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Research Design and Methodology for a Phase II Cultural Resources Survey of the Proposed Keystone Pipeline Project Corridor, Cushing Extension, Kansas Segment, Washington, Clay, Dickinson, Marion, Butler, and Cowley Counties, Kansas

Prepared for
ENSR International
Fort Collins, Colorado

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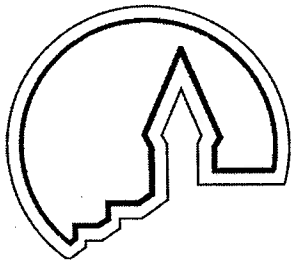

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Introduction

This document is a response by American Resources Group, Ltd., Carbondale, Illinois, to a request by ENSR International, Fort Collins, Colorado, for a research design for conducting a Phase II cultural resources survey of the Kansas Segment of the Keystone Pipeline Project corridor, Cushing Extension. The proposed pipeline-construction corridor passes through six counties in its nearly 210-mile transect of eastern Kansas (Figure 1). The results of previous surveys in the prairie uplands of this region indicate that prehistoric site density is low in this part of the state and that the prehistoric sites that do occur are concentrated in the valleys and adjacent uplands of the larger drainages. In view of this pattern, it appears that the most effective strategy for identifying sites during the proposed survey of the pipeline corridor will be to focus survey efforts on those portions of the pipeline corridor most likely to contain prehistoric sites, supplementing these efforts with limited upland survey targeting potential historic sites.

The sampling strategy proposed in this research design constitutes a probabilistic survey of an essentially random transect of the upland prairie of eastern Kansas. After characterizing the environmental setting of the project corridor, the site-distribution pattern documented by previous research in the region is briefly summarized, the results of the records check and literature review are presented, and the areas within the project corridor selected for archaeological survey and geomorphological investigation are identified. The areas within the project corridor selected for field investigation are tabulated by mile post number and displayed on the accompanying USGS topographic maps. The survey methodology that will be employed is described in the concluding section of the document.

Project Description

The Keystone Pipeline Project is a proposed 1,870-mile-long crude oil pipeline extending from Hardisty, Alberta, to Patoka, Illinois (Figure 1). The Cushing Extension represents an extension of the Keystone Pipeline from a point near the Nebraska-Kansas border to Cushing, Oklahoma. The Cushing Extension of the Keystone Pipeline passes through the eastern Kansas counties of Washington, Clay, Dickinson, Marion, Butler, and Cowley (Figure 1). The proposed, 200-foot-wide (60-m-wide) pipeline corridor enters the state of Kansas at Mile Post CE-2.5 and exits the state at Mile Post CE-211.7, a distance of 209.2 miles (336.7 km).

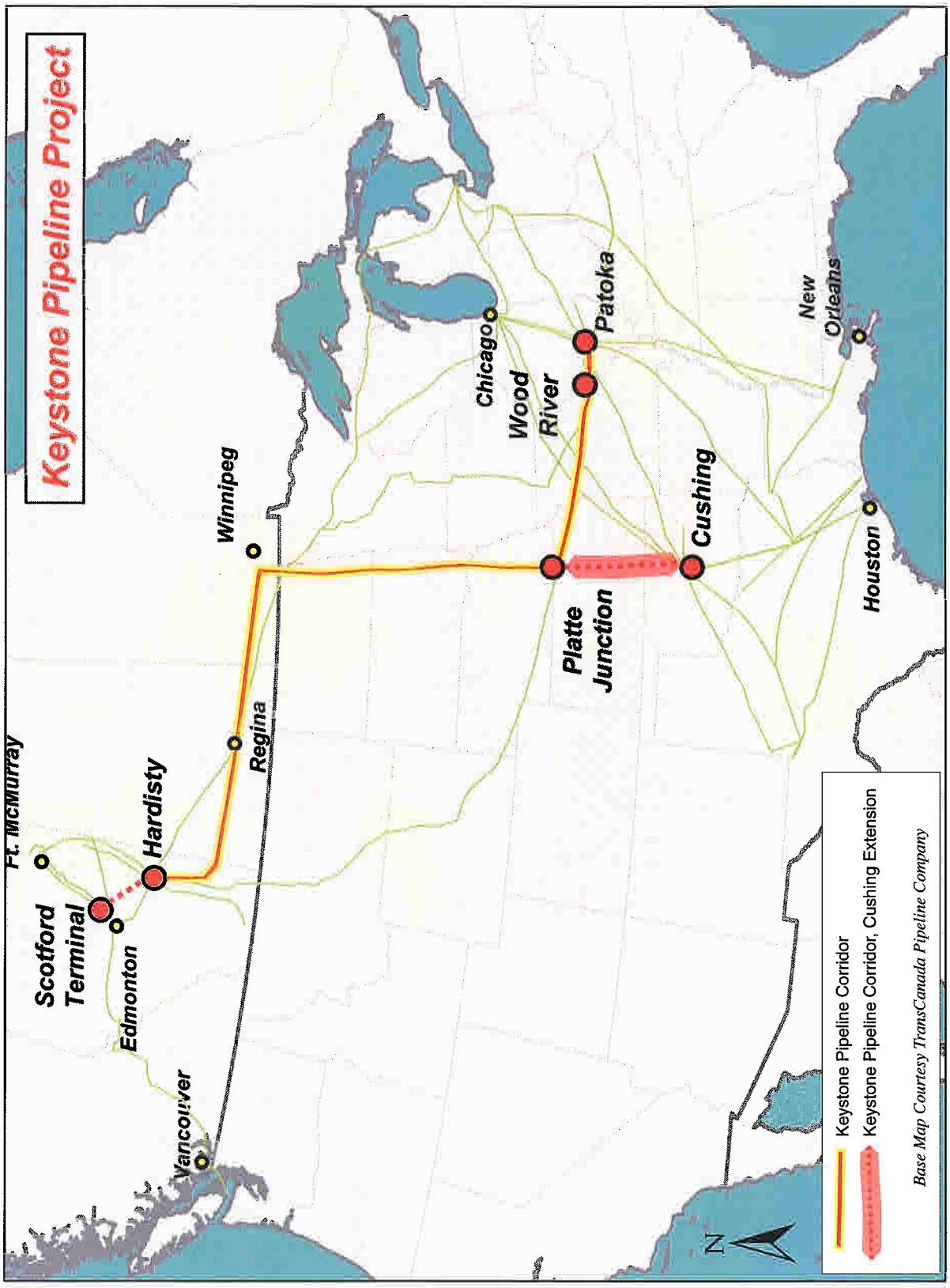

Figure 1. General location of the Cushing Extension within the Keystone Pipeline Project.

The Keystone Pipeline will transport heavy crude oil from Alberta, Canada, to markets in the central United States. The pipeline will be a critical aid to the anticipated growth in Canada's crude oil production over the next decade. The project sponsor is TransCanada Corporation. The U.S. Department of State will oversee the project and, as lead agency, coordinate the participation of the many other state and federal agencies that must also review relevant parts of the project.

Environmental Setting

The majority of the Cushing Extension traverses the Flint Hills Uplands, while the northernmost portion crosses the Glaciated Region of northeastern Kansas (Figure 2). Both of these divisions are contained within the Osage Plains section of the Central Lowland physiographic province.

The Flint Hills Uplands is a north-south oriented linear unit covering a 20–80-mile-wide portion of eastern Kansas (Figure 2). The topography of the Flint Hills Uplands consists of a series of irregularly trending escarpments with flat or gently inclined western slopes and steep, terraced eastern faces. Geologically, the Flint Hills Uplands is characterized by an abundance of chert bands in the locally occurring limestones. Generally gravelly soils are the result of the erosion and weathering of these limestones. Deep, clay-rich soils characterize ridge tops, while the majority of heavily sloping land exhibits only a few centimeters of soil above the limestone bedrock.

The Flint Hills Uplands is drained by generally east-flowing, deeply entrenched streams, often lined with rock ledges. The valleys of major streams such as the Republican, Smoky Hill, Whitewater, Walnut, and Arkansas rivers are traversed by the Cushing Extension. The natural vegetation of the Flint Hills Uplands, and, indeed, most of eastern Kansas, consists of tall grass prairie, penetrated by bands of riverine forest. Big and little bluestem, switchgrass, and Indian grass are the primary grasses. Elm, cottonwood, hackberry, and willow dominate the forested areas along major streams. Fauna were abundant in the Osage Plains prior to historic settlement, and included large mammals such as bison, elk, deer, antelope, and bear. Smaller game such as squirrel, rabbit, opossum, muskrat, fox, beaver, otter, and cougar were also present (Wedel 1959).

The Glaciated Region is a dissected drift plain bordered on the south by the Kansas River valley and on the west by the Flint Hills (Mandel 1987:III-2) (Figure 2). At least two continental ice sheets invaded northeastern Kansas during the Pleistocene, scouring stream valleys and leveling uplands throughout the drift plain. The advance of the ice sheet during the Kansan glacial episode left the underlying Pennsylvanian and Permian bedrock formations covered by thick, unconsolidated deposits of till, outwash, and loess. The topography of the uplands is characterized by broad, gently rolling hills which become much more dissected near the larger river valleys (Mandel 1987:III-2). The most rugged portion of the region is the heavily dissected uplands bordering the Missouri River valley.

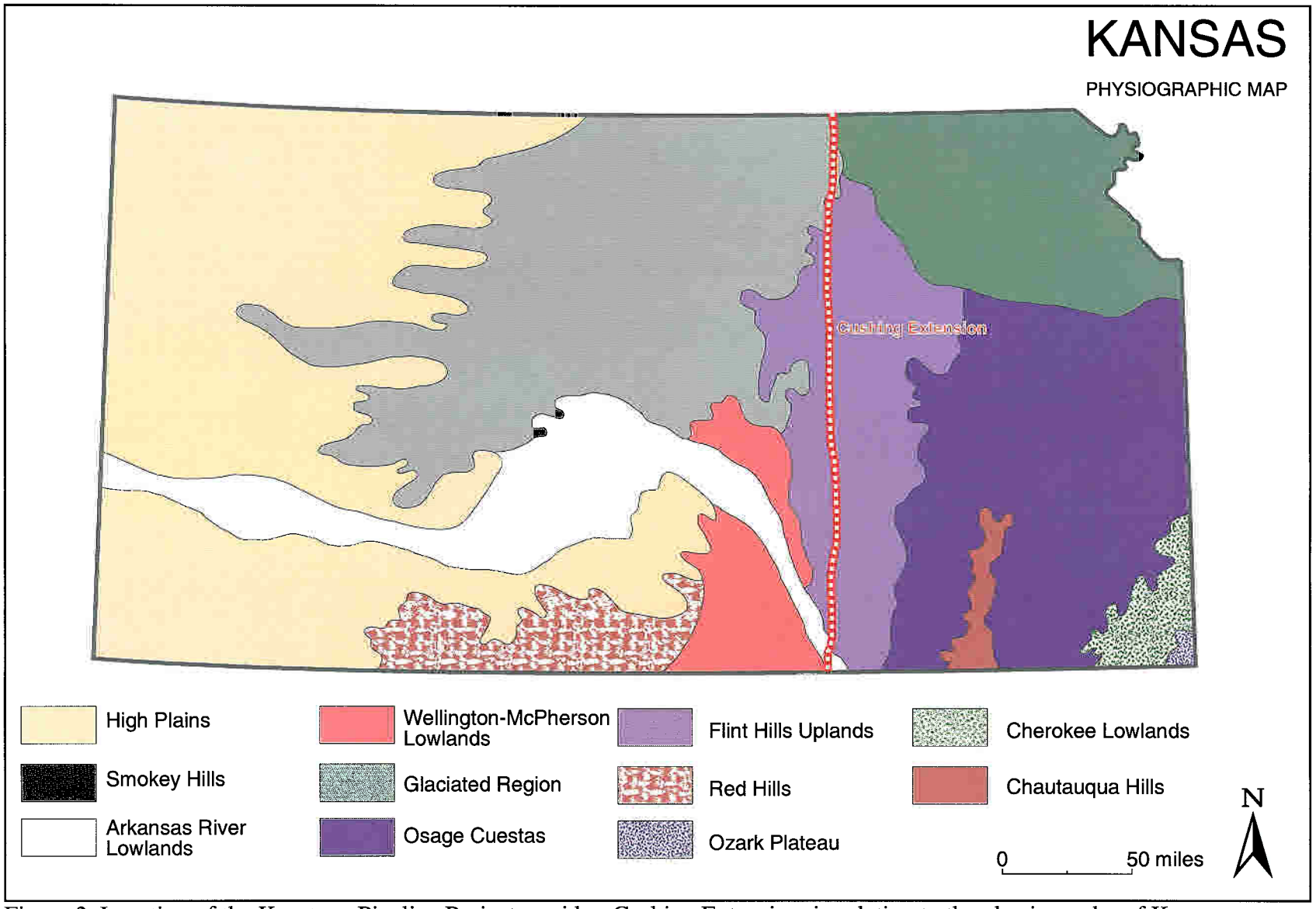

Figure 2. Location of the Keystone Pipeline Project corridor, Cushing Extension, in relation to the physiography of Kansas.

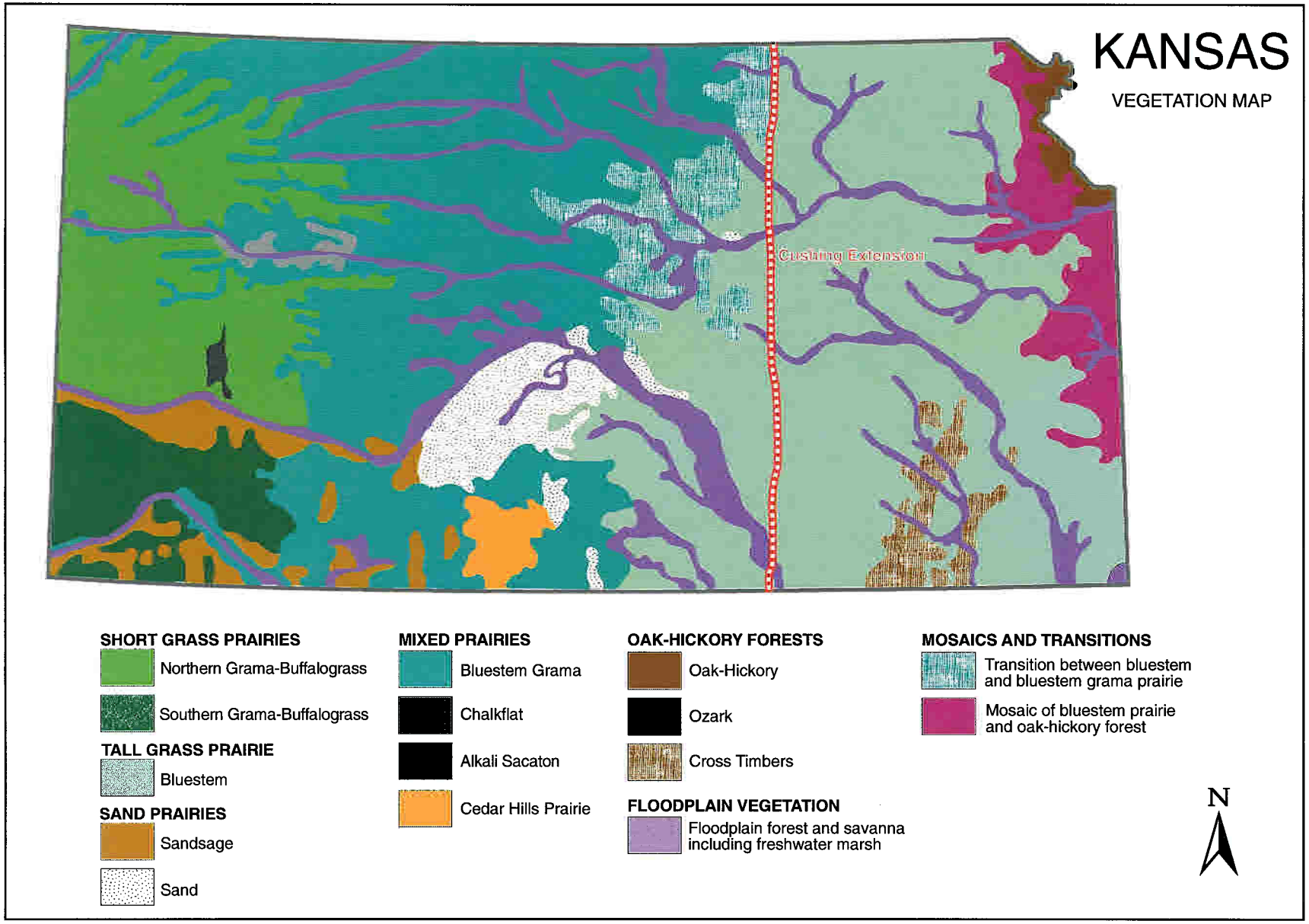

Figure 3. Location of the Keystone Pipeline Project corridor, Cushing Extension, in relation to the natural vegetation of Kansas.

The Glaciated Region is drained by the Big Blue, South Fork Big Nemaha, Delaware, and Missouri rivers. The Big Blue and Delaware rivers flow south through the region into the Kansas River, while the South Fork Big Nemaha flows north to the Big Nemaha River; both the Kansas and the Big Nemaha rivers in turn flow east to empty into the Missouri. The valleys of the these rivers are typically characterized by wide floodplains and steep valley walls (Mandel 1987:III-2).

Like the Flint Hills Uplands, most of the Glaciated Region is covered by tall grass prairie (Figure 3). The dominant flora of this vegetation community include little and big bluestem, switchgrass, Indian grass, and brome grass. Modern day faunal species within the Glaciated Region of northeastern Kansas include deer, raccoon, coyote, fox, and numerous types of birds. Other fauna include amphibians, fish, turtles, and migratory and some resident waterfowl species (Wagner et al. 1989:10).

Previous Archaeological Investigations in the Region

The results of previous archaeological investigations in the Flint Hills Uplands and the Glaciated Region of eastern Kansas indicate that prehistoric sites occurring in this part of the state are concentrated in the valleys and upland-valley margins of the larger streams draining the region. Mandel et al. (1991:72–78) provide a succinct summary of a number of large-scale watershed surveys that have helped to document the prehistoric site distribution pattern in the Glaciated Region.

Lees (1986, 1987) surveyed the locations of 26 proposed floodwater retarding structures within the Pony Creek watershed in Brown and Nemaha counties, Kansas, and Richardson County, Nebraska. The selection of locations for intensive survey was based in part on "proximity to the main bottomlands of the creek" (Timberlake 1985:32), locations high in the drainage being eliminated from further consideration (Mandel et al. 1991). The field survey was restricted to areas within stream valleys to be affected by the construction of the structures, and poor field conditions (low ground surface visibility) reduced the effectiveness of the survey and, consequently, the number of sites recorded (Lees 1986). A total 38 of sites was recorded during the two surveys, including 24 sites containing prehistoric components and 21 containing historic components (Mandel et al. 1991). Prehistoric sites were typically found on high ground along Pony Creek and its larger tributaries, but sites were also identified on terrace remnants located near streams.

While acknowledging the nature of the Pony Creek watershed surveys biased the results toward stream valleys, Lees (1987) interprets the distribution pattern of the identified sites as indicating that Ceramic sites are expected to occur most frequently on terraces bordering the confluence of larger streams and their tributaries, but that the locations of earlier prehistoric sites could not be predicted with the available evidence. While the uplands of the Pony Creek watershed were not routinely surveyed, there is sufficient evidence of prehistoric sites occurring on upland divides to indicate this environmental setting was being utilized (Lees 1987). The distribution of historic sites, which constitute approximately 50 percent of the sites recorded during the Pony Creek watershed survey, indicates that earlier historic sites are far less common than later sites, and their

locations are less apt to have been selected with respect to cultural features (roads and towns) than were later sites (Mandel et al. 1991).

Mandel et al. (1991) conducted a combined geomorphological and archaeological field study of the Upper Delaware River watershed in Nemaha, Brown, Jackson, and Atchison counties, Kansas. The primary goals of the investigation were "to generate a model of landscape evolution in order to better identify the context and content of the local archaeological record, to help archaeologists develop more effective means of predicting the potential distribution of prehistoric sites on and below the present landforms in different drainage elements of the watershed, and to assist the Soil Conservation Service in formulating cultural resource management strategies for the project area and northeast Kansas" (Mandel et al. 1991:ii). The goals of the investigation did not include intensive survey of proposed flood protection structures or clearance of areas from further assessment.

The geomorphological study undertaken by Mandel et al. (1991) focused on selected study areas, in both small and large stream valleys, representative of flood protection structure sites in the upper, middle, and lower parts the Upper Delaware River drainage basin. The geomorphological field investigation included an examination of stream cutbanks in an attempt to identify buried archaeological sites and/or deeply stratified fill sequences suitable for dating. The field investigation also included coring with a hydraulic soil probe at several locations in order "to determine the character, depth, and lateral extent of deposits that underlie the various landforms in the study area" (Mandel et al. 1991:14). An archaeological sampling strategy involving selection of 30 sections within the Delaware River/Cedar Creek drainage was implemented. Within the sections selected for survey, the archaeological investigation was conducted following a methodology described as "a stratified, opportunistic, and intuitive survey" (Mandel et al. 1991:16). In practice, this involved walking four transects in each section: one on either side of the largest stream in the section to examine cutbanks for buried cultural deposits and inspect the adjacent terraces; and, another transect on either side of the stream to examine areas beyond the immediate vicinity of the major stream, cutbanks of smaller streams, and the locations of historic structures depicted on historic atlases. No shovel testing or soil coring was attempted.

Mandel et al. investigated 29 prehistoric sites in the course of their Upper Delaware River study, including five that had been previously recorded (1991:114–115). Four of the prehistoric sites are buried sites that were identified in cutbanks of the Delaware River, three of them a relatively short distance upstream of the point where the Keystone Pipeline Project corridor crosses this drainage. The distribution of prehistoric sites identified during this investigation suggested that the extreme upper reaches of the drainage never provided a sufficiently reliable source of water to support any but the most ephemeral prehistoric occupations. The results of the survey also suggested that prehistoric sites could be expected to occur on all landforms along larger streams, although all those identified during the field investigation occurred on high terraces and in the uplands bordering the stream valleys. While each of the buried sites identified during the investigation were discovered in the cutbanks of larger streams, the potential for site burial also exists along smaller streams in the upper portion of the drainage (Mandel et al. 1991:115).

The archaeological survey of the Upper Delaware River watershed is also notable for its use of late nineteenth- and early twentieth-century atlases to identify the locations of potential historic sites. A total of 122 historic farmsteads was recorded during the survey through the review of the early atlases and subsequent survey. While the results of the historic map review argue for making this practice a standard part of survey procedure, it is acknowledged that historic sites pre-dating the earliest maps can be found only through intensive archaeological survey (Mandel et al. 1991:114).

American Resources Group recently completed the Phase II survey of the Kansas Segment of the Rockies Express Pipeline Project (REX) corridor, a proposed pipeline-construction corridor abutting the southern edge of the existing pipeline corridor that the present project corridor parallels (Myers et al. n.d.). A sampling strategy identical to the probabilistic survey strategy proposed for the Keystone project corridor guided the survey of the REX corridor. Survey efforts were focused on the valleys and adjacent uplands of the larger drainages—which were the portions of the pipeline corridor judged most likely to contain prehistoric sites—and these efforts were supplemented by limited upland survey targeting potential historic sites (Myers et al. n.d.).

The survey of the REX corridor resulted in the identification of 23 archaeological sites, including 12 sites containing prehistoric components and 11 containing historic components (Myers et al. n.d.). All but one of the 12 prehistoric sites recorded during the survey of the REX corridor are located in a stream valley or adjacent upland and, conversely, only one of the upland sections of the project corridor that were surveyed was found to contain a prehistoric site. The distribution of prehistoric sites within the REX corridor conforms to the pattern documented by previous research, thus providing additional evidence in support of the hypothesis underlying the sampling strategy proposed for the survey of the Keystone Pipeline Project corridor, Cushing Extension.

A limited number of large-scale surveys have been conducted in the vicinity of the project corridor within the Flint Hills Uplands. Those that have been carried out in this region include a Phase II cultural resources survey of the Milford Lake shoreline and adjacent areas in Clay, Dickinson, Geary, and Riley counties in eastern Kansas. In 1993, the University of South Dakota Archaeology Laboratory (USDAL) surveyed approximately 5,561 acres and identified 51 prehistoric and 32 historic archaeological sites. Studies at Milford Lake had been conducted previously by the University of Kansas, Kansas State University and the Kansas State Historical Society (Molyneaux et al. 1995).

A 1988 cultural resources inventory compiled by Schmits listed 124 sites in the Milford Lake area, including 92 prehistoric, 32 historic and one site with both a prehistoric and historic component. Schmits (1988) developed a predictive model based on his 1982–1984 Milford Lake survey and other prior surveys. Although Schmits found that the majority of sites are located on terrace landforms, he suggests that future surveys may determine that a much higher density of sites are located along tributaries and in upland settings than have previously been recognized. This hypothesis was based on the fact that 68 percent of the sites identified during previous surveys were located in upland settings. He suggests sites dating to specific cultural periods, including Plains

Archaic and Plains Woodland (Early Ceramic), will be located in upland settings, while sites affiliated with Plains Village (Middle Ceramic) will be primarily found on terraces (Schmits 1988).

The 1993 USDAL Milford Lake survey used a similar terrain-oriented settlement study as a further predictor of site location and tested Schmits predictions. The results indicated that terraces remained the most heavily occupied topographic location, in contrast to Schmits prediction of higher site density on smaller tributaries in uplands away from the Republican River valley. In addition, the 1993 survey noted that historic sites were also found more often on terraces than on uplands (Molyneaux et al. 1995).

Results of Records Check and Literature Review

A site file search and literature review were conducted online at the Kansas State Historical Society's website the week of February 20, 2006. The purpose of the records search and literature review were to determine the nature and extent of archaeological investigations conducted to date in the portions of eastern Kansas that the Cushing Extension pipeline traverses and to identify the number and nature of previously recorded sites located within approximately a one-mile radius of the proposed pipeline. The 1887 atlas of the state of Kansas also consulted in order to identify potential historic sites within the pipeline corridor.

Previously Recorded Sites and Surveys

The results of the background study indicate that eight previously recorded sites are located within the Cushing Extension pipeline corridor. An additional 58 sites have been recorded within ½ mile of the project corridor center line. The 66 previously recorded sites identified in the vicinity of the project corridor include 60 prehistoric sites, three historic sites, and three sites containing both prehistoric and historic components (Table 1). The majority of these sites have not been evaluated against NRHP criteria, and therefore, no determination of eligibility has been noted for these sites. At least two of the sites have been tested and one has been mitigated (Table 1).

Relatively few professional archaeological surveys have been conducted in the vicinity of the proposed Cushing Extension. These consist primarily of road alignment, gas line relocation, and watershed studies. These surveys are noted on the accompanying USGS topographic maps and are discussed in brief below.

The largest surveys in the project area are those conducted at Milford Lake, which have been summarized above. An archaeological survey of a portion of the Whitewater River Watershed in Butler County investigated areas to be impacted from the construction of a dam, flood pool, and spillway. This survey identified four sites—all of which are located near the Cushing Extension. A fifth site appears to have been identified at a later time (Bevitt 2002) (see Figure 27; Sheet CE-226). Subsequent investigations at two of these sites determined that one, a rock oven (site 14BU1308), was eligible for the NRHP. This site was mitigated in 2003 (Bevitt et al. 2003; Molyneaux n.d.). Site

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