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Keystone Pipeline Project

A Summary Report of the January-February 2007 Aerial Raptor Nest / Bald Eagle Nest and Winter Roost Survey Completed for the Keystone Mainline and Cushing Extension Rights-of-Way

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Executive Summary

Two aerial surveys were previously completed to collect raptor nest occurrence information along portions of the proposed Keystone Pipeline right-of-way (ROW) from March 28 through April 1, 2006, in Kansas and Missouri and from April 26 through May 2, 2006, in North Dakota, South Dakota, and Nebraska (ENSR 2006). This report covers a third additional raptor nest aerial survey conducted along the entire Keystone ROW (Illinois, Missouri, Kansas, Nebraska, South Dakota, and North Dakota) and the Cushing Extension ROW (Nebraska, Kansas, and Oklahoma) from January 30 through February 4, 2007. All aerial surveys were conducted in a helicopter with a pilot and a two-person survey team. The 2006 surveys covered an area of at least 0.25-mile on each side of the proposed ROW alignment, while the 2007 survey addressed only an approximate 150-foot ROW corridor along each side of the proposed pipeline centerline (300-foot-wide survey path). At major river crossings, survey coverage was expanded to 1 mile on each side of the ROW to search for bald eagle nests and their winter roost sites.

The 2007 survey documented 112 raptor nests within the proposed Keystone Pipeline Project construction ROW. These included 93 nests along the Mainline ROW (2-Illinois, 44-Missouri, 19-Kansas, 15-Nebraska, 4-South Dakota, 9-North Dakota) and 19 nests along the Cushing Extension (16-Kansas, 3-Oklahoma).

Additionally, two osprey hack sites have been identified within the immediate vicinity of the proposed Missouri River crossing near Yankton, South Dakota. Discussion with the South Dakota Game, Fish, and Parks Department (SDGFP) indicates that the two hack sites may be used again in 2007, 2008, and 2009.

Surveys for wintering bald eagles identified transitory or communal roosts and winter concentration areas within 1 mile of the Mainline ROW at the Mississippi River crossing, the Missouri River near its confluence with the Mississippi, the Cuivre River, the West Fork of the Cuivre River, the Missouri River at the Kansas/Missouri state line, and the Big Blue River. Roosts and wintering concentrations of bald eagles within 1 mile of the Cushing Extension ROW were identified at the Little Blue River, Mill Creek, Republican River, Smoky Hill River, Arkansas River, and Salt Fork of the Arkansas River.

A total of 7 bald eagle nests were located within 1 mile of the Mainline ROW. These included two bald eagle nests at the Mississippi River crossing near Confluence Park, three nests in the Cuivre and Missouri River floodplain in Missouri, one nest at the Big Blue River in Kansas, and one at the Pembina River in North Dakota. Two nests were observed within 1 mile of the Cushing Extension ROW, one on the Smoky Hill River in Kansas and one nest in poor shape at the Arkansas River in Oklahoma.

1.0 Introduction

Keystone is planning to construct, operate, and maintain an approximately 1,845-mile-long interstate crude oil transmission system from an oil supply hub near Hardisty, Alberta, Canada to destinations in the Midwestern United States (U.S.) (**Figure 1**). ENSR Corporation (ENSR) has been retained by Keystone to assist with environmental permitting for the proposed Keystone Pipeline Project (Project) within the U.S. In the U.S., the proposed Project consists of approximately 1,078 miles of new pipeline constructed from the U.S.-Canada border in Pembina County, North Dakota, to terminals and refineries in Salisbury (Chariton County), Missouri; Wood River (Madison County); and Patoka (Marion County), Illinois. This route is identified as the Mainline. Based on interest expressed by crude oil shippers, Keystone also is considering the construction of a 294-mile pipeline extension, which would extend the Keystone Pipeline south from the Nebraska/Kansas border (Jefferson County) to Cushing, Oklahoma. The primary delivery point would be in the Cushing area, with potential connections to refineries or pipelines in Kansas and North Texas as well as Oklahoma. This portion

of the Keystone Pipeline system is named the Cushing Extension. Keystone proposes to begin construction of the new pipeline in the spring of 2008, with the Keystone Mainline in-service by the end of 2009.

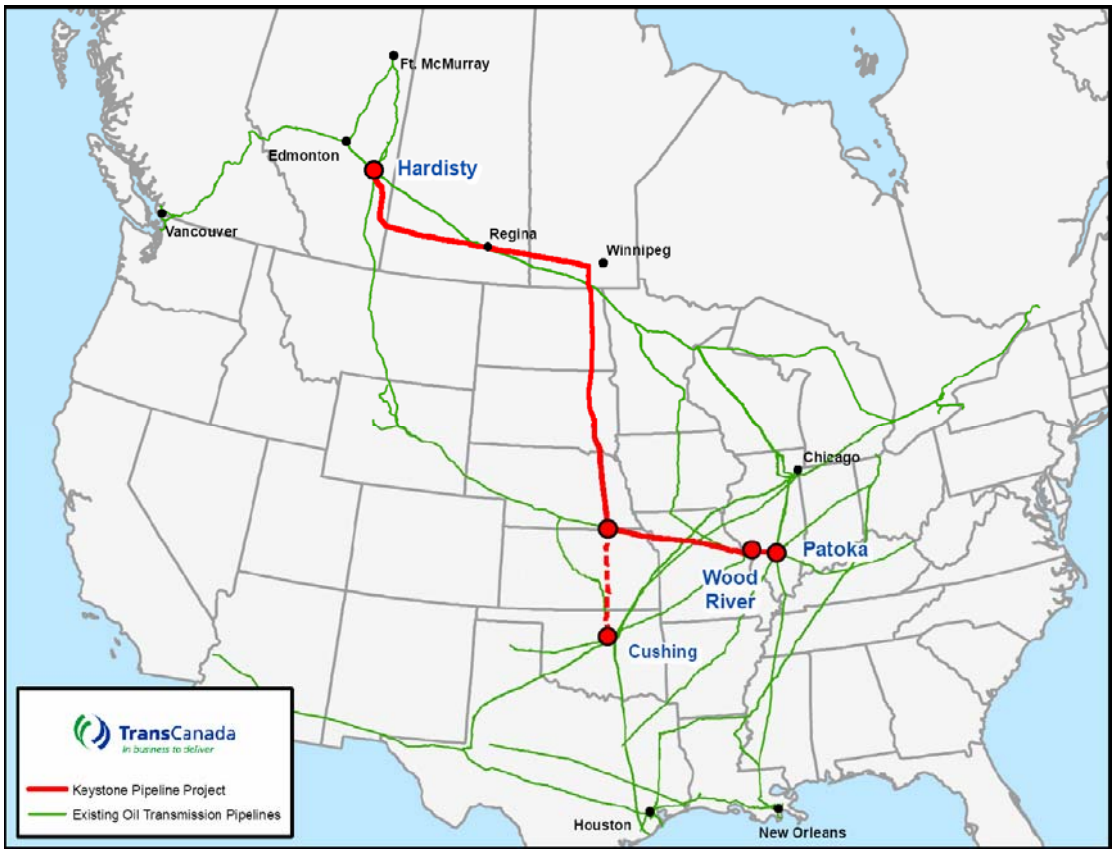

Figure 1 Proposed Keystone Pipeline Route (Cushing Extension represented by the dotted line)

The Project also will require the construction of pump stations, valves, meters, and other ancillary facilities. Location data for these facilities was not available at the time of this survey; therefore, surveys required for these project features need to be completed prior to construction.

Background Information

A variety of raptor species are known to nest in the region of the proposed Project. These species include eagles, buteos, falcons, owls, harriers, osprey, and other birds of prey. Breeding and nest building/tending activities can begin as early as February for some raptor species, and the rearing of young and fledgling dependency can last into early August for some of the later nesting species. Protected raptor species occurring along the proposed Keystone Pipeline Project route include the bald eagle, northern harrier, peregrine falcon, and barn owl. Other raptors identified as species of special concern include the Cooper's hawk, red-shouldered hawk, broad-winged hawk, and short-eared owl.

Information obtained by Keystone on historic raptor nest sites in the vicinity of the proposed ROW was primarily limited to listed species, including bald eagles. The principal methods for locating nest sites along the proposed pipeline route were the aerial surveys conducted by helicopter in late March through early May 2006 and the January-February 2007 survey.

2.0 Methods

Aerial survey methods for the 2007 followed those outlined by Call (1978). Two surveyors (seated in left- and right-hand positions of the helicopter) examined the area within the 300-foot-wide construction corridor along the entire Mainline and Cushing Extension ROW to locate existing raptor nest sites. In addition, a 1-mile survey area on each side of the ROW was employed to locate potential bald eagle nest and winter roost sites where the ROW intercepted major river crossings, such as the Platte and Missouri rivers. Aircraft navigation along the proposed pipeline ROW and maintenance of appropriate aircraft position in relation to the ROW was then facilitated using a pilot operated and monitored GPS unit and real time GPS tracking on an on-board computer. Aircraft position and location along the ROW was further monitored by the front, right-hand observer using a separate GPS unit that displayed real time position and the ROW centerline on DRG (digital raster graphic) 7.5-minute USGS topographic maps exhibited on the observer's laptop computer screen.

The 2007 aerial raptor survey focused on locating raptor stick nests constructed in trees in riparian zones, shelterbelts, and other wooded areas, and on locating bald eagle winter roost sites along the major river crossings. Winter timing of the survey facilitated locating nests in deciduous trees prior to leaf-out. No areas of cliffs, rock outcrop, knolls, and topographic features suitable for raptor nesting use were located within the Keystone Mainline or Cushing Extension ROW. In addition to recording raptor nest sites, heron rookeries (communal nest areas) were also recorded by the survey since herons are migratory along most portions of the Keystone Pipeline ROW. Herons are protected under the Migratory Bird Treaty Act (MBTA). Nesting herons are susceptible to disturbance and pipeline construction near a rookery during the nesting season and could result in nest abandonment and a potential "take" or loss of young of these bird species.

The January-February 2007 survey started at the eastern terminus (Patoka) of the Keystone Mainline on January 30, and proceeded westward to the junction of the Keystone Mainline and Cushing Extension. The Cushing Extension segment was surveyed on February 1, and the remainder of the Keystone Mainline, north of the Keystone Mainline/Cushing Extension junction, was surveyed from February 2 through 4.

Surveys were conducted between sunrise and sunset (approximately 0800 to 1730 Central Time). The date, temperature, wind, and cloud cover were recorded at the beginning of each survey day and at the end of each survey day; changes in overall weather conditions during the survey were also recorded.

Temperatures during the survey ranged from highs of approximately 20 degrees Fahrenheit (°F) to lows of minus 25°F. Skies were generally clear to partly cloudy with little to no precipitation. Sporadic, light snowfall events were encountered the morning of January 30 in western Illinois and the afternoon of January 31 in western Missouri and eastern Kansas along the Mainline ROW, but visibility of the ROW was not compromised. West/northwest winds were fairly consistent, ranging from 5 to 15 miles per hour (mph) during most of the survey period.

Complete coverage of the entire ROW was obtained by traveling down the ROW centerline and visually scanning all areas of potential nesting habitat. This typically involved slowing aircraft speed to 25 to 40 mph when woodlands, shelterbelts, riparian areas, and isolated trees were encountered. Once a possible nest site was located, a second pass-over was made to confirm nest type and condition and to obtain accurate GPS location coordinates using the front observer's GPS unit. The rear observer recorded notes on nest configuration, condition, possible species, habitat, and nearest pipeline milepost.

All major rivers crossed by the Keystone Mainline and Cushing Extension ROW were initially selected as potential areas to be searched for bald eagle winter roosting activity (**Table 1**). However, during the January-February 2007 aerial survey a number of these crossings were determined not to support suitable bald eagle winter roosting habitat, either because the river was completely frozen over and there was no open water for bald eagle foraging and/or there were no suitably sized roost trees along the river within 1 mile of the ROW

(**Table 1**). At major river crossings where suitable bald eagle winter roosting habitat (large trees and open water) was present, a 2-mile survey corridor centered on the ROW was obtained by flying 1 mile from the ROW centerline along one side of the river and returning along the opposite side of the river to the ROW centerline. The same process was then repeated on the opposite side of the ROW. Only raptor nests large enough to support eagle nesting activity were recorded outside of the 300-foot ROW but within 1 mile of the ROW centerline. The observers were also alert to noting and recording perched bald eagles in trees as well as bald eagles flying along the river corridor. GPS location coordinates were recorded for all bald eagle nest and roost sites observed. In addition, general GPS coordinates were recorded for areas along the river where bald eagles were observed in flight. General observations on bald eagle behavior and numbers were also recorded where birds were observed.

Initially, the focus of the bald eagle roosting portion of the surveys was to survey major river crossings either early in the morning (within an hour after sunrise) or late in the afternoon (1 hour before sunset) when eagles were most likely to found using nighttime roost sites. However, as the survey progressed, it was noted that bald eagles appeared to be remaining in or near roost sites along the major rivers during most of the day as a result of the cold temperatures (less than 20°F down to subzero temperatures) that were encountered throughout the survey period. In addition, it also was noted that bald eagles often flushed from perch sites as the helicopter flew into the vicinity making accurate identification of specific roosts difficult. As a result, survey emphasis shifted to recording bald eagle presence rather than specific roost trees although eagle perch site locations were still recorded. It was assumed that if bald eagles were located within 1 mile of the ROW then nighttime roost sites were also likely to be present within 1 mile of the ROW.

3.0 Results

3.1 Bald Eagle Winter Roost and Nest Sites

The U.S. Fish and Wildlife Service (USFWS) defines two types of bald eagle winter roost sites. Transitory roosts are described as sites with three or more eagles within 100 meters of each other for at least two nights in an area with no previous history of winter communal roosting. Communal roosts are defined as six or more eagles in a small area for extended periods of time or used for multiple years. Since a one-time winter aerial survey cannot distinguish between transitory roosts versus communal roosts, it was assumed that if bald eagles were observed perching along a river within 1 mile of the ROW then at least some type of roosting activity occurs within 1 mile of the ROW. Follow-up ground surveys would be required to determine if identified roosting areas represent transitory or communal roost sites.

3.1.1 Mainline ROW

Out of the 24 major river crossings initially selected as potential bald eagle winter roost areas on the Keystone Mainline ROW, 14 were found to be frozen solid and/or supported no suitable-sized perch trees near the ROW. These river crossing were not surveyed for bald eagle winter roosting use (**Table 1**). The Pembina River in North Dakota was frozen solid making it unsuitable for winter roosting use, but one historic bald eagle nest was located on the south side of the river. Four additional river crossings (Missouri River at South Dakota/ Nebraska border, Platte River in Nebraska, Grand River in Missouri, and Kaskaskia River in Missouri) were surveyed for bald eagle use, but no eagles were observed within 1 mile of the ROW. The Missouri River ROW crossing at the South Dakota/Nebraska border exhibited suitable stretches of open water for bald eagle foraging, but the south bank had few large perch trees. The north bank crossing is close to Yankton and other human activities rendering this area unsuitable for bald eagle roosting use. One historic eagle nest was located approximately 1.5 miles downstream of the ROW on the north side of the river, and two adults were seen nearby. In addition, at least 10 adult and immature bald eagles were observed along the river corridor near the Lewis and Clark Lake dam (Gavins Point Dam) approximately 5 miles upstream of the ROW. The area of the Platte River ROW crossing in Nebraska exhibited only one very narrow, short stretch of open water making this reach of the river unsuitable for bald eagle foraging. Suitable roost trees and open water were

determined to be present at the Grand River ROW crossing in Missouri, but no eagles or eagle nests were found within 1 mile of the ROW. The ROW crossing at the Kaskaskia River and adjacent wetland complexes was found to exhibit only limited areas of open water with few potential perch trees within 1 mile of the ROW, and no eagles were noted using this area.

Bald eagles and bald eagle perch/roost trees were recorded at the five remaining major rivers either crossed or approached by the Keystone Mainline ROW. These were the Big Blue River in Kansas, the Missouri River at the Kansas/Missouri state line, West Fork of the Cuivre and the Cuivre River (two locations) in Missouri, and the Mississippi River at the Missouri/Illinois state line (**Tables 1** and **2**). Two adult eagles were noted roosting on the Big Blue River within 1 mile of the ROW. In addition, one possible eagle nest was located in a heron rookery within 1 mile of the ROW on the Big Blue River. Several eagles and perch/roost locations were observed within 1 mile of the ROW on the Missouri River at the Kansas/Missouri state line. Eagle roosting use was documented for both the West Fork of the Cuivre River and the Cuivre River within 1 mile of the ROW, and two eagle nests were found on the Cuivre River within 1 mile of the ROW (**Table 2**).

3.1.2 Cushing Extension

Bald eagle presence and roosting use was documented within 1 mile of the ROW along six of the seven major rivers crossed by the Cushing Extension ROW (**Tables 1** and **2**). Observations within 1 mile of the ROW included two adults and one immature eagle on the Little Blue River, two adult eagles on Mill Creek, several adult eagles on the Republican River, one adult and one eagle nest on the Smoky Hill River, three adult and two immature eagles on the Arkansas River, and three adults and one immature eagle on the Salt Fork Arkansas River at its confluence with the Bois'd Arc River. The confluence of the Salt Fork Arkansas River and Bois'd Arc River is a documented historic eagle concentration area. The Cimarron River was the only major river crossed by the Cushing Extension where eagle presence was not documented within 1 mile of the ROW. This segment of the river also supported few suitable roost sized trees. Three perched eagles, however, were located along a segment of the Cimarron River approximately 1.5 to 4 miles downstream of the ROW, and one nest in poor condition was found approximately 1 mile downstream of the ROW.

3.2 Other Raptor Nest Sites

Table 3 provides a listing of all raptor nest locations (including great blue heron rookeries) identified by January-February 2007 aerial survey along the Keystone Mainline ROW and Cushing Extension ROW. A total of 112 nest sites were documented within the survey area. Of these, seven were heron nest sites representing three separate rookery areas (two on the Keystone Mainline ROW and one on the Cushing Extension). The remaining 105 nests were potential raptor nest sites with 90 on the Keystone Mainline ROW (2 in Illinois, 43 in Missouri, 17 in Kansas, 15 in Nebraska, 4 in South Dakota, and 9 in North Dakota) and 15 nests along the Cushing Extension (12 in Kansas, 3 in Oklahoma). The listing includes bald eagle nests within 1 mile of the ROW centerline and all other possible raptor and heron nests within a 150-foot construction corridor on each side of the ROW centerline. **Table 3** also includes GPS coordinates for each nest location as well as information on species ownership, nest condition, and habitat. All nests located were tree nests, and no other types of potential nesting habitat, such as cliffs or rock outcrops, were located within the survey corridor.

Twenty-six of the 2007 survey nests had been identified during the 2006 surveys of the Keystone Mainline ROW. Nine other previously identified raptor nest locations within the Keystone Mainline ROW were either not found (site #75, 86, 98, 111, and 133), were located just outside of the proposed ROW corridor (site #190 and 191), or were determined not to be raptor nests (site #83 and 184). The remainder of the nests documented by the 2006 surveys were well outside of the 300-foot ROW corridor. It is quite possible that nests not relocated by the 2007 survey had been lost to the severe winter ice storms that had plagued the region prior to the survey. Considerable ice storm damage to trees in the form of broken limbs and trunks was clearly evident along many portions of the ROW during the January-February 2007 survey.

Because of the winter timing of the survey, information on activity status of nests was limited to a few bald eagle, great horned owl, and red-tailed hawk nests that showed evidence of early season nesting use. Active

nests included three bald eagle nests that either had an adult on a nest or adults nearby that were assumed to be establishing a nesting territory, one red-tailed hawk nest with a pair of adults nearby, one red-tailed hawk nest with an adult incubating a single egg, and a great horned owl nest with an adult in incubation posture. The one red-tailed hawk nest with an adult incubating an egg was a very early nesting attempt for this species.

Species ownership determinations for remaining nests were based on nest size, configuration, and location. Beyond the few nests where species ownership was determined by presence of adults, the majority were classified as red-tailed hawk or accipiter (either Cooper's hawk or sharp-shinned hawk) (**Table 3**). Great horned owl, long-eared owl, and American crow could also use nests classified as accipiter.

In addition to the raptor nest sites identified above, two osprey hack sites were identified during field reconnaissance efforts in 2006 near the Missouri River crossing near Yankton, South Dakota. The hack sites are artificial nesting towers approximately 15 feet aboveground, located in the Paddlewheel Point Natural Area. The nearest hack site is located approximately 450 feet east from the Project ROW. The second hack site is located approximately 750 feet east from the Project ROW. The hack sites were used to hack osprey in 2006. The birds were placed in the hack site on July 26 and were considered fledged by August 12. The SDGFP indicated that this site could possibly be used again in 2008 and 2009, if appropriate funding was available.

4.0 Discussion

Based on the findings of the 2006 and 2007 aerial surveys, a number of raptor species breed and forage in and near the Project ROW. The most common species include red-tailed hawks and great-horned owls, with scattered breeding records for the Swainson's hawk, northern harrier, American kestrel, red-shouldered hawk, osprey, and bald eagle. Given the aerial survey method employed for the project, nests of some species such as cavity nesters (American kestrel and eastern screech owl) ground nesters (short-eared owl, burrowing owl, turkey vulture, and northern harrier), and woodland nesters in evergreens (accipiters, long-eared owl, and great horned owl) could not be effectively located. Survey emphasis was placed on locating nests of eagles, buteos (broad-winged hawks), and accipiters and owls that nest in deciduous trees. These are the most common species that could be affected by project construction, particularly if it were to occur within the breeding season (February through August).

The intent of these surveys was to identify as many raptor nests as possible within the immediate vicinity of the proposed pipeline ROW. The surveys were conducted in 2006 and 2007, in anticipation of construction in 2008. Nest data will aid in project planning in two ways: 1) provide information to avoid the disturbance of nest sites located within the construction ROW during the breeding season, or if necessary, identify nests that may need to be removed outside of the nesting season; and 2) provide historic nest location information for specific follow-up surveys that may need to be completed to determine activity status immediately prior to construction. For the purposes of avoiding adverse impacts to wintering bald eagles, follow-up surveys would need to be employed at major river crossings with documented eagle use to confirm the location of transitory or communal winter roost sites, if pipeline construction will occur at any of these crossings between October 1 and January 31. Winter roost surveys need to be conducted at least one day prior to the first date of construction.

Use of GPS

GPS provides an advanced, practical method for precise navigation and to obtain accurate location data, particularly in areas with little to no topographic relief or prominent landmarks; however, use of GPS can occasionally have limitations. Due to wind movement and positioning of the helicopter, GPS coordinate locations could be up to 100 to 200 feet in error from the actual nest location. All efforts were made to obtain

the most accurate GPS coordinate locations possible during the aerial surveys. However, two principal factors are believed to affect the overall accuracy of GPS recorded raptor nest locations during aerial surveys.

First, it was often difficult to maintain aircraft position directly over a nest site long enough to obtain GPS accuracy because of nest location, topography, wind, and other factors affecting flight conditions. Second, the GPS units used during the aerial surveys required several seconds of acquiring and averaging satellite position data to compute the most accurate location coordinates for each waypoint recorded. This factor in combination with difficulties in maintaining aircraft position exactly over the nest site were believed to be the greatest contributing factors to errors in obtaining the most accurate GPS coordinates for nest sites. Another complication related to obtaining accurate GPS coordinates, especially for active nest sites, was the aerial survey crew's concern for potential disturbance of active nests, particularly when an incubating adult bird was present on the nest. In order to avoid undue disturbance of these nests, the extent of aircraft time near the nest was kept to a minimum, and these nests were only approached close enough to obtain accurate information regarding nest type and species presence.

The accuracy of the majority of the nest location coordinates obtained during the January-February 2007 survey was believed to very high (±15 meters or less) during this survey period for two reasons: 1) relatively calm or steady winds and 2) inactive status of most nests because of winter timing of survey. The combination of these two factors permitted the pilot to maintain aircraft position directly over each nest site until the observer's GPS had locked in on the location coordinates thereby obtaining as accurate a GPS reading as possible. During the 2007 survey, there were only a small number of nests (**Table 3**) with early season activity (presence of adults on nest or in incubation posture). At these nests the GPS location was taken as quickly as possible and not immediately over the nest, and location accuracy was slightly compromised to avoid undue disturbance of the nest.

Even with less than optimal accuracy for some nest location coordinates, ENSR is confident that the data provided in this report and for the 2006 survey will be sufficient for future nest identification, project planning, and application of appropriate mitigation measures, if warranted. The next important step in the protection of breeding raptors from project construction and operation will be consultation with the USFWS, as well as applicable state game and fish departments, and the development of an agency approved mitigation plan and implementation process.

5.0 Mitigation Planning

The data from these surveys will allow Keystone and appropriate wildlife agencies to plan construction along the ROW and temporary use areas to avoid the removal of existing raptor nests, where possible. Raptor nest surveys were conducted during the 2006 breeding season and late winter 2007 to obtain complete coverage for the Keystone Mainline ROW and Cushing Extension ROW. However, pipeline construction is currently proposed to commence in 2008. It is highly likely that activity status of nests will change, some existing nests may be lost, and new nests constructed in the interim between survey completion and pipeline construction in 2008. It is Keystone's intent to minimize impacts to wildlife species, including breeding raptors, and it is anticipated that additional raptor surveys would be completed immediately prior to construction to confirm nest locations and activity status. All attempts would be made to construct during periods with the most minimal impacts to breeding birds. In the event that construction occurs during the breeding season, it may be necessary to provide a biological monitor or clearance surveys along certain portions of the route that would be scheduled for construction between February 1 and August 31 to prevent disturbance to nesting raptor species. However, these measures would depend on a number of site-specific factors and would be determined on a case-by-case basis with the applicable agencies.

It is anticipated that areas that would be disturbed by project construction and reclamation would be resurveyed prior to commencement of construction activities, or a biological monitor would be present to

determine whether birds were moving into the area and could be affected by project activities. Based on these survey results, Keystone would coordinate with the applicable agencies to determine whether additional protection measures may be warranted. It is possible that construction could proceed in certain areas near known nests depending on the activity status of a given nest, the distance between construction and the nest site, line-of-sight implications between the nest site and construction activities, duration and type of construction activity, and/or the presence of a qualified biologist to monitor bird behavior and response to construction activity. However, it is also likely under certain conditions that the agencies would require a buffer area around an active site and a construction constraint period within this buffer area until breeding is complete and the young had fledged.

The development and implementation of potential mitigation measures would depend on a number of factors, including species involved, its relative sensitivity to disturbance, the time of year, the type of activity proposed (e.g., trenching versus reclamation), the duration and timing of this activity, and possible topographical shielding. The use of a biological monitor may be warranted to allow construction to proceed in certain areas to ensure that nest sites are not disturbed and/or abandoned. These decisions would be made by the applicable agencies in consultation with Keystone.

Literature Cited

Call, M. W. 1978. Nesting Habitat and Surveying Techniques for Common Raptors. Bureau of Land Management, Denver, Colorado. 115 pp.

ENSR. 2006. A summary report of aerial surveys conducted for raptor nests along the Keystone Pipeline Project right-of-way in Missouri, Kansas, Nebraska, South Dakota, and North Dakota. ENSR, Fort Collins, Colorado. 23 pp.

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