interspersed with occasional, short riffle sections (Woods et al., 2005).

The Cretaceous Dissected Uplands of the South Central Plains ecoregion of Oklahoma are underlain by poorly-consolidated deposits. The Cretaceous Dissected Uplands are mostly underlain by calcareous sands, gravels, and clays of the Cretaceous age. Natural vegetation is oak-hickory-pine forest (Woods et al., 2005).

The entire Gulf Coast Project area in Oklahoma and Texas consists of a variety of landscapes consisting of wetlands, waterways, floodplains, grassland/rangeland, and upland forest. The most common landscapes temporarily affected during Project construction would consist of grasslands and rangelands and upland forest. Once constructed, the permanent ROW within the Permit Area would impact approximately 464.9 acres of grassland/rangeland and 231.2 acres of upland forest. Some of the Project would follow existing utility ROWs and roads, while other segments would exist within a new ROW.

In Oklahoma the Project would cross a total of 156.2 miles, 138.8 miles of which are located within the Permit Area covered in this EA. All of the property crossed within the Permit Area is private land. The breakdown of land uses traversed by the Project within the Permit Area is as follows:

- 73.5 miles of rangelands,
- 38.1 miles of forest land,
- 8.6 miles of agricultural land,
- 15.3 miles of developed land, and
- 3.7 miles of water/wetlands.

3.1.2 Resources Analyzed in this Environmental Assessment

Within the Permit Area, the following resources could potentially be affected by implementation of the alternatives evaluated in this EA:

- Visual and Aesthetic Qualities
- Climate and Climate Change
- Air Quality
- Soils and Geology
- Water Resources
- Biological Resources
- Cultural Resources
- Land Use
- Socioeconomics
- Noise
- Human Health and Safety
- Environmental Justice

The existing conditions for each of these resources are described in this chapter, and the potential impacts to these resources resulting from each of the alternatives under consideration are analyzed in Section 4. A more detailed discussion and analyses of these resources and impacts is covered in the Keystone XL FEIS (August 26, 2011).

3.1.3 Resources Not Considered for Detailed Analysis

Potential impacts to ecologically sensitive resources such as Wilderness, Wild and Scenic Rivers, and Coastal Management Zones must be addressed in NEPA documents, should they occur in the area of potential effect. No designated Wilderness, Wild and Scenic Rivers, or Coastal Management Zones are present within the Permit Area; therefore, these topics have been dismissed from analysis.

3.2 Visual and Aesthetic Qualities

Visual resources are landscape characteristics that have an aesthetic value to residents and visitors from sensitive viewpoints such as residences, recreation areas, rivers, and highways. All land has inherent visual values that warrant different levels of management. Aesthetic judgment, especially related to landscape views, is often considered subjective.

Oklahoma does not have formal guidelines for managing visual resources for private or state-owned lands. The prevailing landscape characteristics within the Project area are identified above.

Climate and Climate Change

3.3.1 Climate

The Project area in Oklahoma is located within a zone characterized by a humid subtropical climate, noted for its warm summer months and relatively mild winters. The daily temperature range within this climate zone tends to be very small, and tropical air masses and warm ocean currents create air mass instability that produces moderate amounts of precipitation during most of the year. Representative climate data for Cushing, Oklahoma are presented in Sections 3.12 and 3.14 of the Keystone XL Project FEIS (August 26, 2011).

3.3.2 Climate Change

According to the American Meteorological Society (AMS), global mean temperatures have been rising steadily over the last 40 years (AMS 2007). This trend is expected to continue, both globally and, in many cases, regionally. Climate change may be influenced by a number of variables, including natural external forces, natural internal processes of the climate system, or human activities (Cohan 2009). In the case of the current and predicted global warming trend, the cause is likely related to greenhouse gases, primarily carbon dioxide (CO_2), accumulating in the earth's atmosphere as a result of human activity (EPA 2010). According to the EPA (2010), energy-related activities account for over 85 percent of human-generated greenhouse gases in the United States. This is mostly in the form of CO_2 emissions from burning fossil fuels. Industrial processes (such as the production of cement, steel, and aluminum), agriculture, forestry, and waste management are also important sources of greenhouse gas emissions in the United States (EPA 2010).

Over the next century, climate in Oklahoma is expected to change (EPA 1998). By 2100 temperatures in Oklahoma could increase by 2°F (with a range of 1-4°F) in spring, 3°F in summer and fall (with a range of 1-5°F), and 4°F in winter (with a range of 2-6°F). Precipitation is estimated to change little in winter, to increase slightly in fall (with a range of 0-10%), and to increase by 20% in spring and summer (with a range of 10-30%).

3.4 Air Quality

Ambient air quality standards are regulated by federal, state, and local agencies. EPA has established national ambient air quality standards (NAAQS) for six criteria pollutants: sulfur dioxide (SO_2), nitrogen dioxide (NO_2), particulate matter (PM_{10} particulates and $PM_{2.5}$ particulates), carbon monoxide (CO), ozone (O_3), and lead (Pb). The NAAQS were developed to protect human health (primary standards) and human welfare (secondary standards). State air

quality standards cannot be less stringent than the NAAQS. Oklahoma has adopted ambient air quality standards equivalent to the NAAQS for all six criteria pollutants.

EPA uses four classifications to define relative air quality within specified zones in the United States. These four classifications are:

- *Attainment* – areas where the ambient air concentration of a pollutant is less than the NAAQS;
- *Nonattainment* – areas where the ambient air concentration of a pollutant is greater than the NAAQS;
- *Maintenance* – areas previously designated as nonattainment areas that have more recently demonstrated compliance with the NAAQS and are treated as attainment areas for the purposes of permitting stationary sources (individual states may have specific provisions to ensure that the area would continue to comply with the NAAQS); and
- *Unclassifiable* – areas where no ambient air quality data are available. Unclassifiable areas are treated as attainment areas for the purposes of permitting stationary sources.

A network of ambient air quality monitoring stations has been established by EPA and state and local agencies to measure and track the background concentrations of criteria pollutants across the United States, and to assist in designation of nonattainment areas. To characterize the background air quality in the regions surrounding the proposed Project area, data from air quality monitoring stations were obtained. A summary of the available regional background air quality concentrations in Oklahoma for 2008 is presented in Table 3.4.

Table 3.4
2008 Regional Background Air Quality Concentrations for the Project in Oklahoma[a]

	PM10	PM2.5		SO2		CO		NO2		O3	
	(µg/m3)	(µg/m3)		(ppm)		(ppm)		(ppm)		(ppm)	
Location	24-Hr	Annual	24-Hr	Annual	24-Hr	3-Hr	8-Hr	1-Hr	Annual	8-Hr	1-Hr
Creek County	x	x	x	x	x	x	x	x	x	0.069	0.085
Kay County	84	x	x	0.003	0.018	0.037	0.300	0.300		0.069	0.090
Lincoln County	x	x	x	x	x	x	x	x	x	0.061	0.073
Tulsa County	77	12.1	24.7	0.007	0.036	0.067	1.300	1.900	0.011	0.079	0.099

aThe values shown are the highest reported during the year by all monitoring sites in a county.
b Data represents the second-highest daily maximum concentrations.
c Data represents the 98th percentile of 24-hour average PM2.5 concentrations.
d Data represents the fourth-highest daily maximum 8-hour average ozone concentrations.
X = no data measured.
Notes:
µg = Microgram(s) ppm = Part(s) per million
CO = Carbon monoxide m3 = Cubic meter(s) NO2 = Nitrogen dioxide O3 = Ozone SO2 = Sulfur dioxide
PM10 = Particulate matter less than 10 microns in diameter
PM2.5 = Particulate matter less than 2.5 microns in diameter
Source: EPA 2009b.

The Clean Air Act (CAA) and its implementing regulations (42 U.S.C. § 7401 et seq., as amended in 1977 and 1990) are the basic federal statutes and regulations governing air pollution in the United States.

3.4.1 Air Quality Standards and Regional Compliance

Air Quality Control Regions (AQCRs) are categorized as Class I, Class II, or Class III. Class I areas (commonly called "pristine areas") include:

- International parks;
- National wilderness areas that exceed 5,000 acres in size;
- National memorial parks that exceed 5,000 acres in size; and
- National parks that exceed 6,000 acres and were in existence on August 7, 1977 (the effective date of the 1977 Amendments).

In addition, Indian tribes that have received "Treatment in the Same Manner as a State" designations can re-designate Class II tribal lands to Class I. Class II areas include all attainment and not classifiable areas not designated as Class I areas (unless subsequently re-designated). Class III areas are not defined in the statute and refer to areas where in a state decides not to afford the protections associated with either the pristine or Class II areas. Class III designations are intended for heavily industrialized zones, must meet all requirements outlined in 40 CFR § Part 51.166 and can be made only on request.

If a new source (or a major modification to an existing source) is subject to the PSD program requirements and is within 62 miles (100 kilometers) of a Class I area, the facility is required to notify the appropriate federal officials and to assess the impacts of the project on the Class I area.

3.4.2 Title V Operating Permits/State Operating Permits

Title V of the federal CAA requires individual states to establish an air operating permit program. The requirements of Title V are outlined in 40 CFR § Parts 70 and 71, and the permits required by these regulations are often referred to as Part 70 or 71 permits. The permit includes air pollution requirements that apply to an emissions source, including emissions limits and monitoring, record keeping, and reporting requirements. It also requires that the emissions source report its compliance status with respect to permit conditions to the permitting authority. Operating permits (also known as Title V permits) are required for all major stationary sources. What constitutes a major source varies according to what pollutant(s) are being emitted and the attainment designation of the area where the source is located. In general, a source is considered to be a major source under Title V if it emits or has the potential to emit:

- 100 tpy or more of any criteria air pollutant in an attainment area[2];

[2]Lower thresholds apply in nonattainment areas (but only for the pollutant that are in nonattainment). For the Beaumont-Port Arthur 8-hour ozone nonattainment area, the region is currently classified as moderate nonattainment. For moderate ozone nonattainment, the thresholds are 100 tpy or more of VOCs or NOx.

- 10 tpy or more of a single HAP; or
- 25 tpy of cumulative HAPs.

In Oklahoma, the State of Oklahoma Department of Environmental Quality (ODEQ) has authority to implement the Title V Operating Permits Program. Air pollution control regulations are contained in Oklahoma Administrative Code, Title 252, Chapter 100.

State Preconstruction Permits

In Oklahoma, ODEQ requires preconstruction air quality permits (major and minor) under Oklahoma Administrative Code, Title 252, Chapter 100. Permitting is required for all sources with actual emissions greater than 5 tpy.

For emergency generators at MLV stations, preconstruction permitting may be required by state agencies that require a permit based on federal regulation applicability.

3.4.3 General Conformity Rule

The General Conformity Rule was designed to compel federal agencies to require that projects conform to the applicable State Implementation Plan (SIP). General Conformity regulations apply for pollutant emissions within project areas designated as nonattainment for these pollutant emissions (or, for ozone, its precursors nitrogen oxides ($NO_{x)}$ and volatile organic compounds (VOCs)) that are not subject to new source review (NSR) and where pollutant emissions are greater than the significance thresholds established in the General Conformity regulations or exceed 10% of the total emissions budget for the entire nonattainment area. Federal agencies are able to make a positive conformity determination when:

- Emissions from the project are specifically identified and accounted for in the SIP attainment or maintenance demonstration;
- Emissions from the action are fully offset within the same area through a revision to the SIP; or
- A similarly enforceable measure that creates emissions reductions so that there is no net increase in emissions of that pollutant.

There are no non-attainment areas along the project in Oklahoma.

3.5 Soils and Geology

3.5.1 Soils

Soil characteristics present in the Permit Area were identified and evaluated using information from the NRCS. The evaluation focused on soil characteristics of particular interest to the pipeline construction. The following soil characteristics were evaluated:

- *Highly erodible soils*—prone to high rates of erosion when exposed to wind or water by removal of vegetation.
- *Prime farmland soils*— have combinations of soil properties, growing season, and moisture supply needed to produce sustained high yields of crops in an economic manner if they are treated and managed according to acceptable farming methods. Undeveloped

land with high crop production potential may be classified as prime farmland. In Oklahoma, prime farmland soils occupy approximately 45% of the pipeline route. The average freeze-free period is between 245 and 290 days.

- *Hydric soils*— "formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part." (Federal Register, July 13, 1994). These soils, under normal conditions are saturated for a sufficient period of time during the growing season to support the growth of hydrophytic vegetation (USDA 2006).
- *Compaction-prone soils*— surface clay loam or finer textures in somewhat poor to very poor drainage classes.
- *Stony/rocky soils*—have a cobbly, stony, bouldery, gravelly, or shaly modifier to the textural class; or are comprised of more than 5% stones larger than 3 inches in the surface layer.
- *Shallow-bedrock soils*—typically defined as soils that have bedrock within 60 inches of the soil surface. However, for the purpose of this proposed Project, shallow-bedrock soils are defined as those containing bedrock within 80 inches of the surface, because trenching typically would be done to that depth.
- *Drought-prone soils*—include coarse-textured soils (sandy loams and coarser) that are moderately well to excessively drained.

3.5.2 Geology

Physiography and Surface and Bedrock Geology in Oklahoma

The Project in Oklahoma traverses the Central Lowland physiographic province beginning in Cushing to northern Atoka County, where the Gulf Coastal Plains physiographic province begins and continues into Texas. Surface elevations range from 900 feet in central Oklahoma to 450 feet at the Texas state line. The route would cross three EPA Level IV Ecoregions, each with a distinct physiography (Woods et al. 2005).

The Northern Cross Timbers subset of the Cross Timbers ecoregion of Oklahoma are naturally covered by oak savanna, scrubby oak forest, eastern red cedar (*Juniperus virginiana*), and tallgrass prairie. Tallgrass prairie occurs on fine-textured soils derived from shale or limestone. Livestock farming is the main land use and soils are highly erodible when disturbed. Streams are typically shallow and have sandy substrates (Woods et al., 2005).

The Lower Canadian Hills subset of the Arkansas Valley ecoregion of Oklahoma is underlain by Pennsylvanian-age shale, sandstone, and coal. This ecoregion is a transition between the dryer cross-timbers to the west and the more mesic Arkansas Valley to the east. Native vegetation is a mixture of oak woodland, tallgrass prairie, oak-hickory forest, and oak-hickory-pine forest. Most streams are composed of a series of long pools that are interspersed with occasional, short riffle sections (Woods et al., 2005).

The Cretaceous Dissected Uplands of the South Central Plains ecoregion of Oklahoma are underlain by poorly-consolidated deposits. The Cretaceous Dissected Uplands are mostly

underlain by calcareous sands, gravels, and clays of the Cretaceous age. Natural vegetation is oak-hickory-pine forest (Woods et al., 2005).

Upper Paleozoic (Permian) rock lies beneath the proposed route beginning at Cushing to mile post (MP) 121. These rocks consist of alternating beds of sandstone, shale, and occasional limestone formed under both marine and non-marine conditions. In southeast Oklahoma, non-marine river and flood plain sands, silts, and clays are present (Johnson 1996). Beneath these surface sediments lie Cretaceous sedimentary rocks.

3.5.3 Seismic Hazards

Seismic hazards include faults, seismicity, and ground motion hazards. Collectively, these three phenomena are associated with seismic hazard risk. Faults are defined as a fracture along which blocks of earth materials on either side of the fault have moved relative to each other. There is low seismic hazard risk within the vicinity of the Project. In Oklahoma, approximately 50 minor earthquakes occur each year and therefore are not discussed further.

3.6 Water Resources

Ground-water and surface-water resources that could be potentially impacted by the Project are described in this section. Potentially impacted water resources adjacent to the proposed pipeline route include major aquifers, wells, streams and rivers that would be crossed, and reservoirs and large lakes downstream of these crossings. In addition to their description, an evaluation of potential impacts to water resources from the construction and operation of the pipeline and measures to minimize impacts is provided.

3.6.1 Surface Water Resources

Approximately 279 waterbody crossings would occur within the Permit Area along the Project route. Of the 279 crossings, 54 are perennial streams, 96 are intermittent streams, 110 are ephemeral streams, 6 are seasonal, and 13 are unclassified.

Impaired or Contaminated Waterbodies

Contamination has been documented in six of these sensitive or protected waterbodies in Oklahoma (see Table 3.6.1). Contamination in these waterbodies includes unacceptable levels of at least one of the following parameters: chloride, Fish bio-assessments, total dissolved solids (TDS), *Enterococcus* spp., *Eschericihia coli*, and lead. Impairments in these waterbodies include turbidity and dissolved oxygen.

Table 3.6.1
Impaired or Contaminated Waterbodies in Oklahoma

Waterbody Name	Impairment or Contamination
Canadian River	*Enterococcus*bacteria, Lead, Total Dissolved Solids, Turbidity
Euchee Creek	*Eschericihia* coli, Enterococcus bacteria, Turbidity
Hilliby Creek	Fish bio-assessments
Little River	*Enterococcus* bacteria, Lead, Turbidity
Little Wewoka Creek	Dissolved Oxygen
Sand Creek	Chloride, Total Dissolved Solids

3.6.2 Groundwater Resources

Aquifers

Available water quality information for the aquifers within the Permit Area in Oklahoma is presented in Table 3.6.2. Available studies and reports indicate that, in general, water within these aquifers exhibits high TDS but in general is not contaminated with other toxic ions. Most often, high levels of TDS are caused by the presence of potassium, chlorides, and sodium.

Table 3.6.2-1
Groundwater Quality of Select Subsurface Aquifers within the Permit Area in Oklahoma

Aquifer	State	County	Total Dissolved Solids (mg/liter)	Other Water Quality Information
North Canadian River Alluvium and Terrace[k]	OK	Seminole	<500	Calcium bicarbonate rich
Red River Alluviumk	OK	Bryan	1,000-2,000	
Ada-Vamoosak	OK	Osage-Pontotoc	<500	Sodium chloride, Sulfate
Arbuckle-Simpsonk	OK	Coal-Pontotac	<500	Calcium bicarbonate rich
Trinity-Antlersk	OK/TX	Bryan, Atoka	300-1,500	NA

[k] Data obtained from the following source: Ryder 1996,

Initial information on depth to groundwater along the Project corridor was provided by Keystone. In Oklahoma, it was assumed that groundwater in alluvial floodplains was present at the surface. Based on these data limitations, locations (by milepost) along the Project corridor where estimated depth to groundwater is less than 50 feet are presented in Table 3.6.2-2.

Table 3.6.2-2
Water-Bearing Zones Less Than 50 Feet Below Ground Surface Beneath the Proposed ROW within the Permit Area of the Project

County	Approximate Milepost or Range	Approximate Depth to Groundwater (feet bgs)[a]	Formation/Aquifer
Creek/Okfuskee	22-25	0	Deep Fork River alluvium
Okfuskee	28-29	0	Little Hilliby Creek alluvium
Okfuskee	30-31	0	Hilliby Creek alluvium
Okfuskee	33	40	Very High Groundwater sensitivity area
Okfuskee/Seminole	38-39	47	North Canadian River -Very High Groundwater Sensitivity Area
Seminole	43-45	0	Sand Creek alluvium
Seminole	47-48	0	Little Wewoka Creek alluvium
Seminole	50-51	0	Wewoka Creek alluvium
Seminole/Hughes	58-61	0	Wewoka Creek alluvium
Hughes	66-68	0	Bird Creek -Very High Groundwater sensitivity area

Table 3.6.2-2
Water-Bearing Zones Less Than 50 Feet Below Ground Surface Beneath the Proposed ROW within the Permit Area of the Project

County	Approximate Milepost or Range	Approximate Depth to Groundwater (feet bgs)[a]	Formation/Aquifer
Hughes	70-71	0	Little River alluvium
Hughes	74-76	0	Canadian River alluvium
Coal	87-88	0	Muddy Boggy Creek alluvium
Atoka	127-130	0	Clear Boggy Creek alluvium
Bryan	133-134	0	Long Branch alluvium
Bryan	145	0	Whitegrass Creek alluvium

[a]bgs = below ground surface; based on available well data from Keystone 2009, except where noted for footnote b.
Note: Mile-posting for each segment of the Project starts at 0.0 at the northernmost point of each segment, and increases in the direction of oil flow.

Information on key aquifers that would be crossed by the Project and additional information on likely depth to groundwater based on the above categories is presented in more detail in the Keystone XL Project FEIS.

Nearby Public Water Supply (PWS) Wells and Private Water Wells

Within one mile of the proposed pipeline route in Hughes, Coal, and Bryan counties, 28 PWS wells are present. The number of private water wells located within 100 feet of the proposed pipeline route within the Permit Area in Oklahoma is unknown.

3.7 Biological Resources

3.7.1 Vegetation

Vegetative cover is an important component in the classification of ecoregions that reflects differences in ecosystem quality and integrity (EPA 2007). Ecoregions are described through analysis of patterns and composition of geology, physiography, native vegetation, climate, soils, land use, wildlife, and hydrology. Variation in temperatures and precipitation, and differences in soils and parent materials along the northwest to southeast gradient crossed by the proposed Project, result in wide variation in vegetation communities.

The Project ROW traverses central Oklahoma and crosses three different ecoregions including the Cross Timbers, Arkansas Valley, and the South Central Plains. Each of these ecoregions was more thoroughly discussed above in Section 3.1.1.

The occurrence of vegetation communities identified as conservation priorities are summarized from the states' Comprehensive Wildlife Conservation Strategies and agency correspondence (MFWP 2005, SDGFP 2006, Schneider et al. 2005, Wasson et al. 2005, ODWC 2005, Bender et al. 2005). Land-cover types crossed by the Project were identified and delineated based on review of literature, internet database resources, interpretation of aerial photographs, general observations made during field reconnaissance, and information collected during wetland

delineation surveys. Generalized land-cover types, and areas with native vegetation cover within wildlife areas, preserves, parklands, wetlands and forests crossed by the pipeline ROW, access roads, workspaces, and transmission lines provide the basis for assessing potential impacts to vegetation cover.

General Vegetation Resources

Generalized vegetation cover including prairie, forest, wetland communities, and croplands that may occur within land-cover classes crossed by the Project is summarized in Table 3.7.1-1. Grassland/rangeland upland forest, palustrine emergent wetland, palustrine shrub/scrub wetlands, palustrine forested wetland, streams, and open water areas support naturally occurring terrestrial and aquatic vegetation. Shrub-lands are included in the grassland/rangeland land-cover class. Residential, commercial, industrial, and special designation areas (e.g., schools, parks, and recreational facilities) primarily include artificially created landscapes with minimal naturally occurring vegetation. Cropland and irrigated cropland primarily include introduced crop species, which provide forage and grain for livestock and human consumption. ROW areas consist of previously disturbed areas associated with pipelines and other utilities that have been restored primarily with native herbaceous and introduced plants.

Table 3.7.1
Landcover Types with Generalized Plant Communities Crossed by the Project

General and Subclass Designation	General Description	Common Plants
Agriculture		
Cropland	Cultivated land; Row crops; Hayfields	Wheat (*Triticum* spp.), barley (*Hordeum vulgare*), oats (*Avena* spp.), *Sorghum* spp., corn (*Zea mays*), beans (Fabaceae), hay
Hay Meadows		Non-native grasslands
Urban / Built-Up Areas		
Residential	Suburban and rural residential areas	Ornamental trees, shrubs, windbreaks
Commercial	Commercial development areas	Planted vegetation
Industrial	Electric power and gas utility stations; Roads; Landfills; Mines; Wind farms, etc.	Planted and potentially, native vegetation
Right of Way	Roads, Railroads and utility corridors	Mixture of native and non-native grasses and forbs
Grasslands / Rangeland		
Tall-Grass Prairie	Grassland community dominated by 3 to 6 foot tall grasses	Big Bluestem (*Andropogon gerardii*), Little Bluestem (*Schizachyrium scoparium*), Indian-grass (*Sorghas trumnutans*)
Mixed-Grass Prairie	Grassland community dominated by 1 to 2 foot tall grasses	Blue Grama (*Bouteloua gracilis*), Needle and Thread (*Hesperos tipacomata*), Green Needlegrass (*Nassella viridula*), Western Wheatgrass (*Pasco pyrumsmithii*), Little Bluestem, Buffalo-grass (*B.dactyloides*)
Non-native Grassland	Pasturelands planted with nonnative cool-season grasses	Smooth Brome (*Bromusinermis*), Crested Wheatgrass (*Agropyron cristatum*) and other seeded pasture grasses

Table 3.7.1
Landcover Types with Generalized Plant Communities Crossed by the Project

General and Subclass Designation	General Description	Common Plants
Deciduous Shrub-land	Upland or lowland communities dominated by shrubs	Chokecherry (*Prunusvirginiana*), Sandbar Willow (*Salix interior*), Silver Buffalo-berry (*Shepherdia argentea*), Western Snowberry (*Symphori carposoccidentalis*)
Upland Forest		
Deciduous Forest	Forests dominated by a wide variety of mixed native and non-native deciduous trees	Green Ash (*Fraxinus pennsylvanica),* Quaking Aspen (*Populus tremuloides*), Bur Oak (*Q.macrocarpa*), Post Oak (*Q.stellata*), Blackjack Oak (*Q. marilandica*), Hickory (*Carya* spp.), Boxelder (*Acer negundo*), Common Hackberry (*Celtis occidentalis*)
Mixed Forest	Forest composed by a wide variety of mixed deciduous and evergreen species, with neither type more than 75% of total tree cover.	Common Juniper (*Juniperus communis*), Pine (*Pinus* spp.), Green Ash, Quaking Aspen, Bur Oak, Shortleaf Pine (*P. echinata*), Blackgum (*Nyssa sylvatica*), Winged Elm (*Ulmus alata*)
Riverine / Open Water		
Open Water	Open water, sometimes associated with wetland habitat	Not applicable
Palustrine Forested		
Riparian or Floodplain Woodland	Temporarily flooded woodland	Green Ash, Eastern Cottonwood (*P. deltoides*), Boxelder, Bur Oak, American Elm (*U. americana*) , Willow (*Salix* spp.)
	Bald Cypress-Water Tupelo Swamp	Bald Cypress (*Taxodium distichum*), Water Oak (*Q. nigra*), Water Hickory (*C.aquatica*), Swamp Tupelo (*N.biflora*), Swampprivet (*Forestiera* spp.)
Palustrine Emergent / Scrub-Shrub Wetlands		
Emergent Wetlands	Wetlands dominated by persistent emergent vegetation	Common Spikerush (*Eleocharis palustris*), Rush (*Juncus* spp.), Rice Cutgrass (*Leersia oryzoides*), Bulrush, Bur-reed (*Sparganium* spp.), Cattail (*Typha* spp.), Sedges, Fowl Bluegrass (*Poa palustris*), Foxtail Barley (*Hordeum jubatum*)

Vegetation Communities of Conservation Concern

Native vegetation communities throughout the Project area have been altered by agricultural, urban and industrial development and by changes in ecosystem processes that maintain or reset succession including fire, bison grazing, and prairie dogs. Vegetation communities crossed by the Project that have become conservation concerns because of declining abundance, sensitivity to disturbance, and/or reliance of listed or sensitive species on the habitats that they create include: native grasslands, sagebrush grasslands, riparian habitats and bottomland hardwoods, and native forests. Vegetation cover within wetlands, conservation and reserve areas, wildlife production areas, and unique landscapes are areas of concern. The following sections provide brief descriptions of these unique and often rare vegetation communities.

Native Grasslands

Native grasslands or prairies are among the most threatened native vegetation communities in the United States. In the past, grasslands such as the tall-grass prairies, mixed-grass prairies, and short-grass prairies dominated central North America. Across the Project area the influence of fire and grazing, especially by large herds of bison, maintained native grasslands in a relatively treeless condition. With suppression of fires, woody vegetation has encroached upon the prairie landscape in some parts of the Great Plains. Prairies have been lost to agriculture, urbanization, and mineral exploration and altered by invasions of non-native plants, fire suppression, establishment of woodlots and shelterbelts, and water developments.

Tall-grass prairie is the wettest of the grasslands composed of sod-forming grasses. Mixed-grass prairies are intergrades between tall-grass and short-grass prairies characterized by the warm-season grasses of the short-grass prairie and the cool and warm-season grasses of the tall-grass prairie. Short-grass prairies are dominated by blue grama and buffalo-grass – two warm-season grasses that flourish under intensive grazing. Estimated declines in native tall-grass prairie range from 83 to 99%, mixed-grass prairie range from 30 to 75%, and short-grass prairie ranges from 35 to 79% in the Great Plains states crossed by the Project (Samson et al. 1998). Because of this decline and the importance of these areas as wildlife habitat, conservation of native prairie remnants is a high priority throughout the Project area.

Riparian Habitats and Bottomland Hardwoods

Riparian areas are important as wildlife habitat within the western United States (Service, 1997). Riparian areas represent a transition between wetland and upland habitats, generally lack the amount or duration of water present in wetlands, and riparian vegetation may include wetland or upland plants.

In Oklahoma, priority riparian communities include oak and hickory bottomland hardwood forests; and small streams and associated riparian forests (Oklahoma Department of Wildlife Conservation, 2005).

Forest Communities

Native wooded communities were once an integral component of the prairie landscape throughout the Great Plains where they provide foraging, breeding, and refuge habitats for many wildlife species. Prairie woodlands were generally limited in size and distribution by fire to river breaks and protected areas. Many of these communities have been lost due to land conversion to agricultural uses, levee construction, and urban development.

Within the Project area in Oklahoma, native trees develop within the prairies creating savannas and continue increasing in density creating woodlands and forests within the Cross Timbers and South Central Plains. In the Cross Timbers region, fire suppression has led to expansion of forests. Much of the South Central Plains is used for silviculture. Some forest communities in uplands or outside of riparian areas are priorities for conservation across the proposed Project.

Forest community conservation priorities within the Cross Timbers Region of Oklahoma include oak and hickory bottomland hardwood forest; post oak/blackjack oak/hickory woodlands and forest; and post oak/blackjack oak shrub-land. Potential occurrences of remnant ancient Cross Timbers forest that would be crossed by the proposed Project in Oklahoma were evaluated using

the predictive model developed by the Ancient Cross Timbers Consortium (Therrell and Stahl 1998).

3.7.2 Wildlife

3.7.2.1 Fishes

The Fisheries section addresses fish species with recreational or commercial value that occur in waterbodies that would be crossed by the proposed pipeline route, as well as waterbodies located within 0.5 mile of the pipeline ROW. The types of waterbodies discussed in this section include lakes, ponds, rivers, and perennial, intermittent, and ephemeral streams. Special status fish species including threatened, endangered, and species of conservation concern are discussed in Section 3.7.6.

Fisheries Resources

The evaluated fisheries occur in waterbodies that are located within approximately 0.5 mile of the pipeline ROW and that have been identified by state agencies as having recreational or commercial value. Many of these species are native North American fishes that have been introduced into watersheds where they did not previously occur to provide for recreational fisheries, while the common carp (*Cyprinus carpio*) is an exotic Eurasian introduction.

Several fishes that support important recreational or commercial fisheries have declined in abundance and are currently protected within some portions of their range. These fishes are classified as threatened, endangered, or sensitive and include paddlefish (*Polyodon spatula*), pallid sturgeon (*Scaphirhynchus albus*), sauger (*Sander canadense*), shortnose gar (*Lepisosteus platostomus*), and shovelnose sturgeon (*Scaphirhynchus platorynchus*).

Fish species are particularly sensitive to habitat disruption caused by construction during spawning periods. Spawning periods for fishes that range across the length of the proposed Project will vary depending on latitude. After spawning, the type and length of habitat use for larval and juvenile fish rearing varies depending on the fish species, life history stage, and site-specific conditions. Eggs would be expected to hatch relatively soon after spawning activities.

Surface water classifications based on a waterbody's water quality and resource values are important elements of fisheries management. The classification system is administered by the Oklahoma Water Resources Board. Fisheries information was derived primarily from fishery distribution maps available on agency websites supplemented by information provided by regional biologists.

Fisheries of Concern

This section addresses fisheries potentially found in perennial streams (including rivers) that would be crossed by the pipeline route. Although intermittent waterbodies may be of substantial value in terms of fisheries resources, they are not addressed in this section because information is not available for these waterbodies and fisheries impacts are expected to be minimal because they do not expected to be flowing at the time of construction.

Fisheries management in Oklahoma incorporates the state's surface water classification system. The classifications are based on each waterbody's water quality and resource value and are

intended to create an estimate of the potential use by species. The proposed pipeline corridor in Oklahoma would cross 54 perennial streams that support recreational or commercial fishing.

3.7.2.2 Birds

This section addresses bird species that occur near the proposed pipeline route, including migratory birds, bald and golden eagles, and birds that have been identified as of conservation concern. Bald eagles are discussed in Section 3.7.4, as are other migratory birds identified as species of conservation concern.

The Permit Area occurs within a landscape supporting a diverse avifauna that includes many permanent resident species, as well as migratory species that typically are present in the region only during the breeding or non-breeding seasons. Many other bird species that breed and winter outside of the Permit Area can occur regularly in the region during the spring and fall migration periods. A smaller number of bird species recorded in the area occur on an irregular or rare basis, with most of these species being migrants that usually pass east or west of the Permit Area, birds that usually winter farther north or west, or individuals of species whose breeding ranges lie south of the Permit Area that on very rare occasion travel northward for some reason.

The status of birds within the Permit Area is studied regularly by volunteers through participation in Breeding Bird Surveys (BBSs) and Christmas Bird Counts (CBCs). BBSs are conducted across the United States and Canada and are coordinated jointly by the USGS and Canadian Wildlife Service.

The discussion of birds in the previous paragraph concentrated primarily on those species expected to breed or winter in the Permit Area. However, the Permit Area lies within the Central Flyway, used by many species of migratory birds as they travel to and from their wintering grounds in Texas, Mexico, or Central or South America (TPWD 2007). Consequently, many species of birds that do not breed or winter in the Permit Area occur regularly in the region during the spring and/or fall migration periods.

Aerial stick nest surveys were conducted along the entire proposed Project ROW during spring 2008 through 2012 to identify large stick nest sites of raptors and herons in deciduous trees within 1 mile from the Project centerline. A total of 17active nests and 0 rookeries were identified within the Permit Area in Oklahoma. Two raptor species were identified from the nesting surveys: 2 Red Shouldered Hawk (*Buteo lineatus*) nests and 15Red Tail Hawk (*B. jamiacensis*) nests, Table 3.7.2.2.

Table 3.7.2.2
Raptor nests identified within a half-mile of the Permit Area in Oklahoma

Impact Area	Red Shouldered Hawk (2)	Red Tail Hawk (15)
ABB CONSERVATION PRIORITY AREA	0	11
ABB PERMIT AREA	2	15
(1 buffer zone lies within both Priority & Non-Priority areas simultaneously)		

While waterfowl are protected by the MBTA, Federal and state regulations provide hunting opportunities while ensuring that ducks, geese, swans, coots, and cranes continue to thrive. Many waterfowl breed in habitats near the proposed pipeline, and additional migrants pass through the proposed Project area to and from northern breeding grounds during spring and fall.

Non-migratory birds such as wild turkeys, grouse, and northern bobwhite are resident game birds and as such are not protected by the MBTA; although harvest of upland game birds is regulated under state wildlife laws and regulations. Non-native birds such as European starling (*Sturnus vulgaris*), rock pigeon (*Columba livia*), and house sparrow (*Passer domesticus*) are not protected by the MBTA.

3.7.2.3 Mammals

White-tailed deer (*Odocoileus virginianus*) are common within the Permit Area and are highly adaptable and inhabit a variety of habitats, including cropland, grasslands, shrub-lands, and woodlands. They may also be found in close association with humans.

Small animals that inhabit the Permit Area include cottontails (*Sylvilagus floridanus*), coyotes (*Canis latrans*), badgers (*Taxidea taxus*), opossums (*Didelphis virginiana*), raccoons (*Procyon lotor*), beavers (*Castor canadensis*), mink (*Neovison vison*), weasels (Mustelidae), red fox (*Vulpes vulpes*), and squirrels (*Sciurus* spp.). Squirrels depend on forested habitats, usually deciduous or mixed hardwood forests with abundant supplies of acorns and hickory nuts. Cottontails, coyotes, opossums, and raccoons use a wide variety of habitats, including croplands, forests, shelterbelts, living snow-fences and rangelands.

3.7.2.4 Nongame Animals

The Project crosses many different habitats that are home to a wide variety of small non-game mammals such as northern pocket gophers (*Thomo mystalpoides*), woodchucks (*Marmota monax*), mice (Muridae), shrews (generally *Sorex* spp.), ground squirrels (*Spermophilus* spp.), and voles (*Microtus* spp.). These species provide important prey for species such as badgers, coyotes, foxes, weasels, raptors and snakes. Common amphibians and reptiles in the Project area include many types of frogs, toads, turtles, lizards, and snakes. Many different types of invertebrates occur across the Project area including bees, beetles, butterflies, cicadas, earthworms, grasshoppers, hornets, moths, and spiders which provide food for birds, amphibians, reptiles, and small mammals.

3.7.3 Covered Species

American Burying Beetle (*Nicrophorus americanus*)

The ABB is a large black beetle with orange markings. The size range of individuals is1 – 1.8 inches (approximately 2.5 to 4.6 centimeters (cm))(Marrone 1997). The species historically occurred across a large range with documented occurrences from 150 counties in 34 states in the eastern and central United States. The species is also documented from southern Canada (Service 1991). Documentation of records is not uniform throughout this broad historical range. More records exist from the Midwest, southern Canada, and the northeastern U.S. relative to the southern Atlantic and Gulf of Mexico region (Service 1991). During the 20th century, the ABB disappeared from over 90% of its historical range (Ratcliffe 1995). Historic population levels are not known, but the species is thought to have been at least locally common. Populations of ABBs rapidly declined across the eastern portion of their range and became almost completely extirpated from areas east of the Mississippi River by the mid-1970s (a small population remained at Block Island off the coast of Rhode Island). Presently, the species is mainly found along the western periphery of its former range. Larger populations are found in two general

areas: Arkansas and Oklahoma; and Nebraska and South Dakota. The species has also been documented to occur in limited areas of Texas, Kansas, and Missouri. Reintroduction programs are ongoing in certain areas within the former range.

The ABB is a member of the genus *Nicrophorus*, which also includes other species that occur in areas supporting the ABB. Species in the genus are generally referred to as burying, sexton, or undertaker beetles because they share the unique behavior of burying carrion to provide a source of nutrition for developing young. The ideal size carrion appears to be in the weight range of 3.5 to 7 ounces (approximately 100 – 200 grams)(Kozolet al. 1988). Primary carrion sources are small birds and mammals. Northern bobwhites (*Colinus virginianus*) and mourning doves (*Zenaida macroura*) are examples of birds which would provide appropriate-sized carrion. Small mammals such as eastern cottontails (*Sylvilagus floridanus*), gray squirrels (*Sciurus carolinensis*), and rats (*Neotoma* spp.) are examples of mammals in the preferred size range. ABBs are also reported to utilize other carrion within the appropriate size range such as snakes and fish. Kozol et al. (1988) found no significant difference in the ABBs preference for avian verses mammalian carcasses. At Fort Chaffee (western Arkansas), Holloway and Schnell (1997) found that ABB numbers were higher in areas with high densities of small mammals (Service 2008b).

The life history of the ABB is similar to that of other burying beetles (Kozolet al. 1988; Pukowski 1933; Scott and Traniello 1987). The ABB is a nocturnal species that lives only for one year. ABBs are active in the summer months and bury themselves in the soil during the winter. The young tenerals or post-molt individuals emerge in late summer, over-winter as adults, and comprise the breeding population the following summer (Kozol 1990b). Adults and larvae are dependent on carrion for feeding and reproduction.

When the nighttime ambient air temperature is consistently below 60° F (15.5° C), generally about September 20, ABBs bury into the soil and become inactive (Service 1991). In Oklahoma, this typically occurs from late September until mid-May (Service 2008b). However, the length of the inactive period can vary depending on temperature. Recent studies indicate that ABBs bury to depths ranging from 0 to 8 inches (to 20.3 cm) in Arkansas (Schnell et al. 2007). Habitat structure (i.e., woodland vs. grassland) does not appear to be a factor influencing over-winter survival rates in Oklahoma (Holloway and Schnell 1997).

The ABB is active in the summer months, emerging from their winter inactive period when ambient nocturnal air temperatures consistently exceed 60° F, generally about May 20. They are most active from 2 to 4 hours after sunset, with no captures recorded immediately after dawn (Bedicket al. 1999). During the daytime, ABBs are believed to shelter under soil or leaf litter.

ABBs are nocturnal and highly mobile. The longest distance recorded for an individual was 6.2 miles over six nights. The maximum distance moved by one ABB was 1.8 miles in one night (Creighton and Schnell 1998).When not involved with brood rearing, carrion selection by adult ABBs for food can include an array of available species and sizes (Trumbo 1992). Burying beetles are capable of finding a carcass between 1 and 48 hours after death at a distance up to 2 miles (Ratcliffe 1996).

The ABB displays an interesting and relatively complex reproductive behavior. Reproductive activity usually begins in mid-May and is completed by mid-August in Oklahoma. In summer months and during hours of darkness, adult male ABBs search for dead animals using

chemoreceptors located on their antennae. ABBs can detect carrion up to two miles away under ideal wind conditions. When suitable carrion is located, males release pheromones that attract females. When females arrive, there is often competition between the males for mates. Mating pairs then prepare the carcass (by removing hair or feathers and covering it with body secretions that act as preservatives) and excavate a brood chamber where the carcass will be buried. ABBs are known to move carcasses to areas with soils more suitable for burying the carrion. ABBs then mate and lay eggs in the soil near the brood chamber. Larvae emerge a few days later and feed on the buried carcass. ABBs are unique insects because they provide bi-parental care for the developing young.

ABBs are considered feeding habitat generalists and have been successfully live-trapped in several vegetation types including native grasslands, grazed pasture, riparian zones, coniferous forests, mature forest, and oak-hickory forest, as well as on a variety of various soil types (Creighton et al. 1993; Lomolino and Creighton 1996; Lomolinoet al. 1995; Service 1991). Ecosystems supporting ABB populations are diverse and include primary forest, scrub forest, forest edge, grassland prairie, riparian areas, mountain slopes, and maritime scrub communities (Ratcliffe 1996; Service 1991). The ABB readily moves between different habitats (Creighton and Schnell 1998; Lomolinoet al. 1995; Service 2008b). The ABB appears to be most common in areas representing broad transition zones between forested and open habitats In Oklahoma, the ABB has been captured in a variety of habitats including grasslands, grazed pastures, bottomland forest, riparian zones, and oak-hickory forest (Service 2005). Soil conditions for suitable ABB habitat must be conducive to burial of carcasses (Anderson 1982; Lomolino and Creighton 1996).

Some noteworthy areas in Oklahoma with relatively large populations of ABBs occur at Camp Gruber in Cherokee County, areas around McAlester in Pittsburg County, and areas near Atoka in Atoka County (a particularly large population occurs just across the Oklahoma border at Fort Chafee, Arkansas). ABBs have been found in 23 Oklahoma counties and may also occur in additional counties. The Project ROW in Oklahoma passes through six counties with confirmed presence of ABBs (Atoka, Bryan, Coal, Hughes, Okfuskee, and Seminole) and one county with unconfirmed presence (Creek)(unpublished Service data 2012).

The causes for the ABB's decline are complex and not well-understood. The ABB's vulnerability to extinction is likely due to its complex life history and dependence on carrion, which is a finite resource that varies widely spatially and temporally (Karr 1982; Pimmet al. 1988; Peck and Kaulbars 1987). The general explanation for the species' decline is usually attributed to anthropogenic habitat alteration or changing land use practices at the landscape level. Some examples of these anthropogenic alterations include direct loss of habitat associated with urbanization, industrial development, row crop farming, fragmentation of habit, wide scale use of pesticides, interruption of behavior caused by artificial lighting, and various other proposed causal factors including extinction of the once common passenger pigeon (*Ectopistes migratorius*). The passenger pigeon, which formerly occurred in the billions across most of the ABB's range, was an ideal size and almost certainly provided an abundant and important carrion source. The decline and disappearance of this species occurred just prior to the ABB's decline. Other suitable carrion species, such as northern bobwhites and greater prairie-chickens (*Tympanuchus cupido*), have also experienced drastic declines. Competition for limited carrion is apparently exacerbated by increasing numbers of mid-sized mammals such as skunks (*Mephitis mephitis*), raccoons, foxes (*Vulpes* spp.), and coyotes, which have increased in number

in response to extinction or extirpation of larger predators and a drastic reduction in fur trapping. These medium sized mammals, which often compete with ABBs for carrion, often thrive in the patchy and fragmented habitat of the modern landscape.

Relatively recently, fire ants (*Solenopsis invicta*) have become competitors for carrion and a potential source of mortality for burying beetles where they co-occur (Warriner 2004; Godwin and Minich 2005). Collins and Scheffrahn (2005) noted that fire ants may reduce ground-nesting populations of rodents and birds, and in some instances, may completely eliminate ground-nesting species from a given area. Fire ant infestations are not evenly distributed; rather, they tend to be more numerous in open, disturbed habitats. Fire ants now infest large areas within the ABB range in Oklahoma (USDA 2003).

It is clear that no single factor can explain the decline of ABBs. It is apparent that the organism simply cannot tolerate the wide scale landscape changes and other human activities imposed upon them in past decades. Perhaps the species' complex and highly evolved lifecycle makes it more susceptible to negative effects from high levels of disturbance and landscape alteration relative to other species. Large populations today seem to be limited to relatively large blocks of lands with low human population densities, intact native plant communities, and high populations of small birds and mammals.

3.7.4 Evaluation Species

3.7.4.1 Bald Eagle

Bald eagles (*Haliaeetus leucocephalus*) occur throughout the United States and the Project Area. The bald eagle was removed from the list of threatened and endangered species on August 8, 2007. The bald eagle is federally protected under both the BGEPA and the MBTA. Bald eagles are associated with riparian or lacustrine areas for foraging and nesting. They generally nest and roost in large trees or snags with open crowns in areas that are relatively free of disturbance. Nesting territories are most often near open water with a prey base of fish and waterfowl. Bald eagles use upland areas to feed on small mammals and carrion, especially during the winter. Nests are typically within one mile of permanent water. Roost sites are an important habitat component for bald eagles and include live trees and snags that provide good visibility and that are located near nest sites or foraging areas.

One active bald eagle nest that is located approximately 1,203 feet west of the ROW was recorded during nesting surveys of the Permit Area that were conducted in 2011 and 2012. The recommendation from the National Bald Eagle Management Guidelines for avoiding disturbance to bald eagles during activities such as the construction Keystone has proposed is 660 feet. There is no direct line-of-site between this nest and the pipeline ROW due to extensive forest canopy between the nest and ROW.

3.7.4.2 Least Tern

The interior least tern (*Sterna antillarum*) was federally listed as endangered in 1985 and is state-listed as endangered in Oklahoma. They are small seabirds that feed almost exclusively on small fish, crustaceans, and insects that they catch by skimming over the water surface or by hovering and diving from the air (Reel et al. 1989). The interior least tern is a subspecies of the least tern; the east coast subspecies is not threatened or endangered and the west coast subspecies is

federally listed as endangered. The interior least tern is migratory; it winters in South America, then journeys north to central North American river systems to breed. Nesting season for interior least tern is from April 15 through September 15 throughout the breeding range.

Primary threats to the interior least tern are channelization of river systems and construction of dams that alter the rivers' natural flow regimes. This can cause water levels to remain high during the nesting season, eliminating nesting areas and forcing the birds to choose less ideal nest sites. Flood control has also caused nesting habitat to decline due to vegetation encroachment on river banks. River recreation has increased in recent decades, causing more disturbances to prime nesting habitats by boaters, anglers, campers, and ATVs. Excessive human disturbance has been shown to decrease nesting success and productivity and remains a threat to the interior least tern population throughout its range (TPWD 2009).

The interior least tern is known to use reaches of the North Canadian River, South Canadian River, and Red River in Oklahoma (Service 2007a). Within the Permit Area, the Project would cross the North Canadian River in Seminole County, the South Canadian River in Hughes County, and the Red River in Bryan County. Foraging least terns were observed at the North Canadian River in Oklahoma (Table 3.7.4.2).

Table 3.7.4.2
Survey Results for the Interior Least Tern at Potentially Occupied River Crossings along the the Permit Area in Oklahoma

County	Survey Location	Survey Corridor	Survey Date	Survey Results	Comments
Seminole	North Canadian River	0.25 mile each side of centerline	June 24, 2009; June 29, 2010	No least terns observed in 2009; no least terns observed in 2010.	Suitable nesting and for aging habitat at crossing location.
Hughes	South Canadian River	0.25 mile each side of centerline	June 23, 2009; June 30, 2010	No least terns observed in 2009; 3 least terns observed foraging in 2010.	Suitable nesting and foraging habitat at crossing location
Bryan/Fannin	Red River	0.25 mile each side of centerline	June 25, 2009; July 1, 2010	Foraging least terns observed in 2009; 11 least terns observed foraging in 2010	Suitable nesting and foraging habitat at crossing location

Sources: ENSR 2008, AECOM 2009.

3.7.4.3 Sprague's Pipit

Sprague's pipit (*Anthus spragueii*) is a candidate for federal listing as threatened or endangered (75 FR 56028) and is a species of conservation concern in Oklahoma.

Sprague's pipit is a medium sized (5.5 inch long) short distance migrant songbird (passerine). They breed in the northern Great Plains with their highest numbers in the central mixed-grass prairie, primarily in north-central and eastern Montana, to North Dakota through to northwestern and north-central South Dakota (Jones 2010).

Migration occurs through the central Great Plains in April and May and late September through early November (Jones 2010). They winter from the southeast corner of Arizona, southern New Mexico, central and southern coastal prairies in Texas, through southern Oklahoma, with the highest winter densities in Texas (Jones 2010).

Sprague's pipits establish nesting territories and construct nests on the ground in intermediate height and density grasslands primarily with native grasses, little bare ground, and few shrubs from May through August (Jones 2010). Breeding territories are established for both nesting and foraging; and are likely influenced by the size of grassland patches and the amount of grassland in the landscape (Jones 2010). Males establish and maintain territories presumably using their high altitude (984 feet) high pitch display (Jones 2010). They forage primarily on the ground and eat insects in the summer and insects and seeds during fall and winter (NatureServe 2010).

There are an estimated 870,000 Sprague's pipits in the North America and populations have experienced a range-wide declined at a rate of about 3% per year since 1980 in the United States (Jones 2010). Declines in this species are attributed to habitat loss, degradation, and fragmentation through conversion of native grasslands to seeded pasture, hayfields, and croplands, as well as overgrazing by livestock and reduced fire frequency (Jones 2010). Current threats to the Sprague's pipit include habitat loss, degradation, and fragmentation; inappropriate land management (overgrazing, mowing, reduced fire frequency); nest predation and parasitism; energy development, introduced plants, and droughts (Jones 2010).

Sprague's pipits occur in the central and western two-thirds of Oklahoma and in the southern portion of the panhandle during migration, but they have not been observed in the eastern third of the state (Jones 2010) through which most of the proposed Project would cross.

3.7.4.4 Whooping Crane

The whooping crane (*Grus americana*) was federally listed as endangered in 1970 and is state listed as endangered by Oklahoma. Within the Permit Area, whooping cranes use numerous habitats (e.g. cropland and pastures; wet meadows; shallow marshes; shallow portions of rivers, lakes, reservoirs, and stock ponds; and both freshwater and alkaline basins) for feeding and resting during their spring and fall migration. Overnight roosting sites frequently require shallow water where they can stand and rest. Shallow, sparsely vegetated streams and wetlands are required for roosting during migration. Primary threats to the whooping crane are habitat loss and alteration.

The spring migration usually takes place from about March 23 through May 10 and the fall migration from about September 16 through November 16. Migrations are usually completed within 2 to 4 weeks. Though the Permit Area is located outside the 170 mile wide migration corridor where 95% of all occurrences have been documented, migrating whooping cranes could roost or feed within the Permit Area during spring and fall migration.

3.7.4.5 Piping Plover

The piping plover (*Charadrius melodus*) was listed as endangered and threatened December 11, 1985 (50 FR 50726). Piping plover on the Great Lakes were listed as endangered, while the remaining Atlantic and Northern Great Plains populations were listed as threatened. Migrating and wintering populations of piping plover also were classified as threatened. Populations of piping plover within the Project area are considered to belong to the threatened Northern Great Plains population. The final rule designating critical habitat for the Northern Great Plains breeding population of the piping plover (67 FR 57638) within and along river segments bounding Nebraska has been vacated by the Service.

Primary constituent elements of critical habitat include: on prairie alkali lakes and wetlands:

- shallow, seasonally to permanently flooded, mixosaline to hypersaline wetlands with sandy to gravelly, sparsely vegetated beaches, salt-encrusted mud flats, and/or gravelly salt flats;
- springs and fens along edges of alkali lakes and wetlands; and
- adjacent uplands 200 feet above the high water mark of the alkali lake or wetland.

On rivers:

- sparsely vegetated channel sandbars, sand and gravel beaches on islands, temporary pools on sandbars and islands, and the interface with the river;

And on reservoirs:

- sparsely vegetated shoreline beaches, peninsulas, islands composed of sand, gravel, or shale, and their interface with the water bodies (67 FR 57638).

Critical habitat has been designated for the piping plover, none of which is in Oklahoma.

Piping plovers may be present throughout the Project area in Oklahoma during migrations to and from northern breeding grounds. Migration periods for the piping plover in Oklahoma during spring migration are late February through mid-May and during fall migration are mid-July through September (Service 2001b). The Service recommended the identification of suitable migration stopover habitats for piping plovers that would potentially occur in the Permit Area. Suitable migration stopover habitats include sandy shorelines of lakes and rivers (Campbell 2003). The Service confirmed that the only potential areas of concern were the North Canadian and South Canadian rivers for suitable habitat for migration stopovers.

3.7.4.6 Arkansas River Shiner

The Arkansas River shiner (*Notropis girardi*) was federally listed as endangered in 1998 (Service 1998a; 63 FR 64771) and critical habitat was designated in 2001 (Service 2001a; 66 FR 18001). In early 2009, the Service included the Arkansas River shiner in a 5-year status review (74 FR 6917). Arkansas River shiners are present in Oklahoma in the South Canadian River and potentially in the North Canadian River (Pigg 1991). The species is known to occur in seven of the eight counties through Oklahoma that is crossed by the Project. Historically, the Arkansas River shiner was found throughout the western portion of the Arkansas River basin in Kansas, New Mexico, Oklahoma, and Texas. It is currently found in the Canadian River in Oklahoma, Texas, and New Mexico and in the Cimarron River in Oklahoma.

With current abundance and distributions, the species is considered stable (Warren et al. 2000). Preferred habitats are turbid waters of broad, shallow, unshaded channels of creeks and small to large rivers, over mostly silt and shifting sand bottoms (Gilbert 1980). These fish tend to congregate on the downstream side of large transverse sand ridges. Diet consists mainly of plankton and organisms that are exposed by moving sand or by drifting downstream (Moore 1944). Spawning occurs from June to July in main stream channels but spawning may also occur into August.

Within the Permit Area, the Project would cross the North and South Canadian rivers with designated critical habitat in the South Canadian River. Surveys for the Arkansas River shiner

were not recommended in Oklahoma within the South Canadian and North Canadian rivers since the presence of this species at these crossings is assumed.

3.7.5 State Special Status Species

State-protected animals and plants that may occur in the Project Area in Oklahoma are addressed in Section 3.8.3 of the Keystone XL Project FEIS. The state listed species within the Plan Area include: Long-nosed Darter (*Percina nasuta*), Neosho Mucket (*Lampsilis rafinesqueana*), Oklahoma Cave Crayfish (*Cambarus tartarus*) and Black-sided Darter (*Percina maculata*).

3.7.6 Invasive Species

Specific noxious weed sources along the pipeline corridor in Oklahoma have not been identified through field surveys. A noxious weeds plan has been developed by Keystone and invasive species were more thoroughly evaluated in Section 3.5.4 of the Keystone XL Project FEIS.

3.8 Cultural Resources

The FEIS completed by the DOS documents the entire NHPA Section 106 consultation process from 2008 through 2011 (see FEIS Section 3.11). The survey results were reviewed and concurred with by the Oklahoma SHPO's office and consulting tribes. Consulting tribes in Oklahoma included the Caddo, Iowa, Kialegee Tribal Town of the Creek Nation of Oklahoma, Kiowa, Miami Tribe of Oklahoma, Muscogee (Creek) Nation, Osage Nation of Oklahoma, Pawnee Nation of Oklahoma, Ponca Tribe of Indians of Oklahoma, Sac and Fox Nation of Oklahoma, Cheyenne-Arapaho, and Choctaw Nation.

An additional report was filed with the Oklahoma SHPO's office in early 2012 for the remaining surveys in Oklahoma not covered by the FEIS. This amounted to approximately 3.64 miles of mainline survey, 5.84 miles of new and altered access roads, 1.17 acres of temporary workspace locations, and 36.77 acres of ancillary facilities. This completed surveys of the entire footprint in Oklahoma. The DOS concurred with the findings of the survey report and sent a letter to the Oklahoma SHPO seeking their concurrence in February 2012.

The Project route crosses the Historic Route 66 (designated 34LN164/CCUL2ALNx.001), which falls under the purview of the Route 66 Corridor Preservation Program administered by the NPS' National Trails System Office. Additionally, portions of Route 66 in Oklahoma are listed in the NRHP. Though the segment within the Permit Area is not listed, it could be a contributing segment according to NRHP Criteria for Evaluation and specific considerations established in the state-wide NRHP nomination form. Cultural resource investigations conducted in the vicinity of the route identified a portion of the abandoned roadbed. The Applicant's architectural historian and archaeologists completed a site form and historic preservation resource identification form for Route 66.

3.9 Land Use

Land uses along the Project are described in detail in Section 3.9 of the Keystone XL Project FEIS. The Project would cross a total of 156.2 miles in Oklahoma of which 138.8 miles are located within the Permit Area covered in this EA. All of the property crossed within the Permit Area is privately owned land. The breakdown of land uses traversed by the Project within the Permit Area is as follows:

- 73.5 miles of rangelands,
- 38.1 miles of forest land,
- 8.6 miles of agricultural land,
- 15.2 miles of developed land, and
- 3.7 miles of water/wetlands.

3.10 Socioeconomics

The information contained in this section is a summation of more detailed socioeconomics analysis found in Section 3.10 of the Keystone XL Project FEIS published by the DOS in August 2011.

3.10.1 Demographics

The Project route is predominantly rural and sparsely populated, with the population tending to increase from north to south along the route. Population density per square mile ranges from 14 (Atoka County) to 99 (Payne County) along the pipeline route. Between 2000 and 2007, there was relatively little change in population levels; a net increase of 0.6%. Bryan, Coal, Lincoln, and Payne Counties had no communities within 2 miles of the proposed project route.

The 2007 median household income for Oklahoma was $41,551, or $9,189 less than the national level. The Oklahoma county with the lowest median household income in 2007 was Hughes, which was $28,689, or $12,862 less than Oklahoma's median household income.

Other demographic topics were discussed in the FEIS, including population, housing, and local economic activity (see Section 3.10 of the FEIS),

3.10.2 Property Values

Potential damages to private property during Project operation would likely be concentrated along the permanent ROW and at appurtenant facilities. Land disturbed by the Project would be restored to the extent practicable; to repair or restore fences and land productivity damaged or adversely affected during construction; and to compensate property owners for any additional damages caused by Project construction. Although the permanent ROW would be restored after construction, continued access to the proposed Project ROW would be required to support surface and aerial inspections and any necessary repairs or maintenance for the useful life of the Project.

3.10.3 Employment

The unemployment rate in 2008 ranged from 3.4% (Bryan) to 5.3% (Hughes) across the state. Construction of the Project, including the pipeline and pump stations within the Permit Area, would result in hiring approximately 700 temporary workers during the construction period. It is expected that as much as 50 percent of the construction work force would be hired from local labor markets, thus approximately 350 local workers could be hired from within Oklahoma. Additional details regarding employment are included in Section 3.10 of the Keystone XL FEIS.

3.11 Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* directs Federal agencies to identify and address, as appropriate, disproportionately high and adverse health or environmental effects of their programs, policies, and activities on minority populations and low-income populations. Environmental justice refers to the "…fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies" (EPA 2007). The CEQ has provided guidance for addressing environmental justice (CEQ 1997).

In the FEIS (Section 3.10), minority and low-income populations along the Project corridor were screened at the census block level within a 4-mile wide analysis in six states that would be crossed by the proposed Project. This section is a summary of that information where it concerns Oklahoma.

3.11.1 Minority Populations in the Study Area

For census block analysis over a 4-mile-wide study area, minorities represent 26% of the population in the counties crossed by the pipeline. This is the result of the DOS study expanding the study corridor out two miles on either side of the project centerline, which captured the town of Boley in Okfuskee County with a majority African-American population (see Section 3.10 of the FEIS).

3.11.2 Low-Income Populations in the Study Area

Using the same analysis as described above, low-income populations over the 4-mile-wide study area represent 17.6% of the populations in Oklahoma. Six of the counties crossed exceed this level of low-income populations (see Section 3.10 of the FEIS).

3.11.3 Disproportionately High and Adverse Human Health Effects

According to Executive Order 12898, when determining whether human health effects are disproportionately high and adverse on minority or low-income populations, agencies are to consider the following three factors to the extent practicable:

- whether the health effects, which may be measured in risks and rates, are significant, unacceptable, or above generally accepted norms (adverse health effects may include bodily impairment, infirmity, illness, or death);
- whether the risk or rate of hazard exposure by a minority population or low-income population to an environmental hazard is significant and appreciably exceeds or is likely to appreciably exceed the risk or rate to the general population or other appropriate comparison group; and
- whether health effects occur in a minority or low-income population affected by cumulative or multiple adverse exposures from environmental hazards.

3.12 Roads and Aviation Facilities

3.12.1 Roads

The Project would cross approximately 149 roads of various sizes in Oklahoma. Two are interstate crossings, four are U.S. highways, and the remainder state, county, and local/private roads.

3.12.2 Aviation Facilities within the Study Area

There are no airports or runways within one mile of the Project or Permit Area in Oklahoma.

3.13 Human Health and Safety

The protection of human health and welfare figures prominently in the objectives and regulations of NEPA (CEQ 1978). In practice, the consideration of health within an EA is both rare and narrowly focused on toxic exposures; a comprehensive and systematic approach to human health impacts in EA practice has not evolved. However, the quality of ambient air plays an important role in the health of the public, as does water quality, and impacts from noise. These factors are discussed in specific sections above and below. See the Keystone XL Project FEIS (August 26, 2011) for more information regarding human health and safety.

3.14 Noise

There are approximately 137 residences along the entire length of the project in Oklahoma within 500 feet of the pipeline. There are no noise statutes at the state level in Oklahoma that regulate construction noise or operational noise sources. There are some local ordinances at the county level that regulate construction noise.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

The environmental consequences of constructing and operating the Project would vary in both duration and significance. Two levels of impact duration were considered: temporary and permanent. Impacts were considered to be temporary on land that would be restored to its previous condition within 5 years of the disturbance. Permanent impacts are those that modify resources to the extent that they would not return to pre-construction conditions during the life of the Project, such as construction of aboveground structures (i.e., pump stations, MLVs).

This section discusses the affected environment, impacts from construction and operations, and mitigation for each affected resource for two of the three alternatives analyzed. Based on the Proposed Action, issuance of a Section 10(a)(1)(B) ITP, the alternatives considered were as follows:

- *Alternative A:* No action – no permit is requested or issued;
- *Alternative B:* Implementation of the HCP and issuance of Section 10(a)(1)(B) Permit with a 50 year term; and
- *Alternative C:* Implementation of the HCP and issuance of a Section 10(a)(1)(B) permit with a 5 year term (does not cover operational activities).

4.2 Visual and Aesthetic Qualities

4.2.1 Alternative A - No Action

There would be no impacts to visual and aesthetic qualities.

4.2.2 Alternative B - Issuance of Section 10(a)(1)(B) Permit with a 50-year term (Preferred Alternative)

Construction and operation of the Project within the Permit Area would have minor visual impacts, most of which would be temporary as defined above in Section 4.1. Such impacts would be associated with:

- the construction ROW;
- additional temporary workspace;
- clearing and removal of existing vegetation;
- exposure of bare soils;
- earthwork and grading scars;
- trenching;
- rock formation alteration;
- machinery and pipe storage;
- new aboveground structures such as pump stations (permanent impacts).

Most visual effects resulting from ROW disturbance in agricultural areas would likely be substantially reduced with the first crop growth. Visual effects in non-forested areas would also likely be relatively insignificant after seeding and reestablishment of herbaceous cover on the permanent ROW. Most of the clearing in forested areas will cross private lands away from public roads; therefore, most of the Project would not be visible to the general public except where the Project crosses roads or highways, but would be in view of those people that live and work on those lands. The cleared ROW would appear as an anomalous cleared swath where the line crosses shrublands and woodlands. Outside of the 50-foot permanent ROW, trees and shrubs would be allowed to regenerate.

Perceptible changes resulting from construction and operation would largely be visible to travelers along the major transportation corridors in the vicinity of the Project. Their views would typically be limited to short periods of time and small portions of the ROW.

Although recreational travelers are generally more sensitive to changes in scenic quality than residents, there is only one state-designated recreation area, the Deep Fork Wildlife Management Area, in the vicinity of the route and few recreationists would be affected. During the final stages of construction, backfilling and grading would restore the construction ROW to approximately its previous contours and reclamation and revegetation would ultimately return the ROW to approximately its previous condition, except in currently forested areas. In addition, vegetative buffers would be planted around the pump stations to reduce the visual impacts of the facilities. No pump stations would be situated on federal lands or on visually sensitive lands. Due to the temporary nature of the pipeline related impacts, they are not considered to be significant. Impacts from the few aboveground facilities would also be considered insignificant based on the facilities being sited on private lands outside of visually sensitive areas.

No significant impacts to visual and aesthetic qualities are anticipated due to the primary impacts being temporary in nature. Cleanup would begin as soon as possible after backfilling and would include the removal of construction debris, final contouring, and installation of erosion control features. The ROW would be reseeded as soon as possible after the completion of cleanup and the ROW would be inspected after the first growing season to determine the success of revegetation and noxious weed control. Any unsuccessfully re-established areas would be revegetated and any eroded areas would be repaired.

As described in Section 4.2.1, the permanent, aboveground facilities would be developed on private lands away from visually sensitive areas and vegetative buffers would be planted around the facilities to reduce the visual impacts.

Where forested areas are cleared for construction, there will be a permanent cover change. The cleared ROW would appear as an anomalous cleared swath where the Project crosses woodlands. However, in forested areas, outside of the 50-foot permanent ROW, trees and shrubs would be allowed to regenerate. While this is a permanent impact, it does not rise to the level of significance.

4.2.3 Alternative C - Issuance of Section 10(a)(1)(B) Permit with a 5-year term

In comparison to Alternative B, impacts would be identical during the construction and reclamation period, but because the HCP would be in effect for a shorter period there would be fewer impacts from operations and maintenance covered by the ITP. However, since operations

and maintenance are reasonably foreseeable, these effects would be the same as under the preferred alternative.

4.3 Climate and Climate Change

4.3.1 Alternative A - No Action

There would be no impacts to or from climate or climate change.

4.2.2 Alternative B - Issuance of Section 10(a)(1)(B) Permit with a 50-year term (Preferred Alternative)

The Project is not subject to EPA PSD regulations and would have emissions of CO_2 that are less than the applicable thresholds for any of the stationary sources (see section 3.3.2 of this EA). Consequently, the Project would not be subject to the Federal Greenhouse Gas (GHG) permitting rule.

The Project will not significantly affect climate or climate change, nor will it be impacted by climate or climate change over the life of the project due to the limited emissions within the Permit Area. A detailed environmental analysis of Climate and Climate change (including GHGs) for the Keystone XL Project is provided in Section 3.12 of the FEIS.

No significant impacts to or from climate and climate change are anticipated from the Project because air emitting facilities associated with the Keystone XL Project and described in section 3.12 of the FEIS are not located within the Project area being analyzed in this EA. Therefore, the impacts within the Project area are negligible.

Future climate change may affect the habitat preserves that provide mitigation for the Project's impacts to ABB. However, management of those preserves is governed by legal agreements other than the HCP and are beyond the scope of this analysis.

4.2.3 Alternative C - Issuance of Section 10(a)(1)(B) Permit with a 5-year term

In comparison to Alternative B, impacts would be identical during the construction and reclamation period, but because the HCP would be in effect for a shorter period there would be fewer impacts from operations and maintenance covered by the ITP. However, since operations and maintenance are reasonably foreseeable, these effects would be the same as under the preferred alternative.

4.4 Air Quality

4.2.1 Alternative A - No Action

There would be no impacts to air quality.

4.2.2 Alternative B - Issuance of Section 10(a)(1)(B) Permit with a 50-year term (Preferred Alternative)

The Keystone XL Project FEIS (Section 3.12) determined that construction-related emissions associated with the Keystone XL Project would be temporary and localized and would not produce major long-term effects on local or regional air quality. As the Project within the Permit

Area is a smaller component of the originally proposed Keystone XL Project, it would not produce long-term effects on local or regional air quality.

During construction of the Project, there would be a short-term impact on local air quality during periods of site preparation, construction, and cleanup. The primary construction-related emissions would be particulate matter (PM), or fugitive dust, which would be produced by excavation and earth moving. Any effects from fugitive dust would be temporary and would vary in scale depending on local weather conditions, the degree of construction activity, and the nature of the construction activity. During construction, this effect would be minimized by Keystone's commitment to requiring the contractor to adhere strictly to dust control measures, such as wetting newly cleared ROWs and access roads or reseeding disturbed areas as quickly as possible after cleanup.

Construction-related equipment would produce air pollutants associated with diesel and gasoline combustion (nitrogen oxides, carbon and sulfur oxides, hydrocarbons, and PM). These emissions would be confined to the daytime hours and would be generated only during active construction periods. Due to the linear nature of the project, construction-related activities would not last long at any one place.

Operational impacts would include minimal fugitive emissions from crude oil pipeline connections and pumping equipment at the pump stations, and minimal emissions from mobile sources. Pipeline pumps would be electrically powered. Although MLVs would have back-up generators, they would only be used during emergencies and upsets.

Vehicle and equipment emissions would also occur during the operation and maintenance of the Project whenever the ROWs were driven and vegetation was trimmed from the ROWs. However, these activities would occur infrequently and be of short duration.

No significant impacts to air quality are anticipated as impacts from construction related activities would only occur during the pipeline construction (i.e., dust, construction equipment emissions). Permanent facilities such as pump stations and MLVs in the Project area would all be electrically powered with only back-up generation for emergencies or upsets as stated in Section 4.4.1; therefore, emissions would be negligible.

Vehicle and equipment emissions would also occur during the operation and maintenance of the Project, but since these activities would occur infrequently and be of short duration, impacts to air quality from operation and maintenance are expected to be negligible.

4.2.3 Alternative C - Issuance of Section 10(a)(1)(B) Permit with a 5-year term

In comparison to Alternative B, impacts would be identical during the construction and reclamation period, but because the HCP would be in effect for a shorter period there would be fewer impacts from operations and maintenance covered by the ITP. However, since operations and maintenance are reasonably foreseeable, these effects would be the same as under the preferred alternative.

4.5 Soils and Geology

4.5.1 Alternative A - No Action

There would be no impacts to soils and geology.

4.5.2 Alternative B - Issuance of Section 10(a)(1)(B) Permit with a 50-year term (Preferred Alternative)

Pipeline construction activities, including clearing, grading, trench excavation, backfilling, equipment traffic, and restoration along the construction ROW, could adversely affect soil resources. Section 2.2.3 of this EA describes the number of acres of land where ground disturbance activities will likely occur that may therefore impact soils and geology. Other subsections of section 2 describe specific areas of impact from construction. Minor and localized impacts to soil resources may occur during operational and emergency response activities. In addition, the construction of pump stations, access roads, and the tank farm could also affect soil resources. Potential impacts could include temporary and short-term soil erosion, loss of topsoil, short-term to long-term soil compaction, permanent increases in the proportion of large rocks in the topsoil, soil mixing, and short-term to permanent soil contamination.

The Project CMR Plan (Appendix A) includes construction procedures that are designed to reduce the likelihood and severity of impacts on soils.

Based on the evaluation of potential seismic hazards along the ROW in Oklahoma, the risk of pipeline rupture from earthquake ground motion is negligible. Hydraulic fracturing activity is known to occur within the Permit Area; however, there is currently no data to suggest that such activity would have an impact on the integrity of the Project. The route would not cross any known active faults and is located outside of known zones of high seismic hazard.

Implementation of temporary erosion control structures would reduce the likelihood of any construction-triggered landslides. Potential erosion control measures would include trench-breakers, slope-breakers or water bars, and erosion control matting or mulching. In addition, areas disturbed by construction along the pipeline ROW would be revegetated consistent with the CMR Plan (Appendix A) and special landowner or land manager requirements.

The overall risk to the pipeline from karst-related subsidence is expected to be minimal. Impacts to surficial geologic deposits would be localized to the trench, and since the material is returned to the trench, the impacts are expected to be temporary.

Table 4.5.1-1 and Table 4.5.1-2 provide summaries of approximate miles of pipeline ROW by impact area within the Permit Area that would cross soils exhibiting these characteristics. The tables include the approximate acreage (including proposed pump station locations) of soils containing these characteristics that would be disturbed by the Project.

Table 4.5.1-1
Approximate Miles of Soil Characteristics Crossed by the Project in Oklahoma Inside the Permit Area

Impact Area	Highly Erodible (Wind)	Highly Erodible (Water)	Prime Farmland	Hydric	Compaction Prone	Stony-Rocky	Shallow Bedrock	Drought Prone
ABB RANGE	13.8	23.2	68.1	5.9	115.5	28.5	14.4	21.0
ABB RANGE AND CONSERVATION PRIORITY AREA	8.0	15.6	42.0	3.8	74.7	12.0	13.2	9.1

Table 4.5.1-2
Approximate Acreage of Soil Characteristics Crossed by the Project in Oklahoma Inside the Permit Area

Impact Type	Highly Erodible (Wind)	Highly Erodible (Water)	Prime Farmland	Hydric	Compaction Prone	Stony-Rocky	Shallow Bedrock	Drought Prone
ABB RANGE	195	333	971	77	1643	405	201	300
ABB RANGE AND CONSERVATION PRIORITY AREA	110	221	573	52	1036	170	182	127

Note: Soils along the Project alignment may have multiple soil characteristics so may be present in multiple categories

The Project route in northern Oklahoma is located within the Central Great Plains Winter Wheat and Range Land Resource Region and the south-western Prairies Cotton and Forage Region (USDA 2006). The south-western Prairies Cotton and Forage Region consist of gently rolling to hilly uplands dissected by numerous streams. In Seminole County, soils contain siliceous mineralogy and may contain bentonite. Soils range from shallow to very deep, somewhat excessively drained to somewhat poorly drained, and are typically loamy or clayey. Soils formed in alluvium on stream terraces, residuum on hills, and colluvium on foot-slopes. From southern Hughes County through Atoka County, soils have smectitic, carbonatic, or mixed mineralogy and were formed from limestone residuum. Soils in the southern portion of Oklahoma are generally deep to very deep, well-drained to moderately well-drained, and loamy or clayey.

The Project in Oklahoma traverses the Central Lowland physiographic province beginning in Cushing to northern Atoka County, where the Gulf Coastal Plains physiographic province begins and continues into Texas. Surface elevations range from 900 feet in central Oklahoma to 450 feet at the Texas state line. The route would cross three EPA Level IV Ecoregions, each with a distinct physiography (Woods et al. 2005).

Table 4.5.2
Physiographic Characteristics of Eco-regions Crossed within the Permit Area in Oklahoma by the Project

	MP Range	Physiographic Description	Elevation Range (ft AMSL)	Local Relief (ft)	Surface Geology	Bedrock Geology
Cross Timbers –Northern Cross Timbers	16 -78	Rolling hills, cuestas, ridges, and ledges. Contains shallow streams with sandy substrates and sometimes deep pools, riffles, and bedrock, cobble, or gravel substrates.	600 - 1,300	100 -350	Uplands contain Quaternary clayey silt to silty clay residuum. Valleys contain Quaternary alluvium. Rock outcrops are common.	Pennsylvanian and Permian sandstone,shale, and limestone.
Arkansas Valley –Lower Canadian Hills	78 - 119	Hill and valley topography in structural Arkoma Basin with scattered ridges and ponds. Streams contain pools and have substrated composed of cobbles, gravel, and sand.	500 - 1,000	50 -300	Quaternary terrace deposits, alluvium, and sandy to silty clay loam residuum.	Pennsylvanian shale and sandstone.
South Central Plains – Cretaceous Dissected Uplands	119 - 138, 140 - 155	Level to hilly, dissected uplands and low cuestas. Large streams are deep and slow moving and have muddy or sandy bottoms. Smaller streams contain gravel, cobble and boulder substrates.	310 –700	Less than 50 - 200	Quaternary alluvium in valleys. Uplands contain poorly consolidated, calcareous sands, clays, gravels, and limestone.	Calcareous sands, clays, gravels, and limestone.

EPA Level III-IV Ecoregion name. Source: Omernik 2009.

EPA Level III-IV Ecoregion name. Source: Bryce et al. 1996.

No significant impacts to soils and geology are anticipated due to the temporary nature of the impact. Construction of the pipeline will include temporary grading of the ROW, excavation of the trench for pipeline installation, laying and padding of the pipeline, backfilling of the trench to preconstruction conditions, and reseeding to complete the restoration of the ROW. The Project CMR Plan (Appendix A) includes construction procedures that are designed to reduce the likelihood and severity of impacts on soils.

4.5.3 Alternative C - Issuance of Section 10(a)(1)(B) Permit with a 5-year term

In comparison to Alternative B, impacts would be identical during the construction and reclamation period, but because the HCP would be in effect for a shorter period there would be fewer impacts from operations and maintenance covered by the ITP. However, since operations and maintenance are reasonably foreseeable, these effects would be the same as under the preferred alternative.

4.6 Water Resources

4.6.1 Alternative A - No Action

There would be no additional impacts to water resources beyond existing conditions.

4.6.2 Alternative B - Issuance of Section 10(a)(1)(B) Permit with a 50-year term (Preferred Alternative)

Implementation of measures as described in the Project CMR Plan and additional conditions from permitting agencies would reduce adverse impacts resulting to wetland and waterbody crossings. All contractors would be required to follow the identified procedures to limit erosion and other land disturbances. The CMR Plan (Appendix A) describes the use of buffer strips, drainage diversion structures, sediment barrier installations, and clearing limits, as well as procedures for waterbody restoration at crossings.

The pipeline would be constructed under river channels with potential for lateral and vertical scour. Day-lighting of the pipeline will be avoided during scour and channel meandering events by laying the pipeline below scour depth across the entire floodplain. In floodplain areas and wetlands, the contours would be restored to as close to pre-construction contours as practical and the area would be revegetated in accordance with Keystone's CMR Plan (Appendix A). Therefore, after construction the pipeline would not obstruct flows over designated floodplains and wetland habitats. During the operations phase, minor localized impacts to water resources may occur during pipeline maintenance and emergency response activities. All maintenance and emergency response procedures will be done per environmental protection measures contained in the Project operations plan.

Wetland impacts within the Permit Area would include the permanent functional conversion of less than one acre of forested wetlands to emergent wetlands. Impacts to emergent wetlands would be temporary and the areas would be restored and monitored after construction. Mitigation efforts to offset the forested wetland impacts within the Permit Area were coordinated through the USACE, Tulsa District during CWA Section 404 permitting and included the establishment of an approximate 10 acre forested wetland mitigation area.

Hydrostatic test water would be discharged to the source water at an approved location along the waterway/wetland or to an upland area within the same drainage as the source water where it may evaporate or infiltrate. Discharged water would be tested to ensure it meets applicable water quality standards imposed by the discharge permits for the state of Oklahoma. The Project CMR Plan (Appendix A) incorporates additional measures designed to minimize the impact of hydrostatic test water discharge, including regulation of discharge rate, the use of energy dissipation devices, channel lining, and installation of sediment barriers as necessary.

Approximately 2.11 miles of wetlands are crossed within the Permit Area of the Project route including 1.40 miles of palustrine forested wetlands. The FEIS describes the water resources impacted by the Keystone XL Project, including those resources within the Permit Area, in detail in Section 3.3 (FEIS August 26, 2011).

No significant impacts to water resources are anticipated as the Project will only include minor impacts to water resources as stated in Section 4.6.1. Nearly all impacts will be temporary except of the functional conversion of less than 1 acre of forested wetlands to emergent wetlands of operation of the pipeline for maintenance and safety reasons. This small permanent conversion is also being mitigated as required by the USACE and will result in no net loss of habitat through compensatory mitigation.

In addition, implementation of measures as described in the Project CMR Plan and additional conditions from permitting agencies would reduce adverse impacts resulting to wetland and

waterbody crossings. All contractors would be required to follow the identified procedures to limit erosion and other land disturbances. In floodplain areas and wetlands, the contours would be restored to as close to pre-construction contours as practical and the area would be revegetated. The Project CMR Plan (Appendix A) incorporates additional measures designed to minimize the impact of hydrostatic test water discharge. As such, impacts to water resources resulting from the Project are considered insignificant.

4.6.3 Alternative C - Issuance of Section 10(a)(1)(B) Permit with a 5-year term

In comparison to Alternative B, impacts would be identical during the construction and reclamation period, but because the HCP would be in effect for a shorter period there would be fewer impacts from operations and maintenance covered by the ITP. However, since operations and maintenance are reasonably foreseeable, these effects would be the same as under the preferred alternative.

4.7 Biological Resources

4.7.1 Vegetation

4.7.1.1 Alternative A - No Action

There would be no impacts to vegetation resources.

4.7.1.2 Alternative B - Issuance of Section 10(a)(1)(B) Permit with a 50-year term (Preferred Alternative)

The primary impacts on vegetation from construction and operation of the Project within the Permit Area would be cutting, clearing, or removing the existing vegetation within the construction work area and potential invasion by noxious weeds. The degree of impact would depend on the type and amount of vegetation affected, the rate at which vegetation would regenerate after construction, and the frequency of vegetation maintenance conducted on the ROW during pipeline operation.

Impacts on annually tilled croplands also generally would be short-term and limited to the current growing season as topsoil will be segregated and soils will not be compacted after reclamation activities. Impacts on pastures, rotated croplands, and open grassland range generally would be temporary, with vegetation typically re-establishing within one to five years after construction. Impacts on these communities during operation of the pipeline would be minimal because these areas would recover following construction and typically would not require maintenance mowing.

Clearing trees within upland and riparian forest communities would result in long-term impacts to these vegetation communities, given the length of time needed for the community to mature to pre-construction conditions. Permanent impacts would occur within the 50-foot-wide permanent easements centered on the pipeline. In this area, 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 frequently than every one to three years. Minor and localized impacts to vegetation resources may also occur during emergency response activities.

Impacts on scrub land also would be long-term because of the time required to re-establish the woody vegetation characteristic of this community type. Most shrubs would be expected to re-establish within the non-maintained portion of the ROW within 5 to 15 years. The permanent easement in shrub land would not be regularly mowed or cleared and would be allowed to revegetate.

As discussed in the Keystone XL Project FEIS Appendix L, operation of the Project would not have any significant effect on surface soil temperatures in Oklahoma. Therefore, no impacts to vegetation from heating of surrounding soils would occur.

To reduce impacts on vegetation within the construction and permanent ROW and to improve the probability of successful revegetation of disturbed areas, the measures as described in the Project CMR Plan (Appendix A) would be implemented in accordance with applicable permits.

No significant impacts to vegetation resources are anticipated due to the temporary nature of the majority of the impacts. Vegetative communities in all but forested areas will be restored typically within 3 years of construction. The removal of trees from the construction ROW will result in a permanent change in cover type of approximately 231 acres of forested habitat, but this will be partially offset by allowing trees to re-establish outside the 50-foot permanent ROW. Impacts on scrub land would also be long-term because of the time required to re-establish woody vegetation. However, the Preferred Alternative includes offsite mitigation in the form of preserved habitat for the ABB that will likely contribute to the preservation of some forest and other woody vegetation communities. These areas (the location of which is currently unknown) would be protected from development and thus retain vegetative values that might otherwise be lost.

Only a small amount of acreage will be permanently impacted from the construction of aboveground facilities in the Project area. As such, impacts to vegetation resources are considered insignificant.

4.7.1.3 Alternative C - Issuance of Section 10(a)(1)(B) Permit with a 5-year term

In comparison to Alternative B, impacts would be identical during the construction and reclamation period, but because the HCP would be in effect for a shorter period there would be fewer impacts from operations and maintenance covered by the ITP.

4.7.2 General Wildlife

4.7.2.1 Alternative A – No Action

There would be no impacts to wildlife resources.

4.7.2.2 Alternative B – Issuance of Section 10(a)(1)(B) Permit (Preferred Alternative)

The major impact to wildlife comes in the form of temporary habitat loss during the period of construction and reclamation, and some habitat fragmentation where the pipeline does not collocate with existing ROWs in forested habitat within the Permit Area. Limited permanent habitat loss occurs at pump stations and MLV locations. However, these areas are small in the context of the available habitat in the Project Area and are mostly located in agricultural areas (hay fields, row crop, and pasture lands) with no forested impacts. Permanent loss of forested habitat will occur within the permanent ROW easement; however, all adjacent temporary work

areas cleared during construction will be allowed to regenerate as forested areas. As discussed in the CMR Plan, Keystone will restore the construction work areas to reclaim them so the landowner may continue to use the land in a manner consistent with preconstruction use. Operational procedures will include maintaining a portion of the ROW in an herbaceous state as outlined in the CMR Plan (Appendix A). Minor and localized impacts to wildlife may occur during operational and emergency response activities.

No significant impacts to wildlife resources are anticipated due to the primarily temporary impacts to habitat for wildlife resources as described above in Section 4.7.2.1. Although some species of wildlife may be displaced during construction, this phase is brief and impacts are expected to be negligible. In addition, conservation measures for ABBs are likely to provide a benefit to general wildlife and mitigation lands that will be preserved in perpetuity may also provide permanent habitat for some species.

4.7.2.3 Alternative C - Issuance of Section 10(a)(1)(B) Permit with a 5-year term

In comparison to Alternative B, impacts would be identical during the construction and reclamation period, but because the HCP would be in effect for a shorter period there would be fewer impacts from operations and maintenance covered by the ITP. However, since operations and maintenance are reasonably foreseeable, these effects would be the same as under the preferred alternative.

4.7.3 Covered Species

4.7.3.1 Alternative A – No Action

There would be no impacts to ABB in the Permit Area.

4.7.3.2 Alternative B – Issuance of Section 10(a)(1)(B) Permit (Preferred Alternative)

The major impact to ABB comes in the form of temporary habitat loss during the period of construction for the pipeline and permanent loss of habitat for the aboveground facilities. In total these impacts to ABB habitat within the ABB Habitat Range (including the Conservation Priority Area) would include approximately 17.3 acres of permanent habitat loss and 434.7 acres of temporary habitat impacts. Within the Conservation Priority Area alone, impacts would include 7.0 acres of permanent habitat loss and 308.6 acres of temporary habitat impacts. In addition, permanent impacts resulting from new fragmentation of forested habitat would include a total of 27.3 acres within the ABB Habitat Range of which 6.0 acres is located within the Conservation Priority Area (Keystone 2012).

Minor amounts of incidental take of ABB may occur during operational and emergency response activities, which are addressed in the HCP. Keystone has requested authorization for an additional 65 acres of impact to assure that their authorized take would not be exceeded during the life of the requested ITP.

The impact acreages in this section included subtraction of habitat following the Service's ABB unsuitable habitat guidelines for Oklahoma. Conservation measures as described in the HCP will decrease the impact to individual ABBs and habitat and mitigation will be implemented to further offset adverse impacts. The HCP includes additional details regarding the evaluation of impacts to ABB.

Conservation measures as described in the HCP (section 6.3.1 of the HCP) will be implemented to limit impacts to the ABB. Minimization measures include: carrion surveys within the consultation range for ABB according to the Service's most recent Carrion Survey Protocol prior to regularly scheduled maintenance; during the active season; limited clearing in temporary work areas; limited use of artificial lighting; and an education program for construction personnel. Mitigation Measures will include re-establishment of vegetation; relief of soil compaction after construction, addition of supplemental soil in appropriate areas, and erosion control. Mitigation in the form of permanent habitat preservation will also be implemented to offset the temporary and permanent impacts within the ABB Habitat Range and Conservation Priority Areas (section 5.1.2.3 of the HCP). Possible incidental take from operation and emergency response activities would be minor and is included within the mitigation as outlined in the HCP (section 6.3 of the HCP). Due to the combined measures listed here and fully described in the HCP, impacts to the ABB are considered insignificant.

4.7.3.3 Alternative C - Issuance of Section 10(a)(1)(B) Permit with a 5-year term

In comparison to Alternative B, impacts would be identical during the construction and reclamation period, but because the HCP would be in effect for a shorter period there would be fewer impacts from operations and maintenance covered by the ITP. Keystone would need take authorization under some other mechanism, so minimization measures and mitigation under such mechanism are unknown at this time. However, since operations and maintenance are reasonably foreseeable, these effects would be the same as under the preferred alternative.

4.7.4 Evaluation Species

4.7.4.1 Alternative A – No Action

There would be no impacts to any evaluation species.

4.7.4.2 Alternative B – Issuance of Section 10(a)(1)(B) Permit (Preferred Alternative)

Bald Eagle: One active bald eagle nest is located in the Permit Area within 1,203 feet from the ROW near the North Canadian River. There is no direct line-of-site from the nesting location to the pipeline ROW. Therefore, no significant impacts to the bald eagle resulting from the issuance of an ITP are anticipated.

Least Tern: The Project will not impact nesting or migration habitat within the Permit Area. Therefore, no significant impacts to the Least Tern resulting from the issuance of an ITP are anticipated.

Sprague's Pipit: The Project will not impact migration or wintering habitats within the Permit Area. Therefore, no significant impacts to the Sprague's Pipit resulting from the issuance of an ITP are anticipated.

Whooping Crane: The Project will not impact migration habitat within the Permit Area. Therefore, no significant impacts to the Whooping Crane resulting from the issuance of an ITP are anticipated.

Piping Plover: The Project will not impact migration habitat within the Permit Area. Therefore, no significant impacts to the Piping Plover resulting from the issuance of an ITP are anticipated.

Arkansas River Shiner: The project will not impact the South Canadian River as it is no longer being considered for a site for hydrostatic test water withdrawal. Both the South Canadian and North Canadian rivers will be crossed using HDD techniques. Therefore, no significant impacts to the Arkansas River Shiner resulting from the issuance of an ITP are anticipated.

In summary, no significant impacts to any evaluation species in the project area with the issuance of an ITP are anticipated.

No significant impacts to any evaluation species are anticipated as the Project has taken into account these species and has conducted surveys and taken necessary measures to ensure construction and operation from the Project will not likely adversely impact these species as described above in Section 4.8.2.1.

4.7.4.3 Alternative C - Issuance of Section 10(a)(1)(B) Permit with a 5-year term

In comparison to Alternative B, impacts would be identical during the construction and reclamation period, but because the HCP would be in effect for a shorter period there would be fewer impacts from operations and maintenance covered by the ITP. However, since operations and maintenance are reasonably foreseeable, these effects would be the same as under the preferred alternative.

4.7.5 State Special Status Species

4.7.5.1 Alternative A – No Action

There would be no impacts to any state special-status species.

4.7.5.2 Alternative B – Issuance of Section 10(a)(1)(B) Permit (Preferred Alternative)

State special-status species are discussed in Section 3.8.3 of the Keystone XL Project FEIS and the list of those species specific to Oklahoma is provided in Section 3.7.5 of this EA. Owing to the sporadic distribution and other factors, no significant impacts to Oklahoma species of concern listed in Section 3.7.5 are anticipated as a result of issuance of the ITP.

No significant impacts to any state special-status species are anticipated due to the sporadic distribution of these species and their transient nature.

4.7.5.3 Alternative C - Issuance of Section 10(a)(1)(B) Permit with a 5-year term

In comparison to Alternative B, impacts would be identical during the construction and reclamation period, but because the HCP would be in effect for a shorter period there would be fewer impacts from operations and maintenance covered by the ITP. However, since operations and maintenance are reasonably foreseeable, these effects would be the same as under the preferred alternative.

4.7.6 Invasive Species

4.7.6.1 Alternative A – No Action

There would be no impacts from invasive species.

4.7.6.2 Alternative B – Issuance of Section 10(a)(1)(B) Permit (Preferred Alternative)

Specific noxious weed sources along the pipeline corridor in Oklahoma have not been identified through field surveys. In a commitment to control the introduction and spread of noxious weeds, the construction and restoration procedures detailed in the CMR Plan (Appendix A) would be implemented. Noxious Weed Control Plans were prepared for the Project in coordination with applicable county weed boards in Oklahoma. Measures incorporated as part of the noxious weeds plan will minimize any potential impact from spreading of non-native species within the Project corridor or to adjacent properties.

No significant impacts from invasive species are anticipated due to the Project implementing Noxious Weed Control Plans and taking necessary precautions to prevent the spread of invasive species.

4.7.6.3 Alternative C - Issuance of Section 10(a)(1)(B) Permit with a 5-year term

In comparison to Alternative B, impacts would be identical during the construction and reclamation period, but because the HCP would be in effect for a shorter period there would be fewer impacts from operations and maintenance covered by the ITP. However, since operations and maintenance are reasonably foreseeable, these effects would be the same as under the preferred alternative.

4.8 Cultural Resources

4.8.1 Alternative A – No Action

There would be no impacts to cultural resources.

4.8.2 Alternative B – Issuance of Section 10(a)(1)(B) Permit (Preferred Alternative)

Keystone has completed consultation with the SHPO for the Project in Oklahoma as required pursuant to the NHPA. Based on this consultation, the SHPO concurred that the Project would not have significant adverse impacts on any historic properties. Keystone has also actively engaged in tribal consultations within Oklahoma and will continue to coordinate with the tribes through construction and monitoring.

The Project route crosses the Historic Route 66 (designated 34LN164/CCUL2ALNx.001), which falls under the purview of the Route 66 Corridor Preservation Program administered by the NPS' National Trails System Office. Additionally, portions of Route 66 in Oklahoma are listed in the NRHP. Though the segment within the Permit Area is not listed, it could be a contributing segment according to NRHP Criteria for Evaluation and specific considerations established in the state-wide NRHP nomination form. Cultural resource investigations conducted in the vicinity of the route identified a portion of the abandoned roadbed. The Applicant's architectural historian and archaeologists completed a site form and historic preservation resource identification form for Route 66. The Project will avoid potential effects to Route 66 by boring beneath this resource.

No significant impacts to cultural resources are anticipated based on consultations with the SHPO and avoidance and minimization of sensitive cultural areas. As stated in Section 4.8.5.1, the Oklahoma SHPO has concurred that the Keystone Gulf Coast Project in Oklahoma will not adversely affect historic properties.

4.8.3 Alternative C - Issuance of Section 10(a)(1)(B) Permit with a 5-year term

In comparison to Alternative B, impacts would be identical during the construction and reclamation period, but because the HCP would be in effect for a shorter period there would be fewer impacts from operations and maintenance covered by the ITP. However, since operations and maintenance are reasonably foreseeable, these effects would be the same as under the preferred alternative.

4.9 Land Use

4.9.1 Alternative A – No Action

There would be no impacts to land use.

4.9.2 Alternative B – Issuance of Section 10(a)(1)(B) Permit (Preferred Alternative)

Changes in land use due to construction would for the most part be temporary and are described in Section 2.4 of this EA. All disturbed workspaces will be restored and revegetated. With the exception of tree growth over the pipeline, nearly all previous land uses will be allowed to revert to preconstruction uses.

Operation of the Project would affect approximately 231 acres of forested habitat within the Permit Area. Trees would be allowed to regrow only in the temporary ROW after construction, consistent with USDOT pipeline safety standards and Keystone requirements for aerial pipeline safety inspections. This 231 acre estimate is conservative as Keystone may only maintain a 30 foot easement in an herbaceous state whereas this acreage is currently assuming they would maintain the entire 50 foot easement in uplands in an herbaceous state.

No significant impacts to land use are anticipated due to the temporary nature of the majority of the impacts as described above in Section 4.10.1. Only forested areas in the 50-foot (or less) permanent ROW would not be allowed to return to its former use. The total area lost would be approximately 231 acres, or less. Given that these acres are in a linear path, impacts to any one landowner is not likely to rise to the level of significance.

4.9.3 Alternative C - Issuance of Section 10(a)(1)(B) Permit with a 5-year term

In comparison to Alternative B, impacts would be identical during the construction and reclamation period, but because the HCP would be in effect for a shorter period there would be fewer impacts from operations and maintenance covered by the ITP. However, since operations and maintenance are reasonably foreseeable, these effects would be the same as under the preferred alternative.

4.10 Socioeconomics and Land Values

4.10.1 Alternative A – No Action

There would be no impacts to socioeconomics.

4.10.2 Alternative B – Issuance of Section 10(a)(1)(B) Permit (Preferred Alternative)

Within Oklahoma, additional jobs and income would go to workers who would leave the area upon Project completion. In the long-term, a small number of people would be needed to maintain the line within the state. Unemployment rates in the Permit Area would probably not be affected in the long-term, although there could be a short-term lowering of unemployment during construction in the more rural areas.

Population impacts in the region of influence would depend upon the composition of the construction work force in terms of local versus non-local workers and the existing population of the area. Temporary local construction labor would be utilized where possible. It is estimated that up to 50% of the total construction work force could be hired from local communities, with the remaining workers from outside the local area. Few non-local workers would likely be accompanied by their children or other family members because of the mobile nature of the work force along the pipeline route during construction.

Non-local construction workers temporarily residing in other areas in the region of influence would require short-term accommodations. Because workers would not likely relocate with their families and their stay in any one community would be temporary, most workers would likely use temporary housing, such as hotels/motels, RV sites, and campgrounds. Most workers likely would prefer short-term accommodations, primarily hotels, motels, and RV parks, in the more populated, service-oriented communities located within a reasonable commuting distance from the work site.

The Project has the potential to generate substantial direct and indirect economic benefits for local and regional economies along the pipeline route. During construction, these benefits are derived from the construction labor requirements of the Project and spending on construction goods and services that would not otherwise have occurred if the pipeline were not built. At the local level, these benefits would be in the form of employment of local labor as part of the construction work force and related income benefits from wage earnings, construction expenditures made at local businesses, and construction worker spending in the local economy.

Construction of the Project could lead to short-term impacts to property values due to short-term visual, noise, and land disturbance effects. Although the permanent ROW would be restored after construction, continued access to the proposed Project ROW would be required to support surface and aerial inspections and any necessary repairs or maintenance for the useful life of the Project. Potential damages to private property during Project operation would likely be concentrated along the permanent ROW and at appurtenant facilities. Land disturbed by the Project would be restored to the extent practicable; to repair or restore fences and land productivity damaged or adversely affected during construction; and to compensate property owners for any additional damages caused by Project construction.

No significant impacts to socioeconomics are anticipated. Temporary jobs created during construction could provide a temporary benefit to socioeconomics. Only a small number of people would be needed to maintain the line within the state and therefore add to the local economy. Impacts to land values would be short term.

4.10.3 Alternative C - Issuance of Section 10(a)(1)(B) Permit with a 5-year term.

In comparison to Alternative B, impacts would be identical during the construction and reclamation period, but because the HCP would be in effect for a shorter period there would be fewer impacts from operations and maintenance covered by the ITP. However, since operations and maintenance are reasonably foreseeable, these effects would be the same as under the preferred alternative.

4.11 Environmental Justice

4.11.1 Alternative A – No Action

There would be no impacts to environmental justice.

4.11.2 Alternative B – Issuance of Section 10(a)(1)(B) Permit (Preferred Alternative)

The Project route in the Permit Area would not cross within 2 miles of counties that had greater than 50% of the state-wide average for minority or low-income populations at the time of census data collection. However, six Oklahoma counties were identified as having a meaningfully greater minority population than the state-wide average and seven counties were identified as having a meaningfully greater low-income population than the state-wide average. When looking at the types of facilities that will be present in those counties, including the pipeline ROW, most are temporary pipe and contractor yards, which would not disproportionately burden low-income or minority populations.

Impacts to minority and low-income populations during construction would include exposure to construction dust and noise, potential disruption of traffic patterns, and increased competition for social services in underserved populations. Mitigation for these impacts to environmental justice communities would involve ensuring that adequate communication regarding the construction schedule and construction activities is provided to these communities in appropriate languages and with information on how to seek needed social services in the event of health or other social service disruption related to construction activities. Keystone would also develop public awareness materials with special emphasis on considerations of low income and minority communities.

With respect to employment opportunities for all minority and low income populations, Keystone is committed to employee and supplier diversity; has in place continuing Affirmative Action plans for females, minorities, individuals with disabilities and covered veterans; and supports a policy of equal opportunity for Minority and Women-Owned Business Enterprises and Historically Underutilized Businesses.

In addition, Keystone has worked with Hispanic leaders, communities and organizations in order to keep minority and other special interest communities informed about the Project and to seek the input of these communities. The relationship between Keystone and community leaders and interest groups facilitates community education on the Project and its potential relevance to members, and establishes communications so that Project contractors can quickly and efficiently communicate available jobs. Specific outreach efforts to Hispanic communities to date have included publishing and circulating a Project brochure and other materials in Spanish and

English, and steps are being taken to publish information in the media through relationships with the National Association of Hispanic Publications and other primarily Hispanic media. In addition, the Keystone U.S. Landowner Operations Hotline is staffed with bilingual personnel, the Integrated Public Awareness program will utilize bilingual English/Spanish print materials, and the design package would utilize bilingual warning signage in appropriate locations.

No significant impacts to environmental justice are anticipated as the Project has accounted for these potential impacts in its analysis as described above in Section 4.12.1. Keystone has implemented a number of outreach and coordination activities to ensure that environmental justice impacts are minimized.

4.11.3 Alternative C - Issuance of Section 10(a)(1)(B) Permit with a 5-year term

In comparison to Alternative B, impacts would be identical during the construction and reclamation period, but because the HCP would be in effect for a shorter period there would be fewer impacts from operations and maintenance covered by the ITP. However, since operations and maintenance are reasonably foreseeable, these effects would be the same as under the preferred alternative.

4.12 Roads and Aviation Facilities

4.12.1 Alternative A – No Action

There would be no impacts to roads or aviation facilities.

4.12.2 Alternative B – Issuance of Section 10(a)(1)(B) Permit (Preferred Alternative)

Major highways and transit corridors will be crossed using trenchless crossing procedures (i.e., HDDs, conventional bores) while other roadways will be crossed using multiple techniques also including open cut techniques.

Existing public and private roads would be used to provide access to most of the construction ROW. Paved roads would not likely require improvement or maintenance prior to or during construction. However, the road infrastructure would be inspected prior to construction to ensure that the roads, bridges, and cattle guards would be able to withstand oversized vehicle use during construction. Gravel roads and dirt roads may require maintenance during the construction period due to high use. Unpaved road improvements such as blading and filling would generally be restricted to the existing road footprint; however, some roads may require widening in some areas. When construction is completed, Keystone would restore the roads to their preconstruction condition or better. Impacts to roads would be temporary in nature.

Since there are no airports or runways within one mile of the Project or Permit Area in Oklahoma, none will be affected.

No significant impacts to roads or aviation facilities are anticipated.

4.12.3 Alternative C - Issuance of Section 10(a)(1)(B) Permit with a 5-year term

In comparison to Alternative B, impacts would be identical during the construction and reclamation period, but because the HCP would be in effect for a shorter period there would be fewer impacts from operations and maintenance covered by the ITP. However, since operations and maintenance are reasonably foreseeable, these effects would be the same as under the preferred alternative.

4.13 Human Health and Safety

4.13.1 Alternative A – No Action

There would be no impacts to human health and safety.

4.13.2 Alternative B – Issuance of Section 10(a)(1)(B) Permit (Preferred Alternative)

A considerable amount of detailed analysis on the potential for spills, the impacts, and mitigation measures is provided in Section 3.13 of the Keystone XL Project FEIS.

As a result of incorporation of the current PHMSA regulations, current industry standards, and the set of 57 Project-specific Special Conditions developed by PHMSA and agreed to by Keystone, as set forth in Appendix U of the FEIS, the Project would have a degree of safety over any other typically constructed domestic oil pipeline system under current code and a degree of safety similar to that which is required in HCAs as defined in 49 CFR § 195.450.

No significant impacts are anticipated to human health and safety due to the implementation of safety measures as stated in Section 4.13.1.

4.13.3 Alternative C - Issuance of Section 10(a)(1)(B) Permit with a 5-year term

In comparison to Alternative B, impacts would be identical during the construction and reclamation period, but because the HCP would be in effect for a shorter period there would be fewer impacts from operations and maintenance covered by the ITP. However, since operations and maintenance are reasonably foreseeable, these effects would be the same as under the preferred alternative.

4.14 Noise

4.14.1 Alternative A – No Action

There would be no impacts from noise.

4.14.2 Alternative B – Issuance of Section 10(a)(1)(B) Permit (Preferred Alternative)

During construction occasional, short-term intervals, noise levels may the range of normal noise levels for a given area. There are no regulations in rural areas along the pipeline route applicable to construction noise. In municipal areas, pipeline construction noise levels would comply with any applicable municipal regulations. In areas near residences and businesses where

construction activities or noise levels may be considered disruptive, work schedules would be coordinated to minimize disruption.

Any noise impacts from operation of the pipeline would be from 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 back-up generators for emergencies and upsets; however, noise impacts would be infrequent and negligible.

During operation of the pipeline, the noise associated with the electrically-driven pump stations would be limited to the vicinity of the facilities. However, as distance attenuates noise, Keystone has made an effort to acquire enough land to minimize potential noise impacts to nearby residences.

No significant impacts from noise are anticipated. Construction activities would generate noise from heavy construction equipment and trucks used along the access roads and ROW. Levels of construction noise would be variable and intermittent, as equipment would be operated only when needed for a specific task. It is expected that construction activities would typically be limited to daytime hours; and therefore would not impact existing ambient nighttime noise levels. Peak noise levels in the range of near 100 dBA would occur on the active construction sites. These noise levels are high, but would be temporary and intermittent. Because most of the ROW is in sparsely inhabited areas, relatively few people would be affected by the noise.

4.14.3 Alternative C - Issuance of Section 10(a)(1)(B) Permit with a 5-year term

In comparison to Alternative B, impacts would be identical during the construction and reclamation period, but because the HCP would be in effect for a shorter period there would be fewer impacts from operations and maintenance covered by the ITP. However, since operations and maintenance are reasonably foreseeable, these effects would be the same as under the preferred alternative.

5.0 CUMULATIVE IMPACTS AND UNAVOIDABLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The analysis of cumulative impacts in this EA employs the definition of cumulative impacts found in the CEQ regulations implementing NEPA: the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such actions (40 CFR § 1508.7). Not all actions identified in this section would have cumulative impacts in all resource areas.

Section 3.14 of the Keystone XL FEIS discusses cumulative impacts associated with the entire Keystone XL Project.

5.1 Introduction

Cumulative impacts were assessed by combining the potential environmental impacts of the Project within the Permit Area with the impacts of substantial projects that have occurred in the past, are currently occurring, or are or planned in the future within the Project cumulative impact corridor relative to the Permit Area. Major reasonably foreseeable projects were identified in the proposed Permit Area and include wind power projects, such as wind farms and transmission lines to deliver wind energy to consumers, transportation projects, and urban growth. While there is only one permitted conservation plan in the area (Weyerhaeuser Company HCP for impacts to ABB from forestry practices), a General Conservation Plan for take of ABBs during construction, maintenance, operation, and repair of transmission lines, pipelines, and related oil or gas well field activities is in development that would include the Permit area.

In general, the Project cumulative impact corridor extends from one to two miles from the Project (pipeline) centerline within the Permit Area depending on the resource considered. The potential cumulative impact corridor for the Project encompasses the area of physical disturbance along the Project construction ROW and adjacent areas that could have localized impacts associated with temporary access roads and aboveground facilities. The actions considered in the cumulative impact analysis may vary from the Project in nature, magnitude, and duration. These actions are included based on their likelihood of occurrence, and only projects with either ongoing or reasonably foreseeable impacts are identified. Cumulative impacts that may occur outside of this impact corridor within the Permit Area are not considered in this EA.

50 years of Project operation within the Permit Area was assumed for the purpose of this analysis, although the Project could be operational beyond 50 years. Reasonably foreseeable future projects were considered if available information suggested that they could be implemented by 2015. For the purpose of this analysis, short-term effects were those that could occur during the construction period, and long-term impacts were those that could occur over the operational lifetime of the Project.

5.2 Cumulative Impact Analysis

5.2.1 Visual and Aesthetic Qualities

Cumulative impacts on visual resources could occur in areas within the Permit Area where past and reasonably foreseeable future projects such as wind farms and transmission lines to deliver

wind energy to consumers, transportation projects, and urban growth, in addition to the Project remove large swaths of vegetation and where permanent above-ground facilities are installed. Within the Project cumulative impact corridor, the additional visual impact from the Project would include ROW clearing through forested areas and aboveground components (e.g., pump stations, MLVs) that would contribute to an intensified industrial character.

Within most of the Project cumulative impact corridor, contribution to cumulative visual impacts due to Project construction activities would be limited to removal of existing vegetation, exposure of bare soils, earthwork and grading scars, and minor landform alterations including those from electric transmission lines. Along portions of the Project route where concurrent construction activities from other projects occur, temporary contributions to degradation in visual quality could result from the presence of construction crews, equipment, and dust. Over the long term, Project aboveground facilities could contribute, in the presence of similar facilities from past or future projects, to an increased industrial character within the Project cumulative impact corridor that could affect the visual quality of the area. However, due to facility siting requirements the visual impacts overall will likely be insignificant.

5.2.2 Climate Change

The cumulative impacts of the Project within the Permit area on climate change are not expected to be significant due to the minor sources of emissions within the Project Area. A detailed analysis of the cumulative impacts of the Keystone XL Project on climate change and potential effects of climate change on the Keystone XL Project are included in Section 3.14 of the FEIS.

5.2.3 Air Quality

The cumulative impacts of the Project within the Permit area on air quality are not expected to be significant due to the minor sources of air emissions within the Project Area. A detailed analysis of the cumulative impacts of the Keystone XL Project on air quality is included in Section 3.14 of the FEIS.

5.2.4 Water Resources

Cumulative impacts to waterbodies within the Permit Area of the Project cumulative impact corridor could occur if one or more projects cross the same waterbody in the same watershed. Some streams that would be crossed by the Project in the Permit Area are listed as impaired for turbidity. Where conditions warrant the use of the HDD crossing method, waterbody impacts of construction would be minimal since no direct contact would occur with stream banks, channel bed, or waters. Where non-HDD crossing methods are used, or in the event there is a “frac-out”, or inadvertent return of drilling lubricant (bentonite), during an HDD, there would be some short-term contribution to cumulative impacts within the cumulative impact corridor.

The Project would adhere to applicable local, state, and federal regulations and permit conditions that would require the use of best management practices to reduce the short and long-term impacts to waterbodies resulting from construction and operation of the Project. It is possible that in some locations there could be a temporary reduction in channel stability leading to a short-term degradation in localized aquatic habitats. Non-HDD crossings in sensitive systems could contribute to contaminated or impaired conditions. However, the Project includes a set of construction and operating requirements that, if implemented, would lead to minimal impacts to

waterbodies under normal construction and operating conditions and the contribution to cumulative impacts within the Project cumulative impact corridor would be negligible.

Past and current wetland disturbance in the Project's cumulative impact corridor includes wetland drainage and disruption associated with agricultural and rangeland activities. Previous construction activities by other parties within the corridor have impacted wetland resources, including wetland functions. In most areas, the affected wetlands have transitioned back to pre-construction vegetation communities, although wetland restoration in arid areas has not always succeeded. Recovery time for herbaceous or scrub-shrub vegetation in wetlands in the Permit Area is typically 3 to 5 years. Where vegetation would not be continually affected during Project operations, forested wetlands would have regeneration periods of 20 to 50 years or more to accommodate tree species' height potential. Depending on the vegetation types, past effects on wetlands within the Project cumulative impact corridor may still be evident. Also, previously-installed pipeline or transmission projects would have resulted in a permanent conversion of forested wetland vegetation types within permanent ROWs. The Project will mitigate for these forested wetland impacts as required by its Section 404 CWA permit from the USACE. The majority of cumulative wetland impacts would occur where the Project and other existing or planned projects impact the same wetland features.

5.2.5 Biological Resources

5.2.5.1 Vegetation

The degree of cumulative impact from past projects within the Project cumulative impact corridor depends upon the type and amount of vegetation affected, the rate at which the removed vegetation regenerated after construction, and the frequency of vegetation maintenance conducted. The primary contribution to cumulative impacts on vegetation from the Project would be the cutting, clearing, or removal of vegetation within construction work areas, the removal or trimming of herbaceous vegetation during operations in the permanent ROW, and the potential introduction or spread of noxious weeds in cleared areas. The degree of Project contribution to cumulative impacts would depend on the type and amount of vegetation affected, the rate at which removed vegetation would regenerate after construction, and the frequency of vegetation maintenance in the permanent ROW. Construction of the Project would result in some permanent loss of forested and scrub-shrub vegetation and a corresponding increase in native grassland and sagebrush. Clearing in forested areas would contribute to forest fragmentation.

Cumulative vegetation impacts in the Permit Area would result from clearing of upland, riparian, and hardwood forests. Removal of trees in upland and riparian forest communities would result in long-term impacts because of the long periods required for forest communities to mature to pre-construction conditions. Contribution to cumulative impacts within the Project cumulative impact corridor would be minor as most disturbed areas would be allowed to restore to preconstruction condition except for the clearing of vegetation within the permanent ROW where the reestablishment of cleared vegetation would be prevented.

Contribution to cumulative impacts within the Project cumulative impact corridor on annually tilled croplands would be minor and would generally be limited to the current growing season, provided that topsoil segregation was maintained and soils were not compacted during construction. Similarly, contribution to cumulative impacts within the Project cumulative impact

corridor on pastures, rotated croplands, and grasslands would generally be short-term and minor with vegetation typically becoming reestablished within one to five years after construction is complete. Long-term impacts on these vegetation types would generally be minimal because these areas would be allowed to recover following construction and typically would not require maintenance mowing and therefore the contribution to cumulative impacts within the Project cumulative impact corridor would be minimal.

The total amount of vegetation that may be affected by all of the reasonably foreseeable projects, including the Project, is relatively small compared to the abundance of similar vegetation in the Project cumulative impact corridor. Additionally, future projects would likely implement mitigation measures designed to minimize the potential for erosion, revegetate disturbed areas, implement site stabilization procedures, and control the spread of noxious weeds, which would minimize the contribution of those projects to the cumulative impacts on vegetation within the Project cumulative impact corridor.

5.2.5.2 Wildlife

The area within the Permit Area of the Project contains a diversity of wildlife, including big game animals, small game animals and furbearers, waterfowl and game birds, and other nongame animals. Wildlife habitats in these areas include: grasslands/rangelands, shrub-lands, croplands/pasturelands, upland forests, and wetlands. These vegetation communities provide a wide variety of foraging, cover, and breeding habitats for wildlife. Migratory birds also use many of these habitat types for nesting, migration stopover, and overwintering.

Some areas of native grasslands and sagebrush shrub-land habitats and many areas of forestland in the Project cumulative impact corridor have not been previously fragmented by road and/or electrical power line networks. Increased habitat fragmentation from pipeline construction and connected power distribution lines would be most pronounced within large contiguous areas of native grassland/rangeland, shrub-lands, and forested habitats.

Construction and operation of the Project, along with the reasonably foreseeable projects such as wind farms and transmission lines to deliver wind energy to consumers, transportation projects, and urban growth, could result in short-term disturbance to wildlife and long-term wildlife habitat loss, alteration, and fragmentation. The Project would produce a minor contribution to the cumulative effects on resident and migrant wildlife potentially resulting in somewhat reduced abundance and productivity within the Project cumulative impact corridor. Displacement of wildlife that depends on the carrying capacity of habitats that would be disturbed by the Project could result in reduction of reproductive effort or survival, thus producing a minor contribution to cumulative impacts on wildlife within the Project cumulative impact corridor. This potential is greater for wildlife for which suitable habitat is limited in the Project area or that are otherwise sensitive to disturbance.

5.2.5.3 Threatened and Endangered Species

Past cumulative effects for threatened and endangered species present near the Project have included habitat loss, alteration, and fragmentation primarily due to agricultural, silvicultural, industrial, urban and suburban development; reduced water quantity and blockage of fish migrations from impoundment and diversion for agricultural or urban use; and reduced water quality from degradation of riparian habitats and contamination from agricultural, industrial,

urban, and suburban runoff. Such cumulative impacts have led to the overall decline and the resulting determination of the protected status for some animals and plants that occur within the vicinity of the Project.

A number of federally-protected threatened, endangered, proposed, and candidate species potentially occur in the Project vicinity. Of these species, only the ABB would be adversely affected by the project through direct mortality resulting from pipeline and associated facility construction and through potential long-term habitat alteration resulting from vegetation changes. Conservation measures designed to reduce direct take of the ABB would be implemented, although some mortality would likely occur. Compensatory mitigation in the form of contribution to protection of occupied habitat for this species would offset these effects by preventing future losses through conservation of important habitat and populations, thus reducing cumulative impacts on the species.

Incremental impacts to streams and riparian habitats from future linear project construction and the accidental spread of exotic aquatic invasive plants and animals could increase cumulative impacts to threatened and endangered species habitat. Increased competition from invasive species could contribute to cumulative impacts to native freshwater mollusks and prairie stream fishes which have been increasingly recognized as vulnerable. Multiple stream and wetland crossings, especially those associated with small clear springs and streams or freshwater mussel beds, could result in impacts to habitat quality that could in conjunction with the impacts of the Project affect federally-protected aquatic species of conservation concern.

Implementation of appropriate conservation measures as determined through consultations with federal, state, and local agencies for state-protected sensitive species and federally protected threatened, endangered, or candidate species for the Project and for future projects include habitat restoration, impact avoidance, and impact minimization which would ameliorate long-term cumulative impacts. Project reclamation includes restoration of native vegetation and soil conditions and prevention of spread and control of noxious weeds for disturbed areas. Unavoidable alteration and maintenance of vegetation structure to ensure pipeline safety and to allow for visual inspection would result in some conversion of tall shrub and forested habitats to herbaceous habitats. These conversions are not expected to adversely affect or contribute to cumulative impacts for any federally protected threatened or endangered species.

5.2.6 Cultural Resources

Contribution to cumulative impacts to cultural resources in the Permit Area from the Project would include disturbance to aboveground and belowground resources within the designated APE. The Project would be constructed in accordance with requirements under Section 106 of NHPA and other relevant federal, state and local regulations. Disturbance to these resources from construction of the Project would be limited primarily through impact avoidance and minimization; and through mitigation when avoidance or minimization is not achievable.

The contribution to cumulative impacts to cultural resources that could occur from construction and operation of the Project include damage or destruction of historic properties that cannot be avoided; introduction of visual or audible elements that would diminish the integrity of a historic property's significant historic features; changes to the character of the historic property's use; or changes to physical features within the historic property's setting that contribute to its significance. The Project's contribution to cumulative impacts on cultural resources would be

primarily limited through avoidance of adverse effects to historic properties that have been found eligible for listing in the NRHP or that are currently unevaluated. Cultural resource avoidance could be achieved through pipeline route variations to avoid NRHP-eligible properties, or through boring underneath the cultural deposits using HDD construction methods.

Contribution to cumulative impacts on cultural resources could result from future linear projects or other future developments within the Project cumulative impact corridor that disturb known or currently unidentified archaeological sites and historic properties or degrade in-place mitigation for previously disturbed historical properties. However, known sites identified during Project studies or in past or future cultural resource studies would likely be avoided or mitigated to the degree practicable as required by Section 106 of NHPA during future project implementation.

5.2.7 Land Use

Construction of the Project could contribute to cumulative impacts in the Project cumulative impact corridor through localized disruption of normal agricultural, forest, and rangeland production.

Other than forested areas, practically all the acreage disturbed during construction of the Project would be returned to preconstruction uses after ROW restoration and would therefore not contribute to long-term alterations in land uses. Generally, disturbed agricultural land would regain productivity within one-to-three growing seasons. Disturbed pastures and rangelands on the other hand, could require anywhere from one to five years to recover to preconstruction levels. Forestland outside the permanent ROW could take twenty or more years to recover and would be eliminated within the permanent ROW and at aboveground facilities for the life of the Project.

Above-ground facilities (e.g., pump stations and valves) required for operations would convert the land associated with these facilities to an industrial use for the life of the Project. The aggregate contribution of lands committed to industrial uses during the life of the Project would be small in relation to the number of acres available for these land uses. In addition, some agricultural lands currently enrolled in conservation programs may not qualify for continued participation in these programs, potentially resulting in the land converting back to active agricultural uses, thus contributing to cumulative reductions in land dedicated to conservation. Easement restrictions associated with the Project would contribute to land use restrictions within the Project cumulative impact corridor.

5.2.8 Socioeconomic Resources

The Project area is predominantly rural and sparsely populated, with the population tending to increase from north to south along the Project corridor. In the southern Oklahoma area, population density ranges from 35 to 40 people per square mile.

The presence of temporary construction workers requiring housing and other services would be the primary contribution of the Project to cumulative socioeconomic impacts. Construction workers would likely utilize the closest available local rental, motel/hotel, RV and camping facilities during the construction of each spread. Since adequate temporary housing and services appear to be present within the Permit Area, the contribution to cumulative socioeconomic impacts in these areas would be short-term and minor.

Additional short-term contribution to cumulative socioeconomic impacts would result from increased employment opportunities and related labor income benefits, and increased government revenues associated with sales and payroll taxes. The primary long-term contribution to cumulative socioeconomic impacts in these areas would include limited employment and income benefits resulting from a very small permanent Project operations staff and some local Project expenditures, as well as an increased property tax base and associated tax revenues. Operation of the Project would require relatively few permanent employees; thus, there would be little contribution to long-term cumulative impacts on population, housing, municipal services, or traffic in the Project area. The increased tax revenue paid to the state and local governments over the life of the spectrum of projects in the Project vicinity would result in beneficial long-term cumulative economic impacts in Oklahoma. Annual property tax revenues will also be generated by the Project in Oklahoma and will have a beneficial impact to the local and state economies.

Keystone estimates that $667 million in annual property tax revenues would be generated by the Project in Oklahoma over the operating life of the Project. This estimate is based on 2006 tax rates capital costs calculated in 2006. It should be noted that these revenues may increase since the current estimate of Project capital cost has been increased.

5.2.9 Environmental Justice

Minority and low-income populations were located within a 4-mile-wide corridor centered on the pipeline centerline to determine potential impacts to these populations. Cumulative impacts to minority and low-income populations related to past and reasonably foreseeable future projects could occur, particularly if future projects place additional demands on medical services in Health Professional Shortage Areas and/or Medically Underserved Areas/Populations areas. However, the contribution of the Project to these cumulative impacts would be minor since the permanent workforce associated with the Project is not significant.

5.2.10 Human Health and Safety

The Project could result in spills of hazardous materials and conditions that threaten human health and safety. Hazardous conditions have included oil spills and product spills from construction and operation activities. During construction activities, large equipment and construction related activities could threaten human safety. The project personnel will attend rigorous training on safety measures to minimize any potential issues. The cumulative effects of activities on human health and safety are relatively insignificant over the life of the Project. A more detailed analysis in included in Section 3.14.3 of the Keystone XL Project FEIS.

5.2.11 Noise

Given the short duration of construction related noise impacts within the Permit Area for the Project it is likely that contributions to cumulative noise impacts associated with construction within the Project cumulative impact corridor would be minor to negligible and short-term. Contribution to cumulative noise impacts from Project operation could be important in the immediate vicinity of Project pump stations and less important and variable throughout the rest of the Project corridor. Noise from pump stations would be mitigated through construction of berms around the facilities or planting of vegetation noise screens as determined though noise surveys and engineering design.

5.2.12 Indirect Effects

Indirect effects are those from related actions that have no independent utility apart from the primary action on the species or habitat. In the case of the Project within the Permit Area, the only indirect effects anticipated are those associated with the electrical power lines that are necessary to provide service to the Project. The electrical power lines necessary for the Project are further discussed below.

5.2.12.1 Electrical Distribution Lines and Substations

Electrical power for the Project would be obtained from local power providers. These power providers would construct the necessary substations and transformers and would either use existing service lines or construct new service lines to deliver electrical power to the specified point of use. The electrical power providers would be responsible for obtaining the necessary permits, approvals, or authorizations from federal, state, and local governments.

New electrical transmission power lines with voltages of 69 kV or greater would be constructed to service the pump stations. Table 2.3.11 lists the electrical power supply requirements for the pump stations.

Table 5.3.11
Electrical Power Supply Requirements for Pump Stations within the Permit Area in Ok

Pump Station No.	Impact Area	Milepost	Kilovolts of Electricity	Estimated Electrical Line Length (miles)	Power Provider
PS-33	*ABB HABITAT RANGE*	49.1	138	0.43	Western Farmers Electric Cooperative
PS-34	*ABB CONSERVATION PRIORITY AREA*	95.6	138	6.01	People's Electric Cooperative
PS-35	*ABB CONSERVATION PRIORITY AREA*	147.7	138	0.0	Western Farmers Electric Cooperative

Most of the proposed new electrical distribution lines to service pump stations would be 115-kV lines strung on single-pole and/or H-frame wood poles. The poles would typically be about 60 to 80 feet high with wire span distances of about 700 feet.

Each pump station would have an electrical power substation integrated into the general pump station layout. In some cases, Keystone would share pump station land with the local utility for the installation of their substation. Sharing of substation land at the pump station would allow the utility to provide a second transformer to provide service to the rural customers in the area.

The exact location of each substation cannot be identified at this time because the electrical supply lines would access pump stations from different alignments. Each substation footprint would be approximately 1 to 1.5 acres and is included in the total land size of each pump station. The actual size of a substation would be dictated by the specific design and size requirements of the local power supply company, the capacity of the power supply lines connected to each specific pump station, and the associated equipment.

Other electrical power requirements, such as power for MLVs, would be supplied from distribution service drops from adjacent distribution power lines with voltage below 69 kV.

Each distribution service drop would typically be less than 200 feet long, and would require the installation of one or two poles and a transformer. The electric utility would typically install a pole-mounted transformer within 200 feet of the valve site location. However, in some cases the electric utility would install the transformer on an existing pole which would be more than 200 feet from the valve site. The decision on where the transformer pole would be located would generally be based on the most economical installation. Upon completion of the new service drops, the electrical power providers would restore the work area as required, in accordance with local permits.

Preliminary routing for new electrical distribution lines was established through discussions between Keystone and each utility company. Where practical, these preliminary routes were along the Project ROWs, existing county roads, section lines, or field edges, to minimize interference with current adjacent land uses.

5.2.12.2 Construction Procedures

All distribution lines and substations would be installed and operated by local power providers. This work would include ROW acquisition, ROW clearing, construction, site restoration, cleanup, and obtaining any necessary permits, approvals, or authorizations from federal, state, and local governments. The proposed distribution lines would require a 100-foot-wide construction ROW and an 80-foot-wide permanent ROW. Each power provider would develop detailed power line construction procedures to address site specific conditions. In general, construction of the electrical distribution lines would involve the following:

- *ROW Acquisition/Easements:* The electric power provider would obtain any necessary easements.
- *ROW Clearing:* Limited clearing would be required along existing roads in native and improved grasslands and croplands. Either tree trimming or tree removal would be conducted to provide adequate clearance between the conductors and underlying vegetation.
- *Power Line Construction:* Power line poles and associated structures would be delivered on flatbed trucks. Radial arm diggers would typically be used to excavate the required holes. Poles would be either wood or steel and would be directly embedded into the excavated holes using a mobile crane or specialized picker truck where appropriate. Anchors may be required at angles and dead ends.
- *Stringing:* After the power line poles are in place, conductors (wires) would be strung between them. Pulling or reeling areas would be needed for installation of the conductor wires which would be attached to the poles using porcelain or fiberglass insulators.
- *Restoration:* After completion of distribution line construction, the disturbed areas would be restored. All litter and other remaining materials would be removed from the construction areas and disposed of in accordance with regulatory requirements. Preconstruction contours would be restored as closely as possible and reseeding would follow landowner requirements.

5.4 Irreversible and irretrievable Commitment of Resources

The Permit Area includes numerous existing, under construction, and planned linear energy transportation systems, including natural gas pipelines, crude oil pipelines, and electric transmission lines. Additionally, the Permit area supports a major water delivery project and a number of energy development projects, including wind power facilities. In some cases, these existing facilities either transect or are located within the Project corridor.

Additional oil and natural gas pipelines and electricity transmission lines are or are known to be in the planning or permitting stage and may cross the Project corridor. It is also reasonably foreseeable that additional linear facilities would be considered in the future given the national focus on the reconfiguration of the electrical grid system to access stranded renewable energy resources, particularly with regard to wind power in the central plains region.

Construction and operation of the Project would result in additional environmental impacts to those associated with these existing and future projects, although the majority of these would be localized and short-term. Short-term construction impacts could be additive to other construction projects depending on the actual construction timing of individual projects, although at this time, construction schedules would not coincide in the Project corridor.

The overall contribution of cumulative impacts associated with existing and future facilities is considered minor. In addition, long-term cumulative economic benefits would be realized in communities that receive tax revenues from the Project and other projects in the area.

5.5 Short-Term Use of the Environment vs. Long-Term Productivity

Implementation of the Project would result in use of an operating pipeline ROW and associated above-ground facilities. Impacts to agricultural and grazing uses from the operation of the ROW would be non-existent as these activities could continue after the project construction is complete. Minor impacts would exist from the above-ground facilities. The short-term and long-term loss of dryland farming and grazing productivity in Oklahoma would be negligible overall.

6.0 PREPARERS AND CONTRIBUTORS

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Fish and Wildlife Service – Regional Office – Albuquerque, NM

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APPENDIX B

Public Comment and Response to Comments

We received 2 comment letters via electronic mail: one from a private citizen and one from a Federal Agency, the National Park Service, who had no comment. The comment from the private individual expressed fears that the pipeline would eradicate the ABB in Oklahoma and requested that we save the ABB.

After reviewing the current status of the ABB, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the proposed Project is not likely to jeopardize the continued existence of the ABB. As stipulated throughout the HCP pursuant to section 10(a)(1)(B) of the Act, it is Keystone's intent to provide some recovery benefit to the Covered Species and the proposed mitigation is an effort on the part of Keystone to contribute to the recovery of the ABB. The Service's determination is based on the following primary factors:

- The construction and operation of the Keystone Gulf Coast pipeline would likely cause mortality, harm, and harassment of ABBs in Oklahoma. There is considerable uncertainty involved with estimating population levels or densities of ABB in any area, including lands affected by the proposed Project. However, losses constitute a one-time or short-duration pulse effect to the ABB populations in Oklahoma. Such consequences are less likely to affect population survival than longer-duration adverse effects. Additionally, ABBs naturally experience fluctuations caused by poor reproduction in some years (due to weather, disease, etc.), and these short-term stochastic events do not have long-term effects in robust populations (USFWS 2008a). Permanent loss of ABB habitat as a result of Project construction and operation causes a decrease in the availability of suitable habitat for ABB to successfully overwinter and reproduce. The ABB cannot shelter (overwinter) or reproduce in areas covered by above ground facilities such as pump stations. The Keystone HCP estimates that approximately 438 acres of potential ABB habitat will be temporarily impacted by construction and approximately 17 acres will be permanently impacted by placement of permanent structures. However, the loss of this amount of habitat is spread over approximately 138.8 miles of ROW within the ABB range in Oklahoma. Moreover, because temporarily lost acres of ABB habitat will be restored and mitigated at a 1:1 ratio or higher and permanently lost acres of ABB habitat will be mitigated at a 2:1 ratio or higher, funding the purchase of mitigation lands is expected to more than offset the effects of the habitat loss.
- Project plans include the restoration of all areas temporarily affected by construction of the pipeline to the vegetation type and quality existing adjacent to the affected areas, with the exception of forested areas that will be re-vegetated but restored to a grassland vegetation type. Progress and success of habitat restoration will be monitored by Keystone. Successful restoration of areas temporarily affected by the Project will minimize adverse effects to the ecosystem necessary for survival and recovery of ABB populations.

- In addition, co-location of the Project ROW with other project easements or rights-of-way in Oklahoma, (i.e., already fragmented woodland habitats) would reduce the effects of additional habitat fragmentation due to loss of woodland habitat.