Environmental Assessment
KAMO Electric Cooperative, Inc.
Blackberry to Chouteau
345-kV Transmission Line Project

prepared for

Rural Utilities Services

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Project No. 45061

prepared by

Burns & McDonnell Engineering Company, Inc.
Kansas City, Missouri

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ACRONYM LIST

AECI	Associated Electric Cooperative, Inc.
AEP	American Electric Power
APE	Area of Potential Effect
BMP	Best Management Practice
BNSF	Burlington Northern Santa Fe
CFR	Code of Federal Regulations
DOT	State Department of Transportation
EA	Environmental Assessment
EMF	Electric and Magnetic Field
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
GAP	Gap Analysis Program
GIS	Geographic Information System
GLO	General Land Office
GRDA	Grand River Dam Authority
G&T	Generation and Transmission
KAMO	KAMO Electric Cooperative, Inc.
kV	kilovolt
MUTCD	Manual of Uniform Traffic Control Devices
MW	megawatt
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NLCD	National Land Cover Data
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
OAM	Oklahoma, Arkansas, Missouri
OCGI	Oklahoma Center for Geospatial Information
OHGW	Overhead Ground Wire
OPGW	Optical Ground Wire
OTSA	Oklahoma Tribal Statistical Areas
ROW	Right-of-Way
RUS	Rural Utilities Services
SCS	Soil Conservation Service
SHPO	State Historic Preservation Office
SPP	Southwest Power Pool
SSURGO	Soil Survey Geographic Database
SWPPP	Stormwater Pollution Prevention Plan
TVI	Television Interference
UP	Union Pacific
USCOE	United States Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

1.0 INTRODUCTION

KAMO Electric Cooperative, Inc. (KAMO) is a not-for-profit generation and transmission (G&T) cooperative serving 17 rural electric distribution cooperatives. KAMO is requesting financing from the U.S. Department of Agriculture (USDA), Rural Utilities Service (RUS) to construct and maintain an electric transmission line and associated facilities in northeast Oklahoma, southeast Kansas, and southwest Missouri. RUS, an agency that administers the U.S. Department of Agriculture's Rural Development Utilities Program, must complete an environmental analysis and prepare an Environmental Assessment (EA) in accordance with its *Environmental Policy and Procedures for Implementing the National Environmental Policy Act* (7 Code of Federal Regulations (CFR) Part 1794), prior to approving the financing assistance for the proposed project. The EA will serve as a detailed written record of the environmental analysis completed for the proposed project and will be used to determine whether preparation of an Environmental Impact Statement is necessary. The EA incorporates a detailed description of the proposed project and copies of portions of maps locating the project with a discussion of the purpose and need for the project and of the alternatives considered reasonable and feasible to accomplish the proposed action. Discussions of the affected environment within the project area, the environmental consequences of the proposed action, and the mitigation of the potential environmental impacts are also included.

1.1 PROPOSED ACTION

RUS proposes to grant financing for the construction of approximately 100 miles of 345-kilovolt (kV) electric transmission line, approximately 2 miles of single circuit 161-kV electric transmission line that would be owned and operated by KAMO, and two 345-kV substations. The new 345-kV electrical transmission line would be constructed from a point near the Kansas-Missouri border west of Jasper, Missouri in Jasper County to a substation near Chouteau, Oklahoma in Mayes County (Figure 1-1). The single circuit 161-kV transmission line would be constructed from KAMO's new Chouteau Substation to Associated Electric Company, Inc.'s (AECI's) Chouteau Gas Plant. The 345-kV and single circuit 161-kV portions of the project would both be constructed using weathering steel H-frame structures (Figures 1-2 and 1-3). The 345-kV structure would contain two optical ground wire (OPGW) fibers and the 161-kV structure would contain one OPGW. Several 0.5 acre regeneration sites would be located along the 345-kV right-of-way (ROW). Over distance, the signal value of the fiber degrades and needs to be magnified. Regeneration sites are locations where the fiber's signal is sent through a micro-wave repeater that magnifies the signal. To provide access, these sites would likely be located in and along the transmission line ROW and near road crossings.

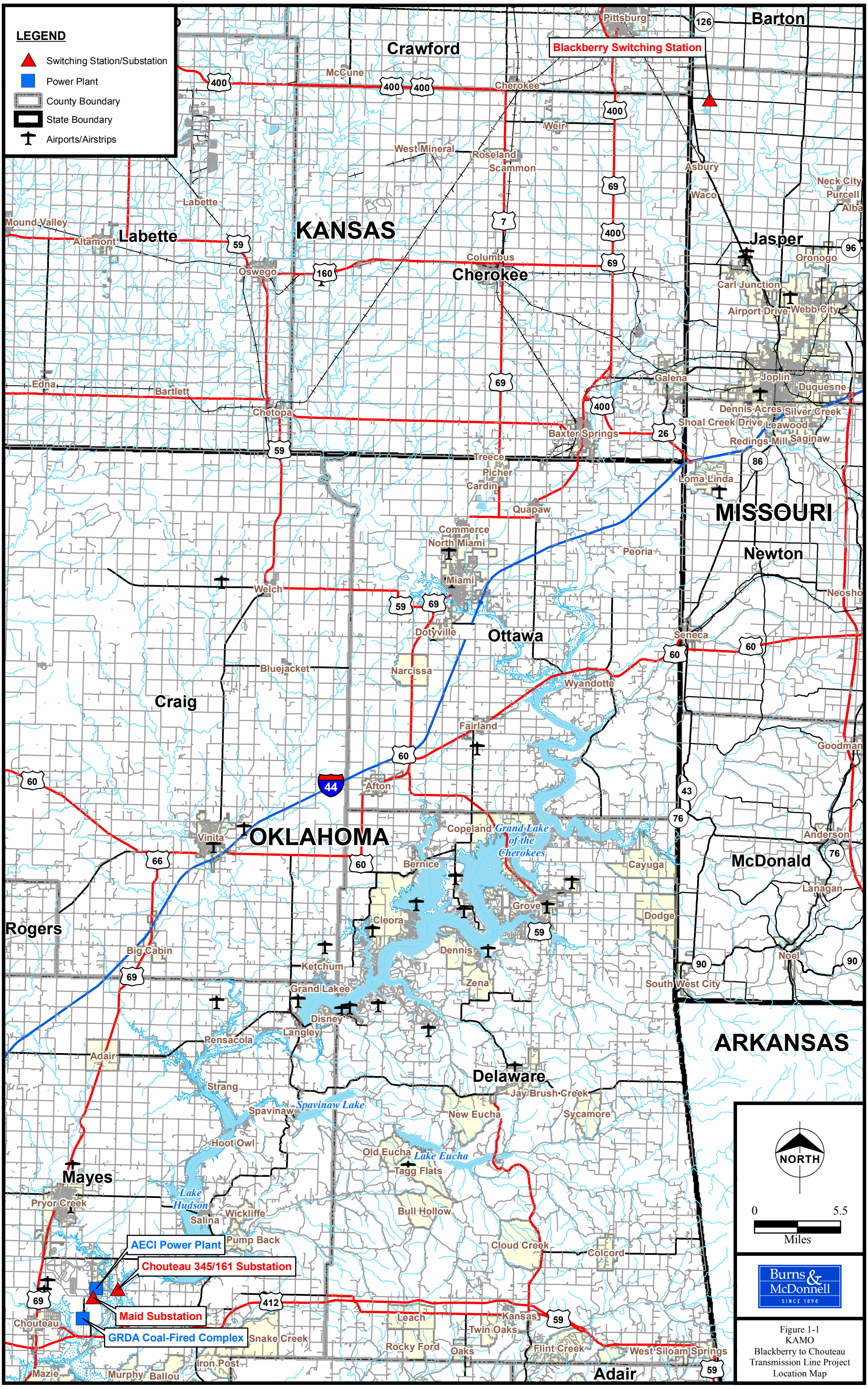
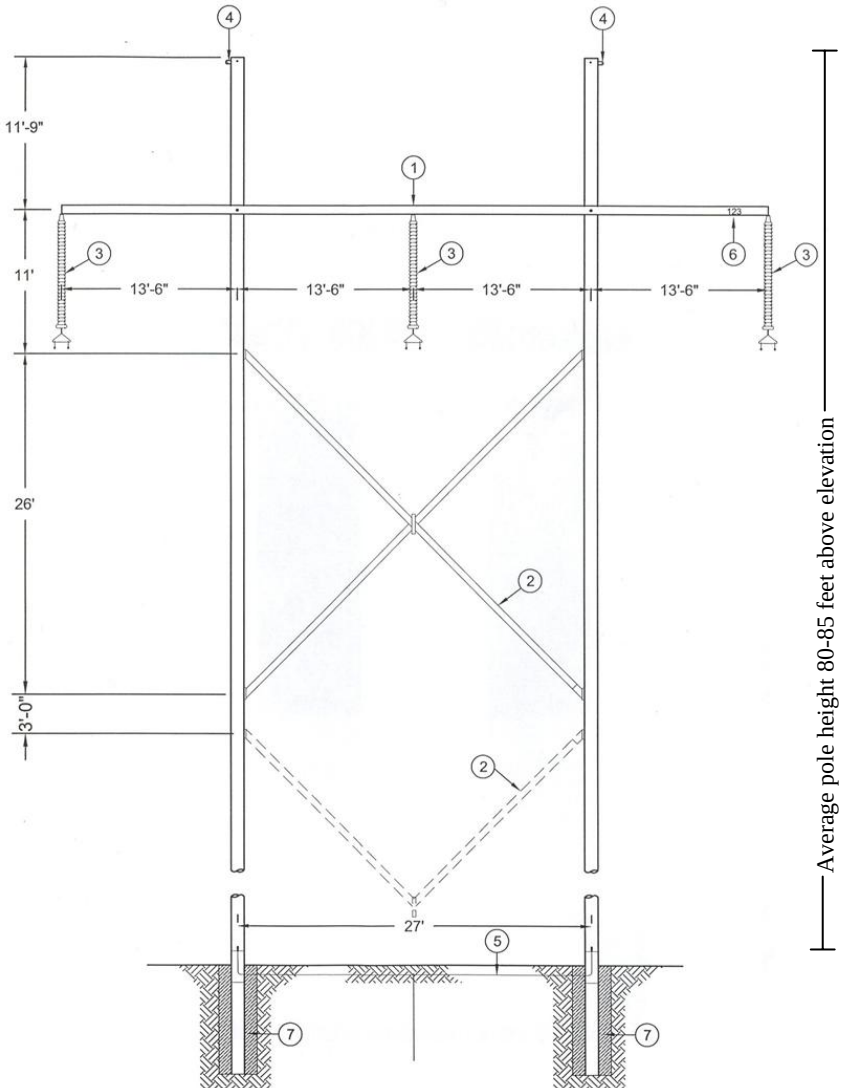
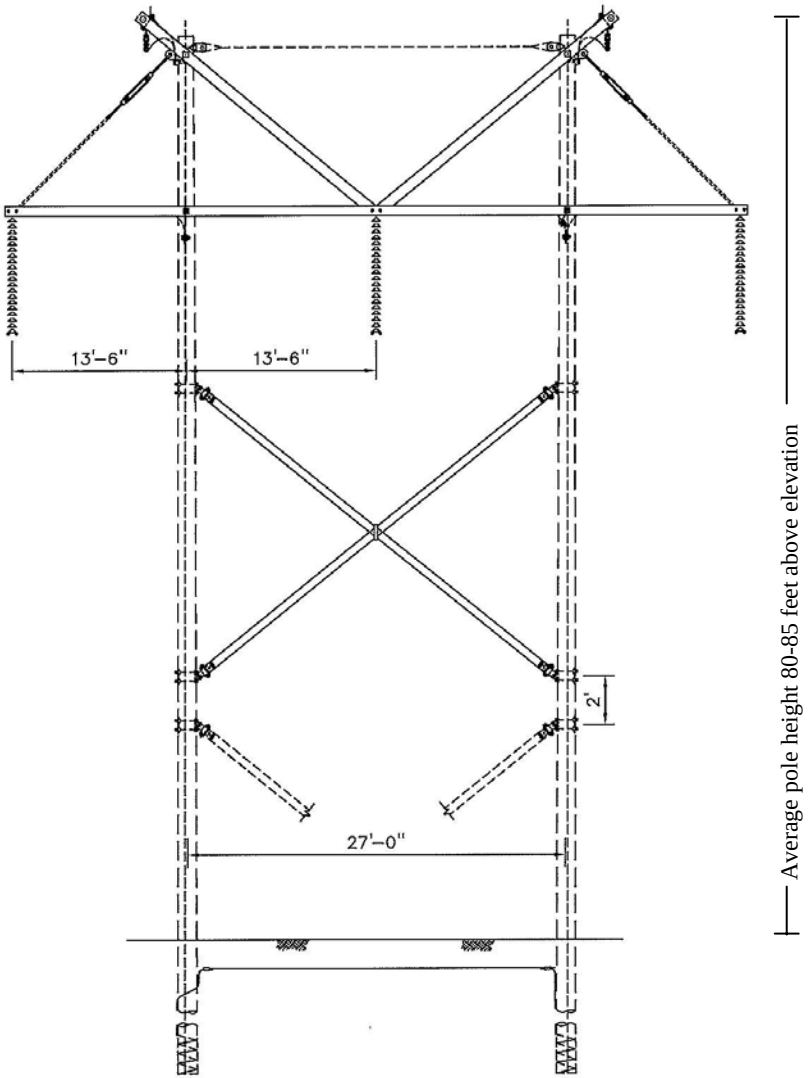


Figure 1-1
KAMO
Blackberry to Chouteau
Transmission Line Project
Location Map



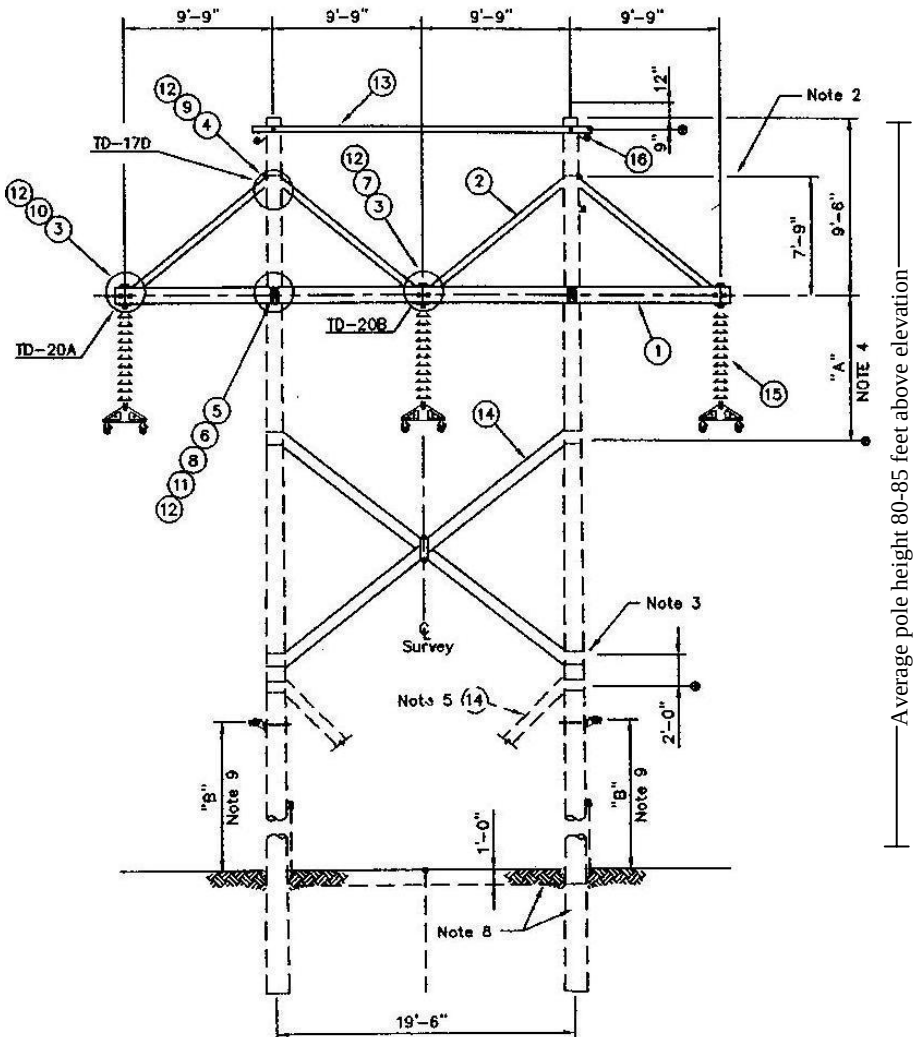
345-kV Weathering Steel H-Frame Structure



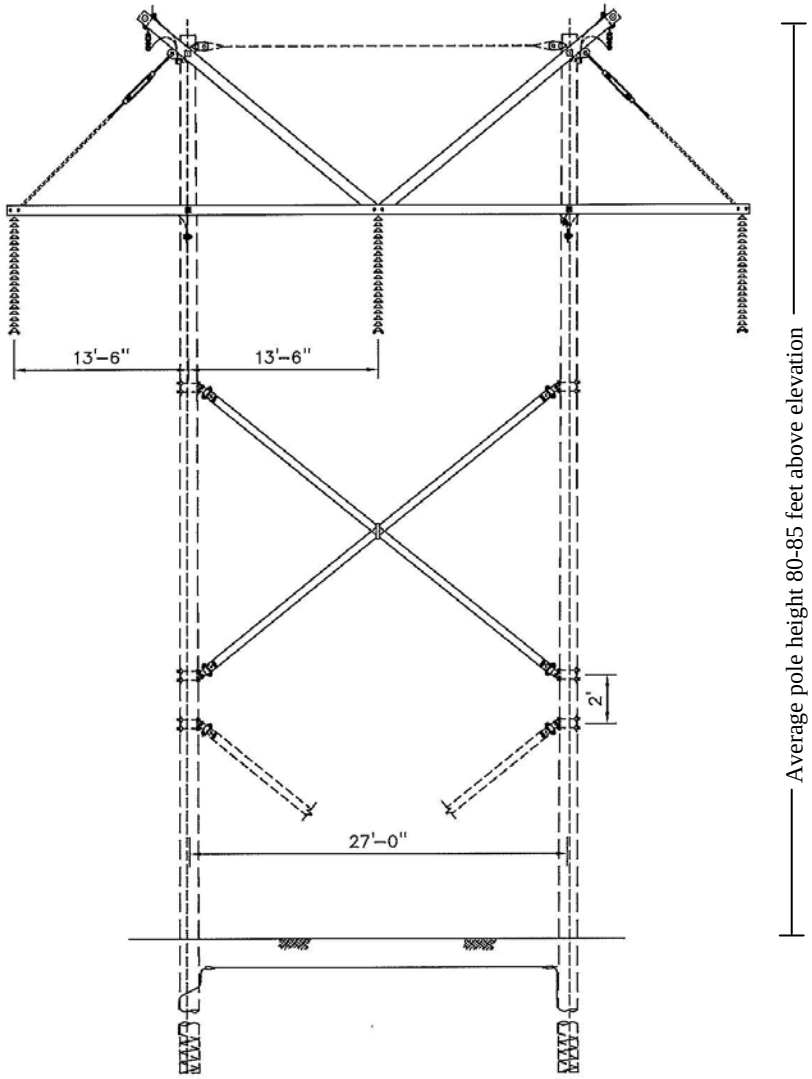
345-kV Weathering Steel H-Frame Structure

Figure 1-2

Blackberry to Chouteau
Transmission Line Project
345-kV Alternate Structures



161-kV Weathering Steel H-Frame Structure



161-kV Weathering Steel H-Frame Structure

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SINCE 1898

Figure 1-3

Blackberry to Chouteau
Transmission Line Project
161-kV Alternate Structures

1.1.1 Location

The project would be located in southeastern Kansas, southwestern Missouri and northeastern Oklahoma (Figure 1-1). It includes portions of Cherokee County in Kansas portions of Jasper County in Missouri and Ottawa, Craig, and Mayes counties in Oklahoma (Figure 1-1). The routes evaluated for this project generally avoid the more developed portions of the study area, including Joplin, Missouri and Miami, Oklahoma. Additionally, they avoid Grand Lake of the Cherokees and other large lakes in the area.

The origin of the new 345-kV transmission line would tie into an existing 345-kV line at the new Blackberry Substation located 3.5 miles north of Asbury, Missouri in western Jasper County. The terminus of the new 345-kV line would be the Grand River Dam Authority (GRDA) Coal-Fired Complex, located east of the City of Chouteau in Oklahoma. The origin of the new single circuit 161-kV line would be the new 345/161-kV Chouteau Substation located approximately two miles east of AECI's Chouteau Gas Plant. The terminus of the new single circuit 161-kV line would be at the Chouteau Gas Plant. Selection of the locations for the proposed Blackberry and Chouteau Substations were chosen by KAMO. These locations were selected because of their proximity to existing lines, access roads, and power plants as well as their location within the existing KAMO network.

1.1.2 Structures

Wood or wood equivalent weathering steel H-Frame structures are proposed for the new 345-kV transmission line (Figure 1-2). The new 161-kV transmission line would use H-frame structures made of wood or wood equivalent weathering steel poles (Figure 1-3). The anticipated pole height for the 345-kV and 161-kV lines range from 65 to 115 feet above ground elevation, with an average pole height of 80 to 85 feet above elevation. The average span for the 345-kV line would be 800 feet and the average span for the 161-kV line would be 300 feet. The 345-kV structure would also contain two OPGW fibers and the 161-kV structure would contain one OPGW fiber with the primary purpose of communications and protective relaying. Surplus capacity will be offered for commercial communications.

1.1.3 Right-of-Way

The new 345-kV and the new 161-kV lines would both require 150 feet of new ROW. KAMO land agents would work individually with property owners to purchase easements for the new 345-kV and 161-kV lines once the RUS approves the project. KAMO would pay just compensation for easements, and landowners would retain ownership of the property. The amount of just compensation for each tract would be determined in the manner prescribed by the particular statutes of the state in which the transmission line is located. Under the agreement, property owners could not place any permanent structures within the corridor that would restrict complete access and maintenance of the line or ROW.

Given the terrain in the area, no construction of access roads outside of the 150-foot ROW would need to be constructed. If obstructions exist that are completely blocking ingress and/or egress along the 150-foot ROW corridor, such as flowing creeks, KAMO would arrange with landowners to use existing field roads, to access the structure locations.

In addition to the ROW, the fiber optic regeneration sites would be purchased in fee and separate from ROW easements. These sites would likely be located near road crossings to provide all-weather access to the sites.

1.1.4 Construction, Operation, and Maintenance

Construction involves a number of steps, which are listed below:

- Detailed survey of the route alignment
- ROW acquisition and clearing
- Construction of access roads, if necessary
- Installation of structure foundations, if necessary
- Assembly and erection of new structures
- Stringing and tensioning of the conductors
- Final clean-up and land rehabilitation

All appropriate materials would be delivered and assembled at each structure location. Most structures would be directly imbedded into the ground, with a hole excavated for placement of the pole. Poles would be backfilled following placement. Excess soil from the holes would be evenly distributed at each pole site and the soil stabilized. No poles are anticipated to be placed in wetlands. However, if necessary, the method used for the installation of poles in wetland areas would depend on the sub-surface conditions; excess soil would be removed to an upland site. If poor subsurface soil conditions are expected, concrete bearing plates may be necessary. Typical construction equipment would include hole diggers, cranes, wire-stringing rigs, tensioners, backhoes, and trucks.

The conductor, OPGW and Overhead Ground Wire (OHGW) would be installed under tension utilizing IEEE 524-2003, *IEEE Guide to the Installation of Overhead Transmission Line Conductors*. Stringing under tension would be used to assure the protection of the public, line construction workers and livestock. Particular attention would be given to railroad crossings, highway crossings, transmission line crossings, and distribution line crossings. Pulling under tension would also protect the conductor, OPGW and OHGW from physical damage. The appropriate transportation agency for each roadway would be contacted for highway crossing permits. KAMO would comply with each jurisdiction's permit

requirements. A Traffic Control Plan would be developed for each highway crossing and the traffic control devices/methods would conform to the Manual of Uniform Traffic Control Devices (MUTCD).

Maintaining the ROW under the transmission lines is essential for the reliable operation of the line and public safety. Operation and maintenance of the line would consist of periodic inspections of the line and ROW, occasional replacement of hardware as necessary and periodic treatment of woody vegetation within the corridor. The periodic inspections would occur on a regular basis and utilize both aerial and walking patrols. Normal operation and maintenance would require only infrequent visits by KAMO or their contractors. Agricultural activities would be allowed to continue within the ROW.

To treat woody vegetation, selective, low-volume herbicide applications targeting only tree species would take place every three to five years. Herbicides would be applied as an individual spot treatment, and not broadcast across the entire ROW. KAMO would acquire sufficient ROW so that cutting or trimming danger trees outside the ROW would not be necessary. KAMO only uses herbicides on power line ROW that are approved by the Environmental Protection Agency (EPA), such as Rebound, Escort, and Accord XRT. These herbicides will only be applied by a licensed professional.

1.1.5 Project Schedule

The construction of a transmission line involves several stages, all of which overlap to some degree. The approximate start schedule for the Blackberry to Chouteau 345-kV line and the 161-kV line from the new Chouteau 345/161-kV substation to the Chouteau Gas Plant Transmission Line Project is described below:

- RUS Approval: early 2008
- Survey: early 2008
- ROW Acquisition: Fall 2008
- Construction: Spring 2009
- In-Service Date: June 2010

1.2 AGENCY ACTION

RUS is the agency that administers the USDA's Rural Development Utilities Programs and is responsible for implementing the National Environmental Policy Act (NEPA) for this federal action. RUS has followed its policies and procedures, 7 CFR Part 1794 Environmental Policy and Procedures for implementing the NEPA, in order to assure compliance with NEPA and related laws including the National Historic Preservation Act (NHPA). In doing so, RUS worked with the local, state, and federal agencies with expertise in their resources, as well as Native American tribes and interested consulting

parties to evaluate the potential environmental impacts of the proposal. The proposed federal action related to KAMO's proposed transmission project would be the granting of financing for the construction of the proposed facilities.

The RUS decision to be made, based on the environmental analysis outlined in the EA, would be whether or not to grant the financing assistance for the construction of the proposed electric facilities.

1.3 PURPOSE AND NEED

1.3.1 Purpose for the Proposed Action

The purpose of the proposed action is to provide additional transmission facilities for increasing transmission capacity between KAMO's southwest Missouri system and KAMO's northeast Oklahoma system.

1.3.2 Need for the Proposed Action

KAMO is a not-for-profit G&T cooperative serving 17 rural electric distribution cooperatives. KAMO exists to serve the needs of its member cooperatives by providing safe, low-cost, reliable power. KAMO accomplishes these goals through its transmission network, qualified and dedicated personnel, effective system operations, maintenance, planning, and long term rate stability.

KAMO has experienced strong electrical demand growth throughout its entire service area. In order to meet the continued strong growth, KAMO's transmission system must be able to move greater amounts of power. Through the transmission planning process, a transmission bottleneck has been identified that can significantly impact the ability to move power from KAMO's generation resources to KAMO's load, as well as to other electric utilities in the region. This bottleneck is becoming progressively worse as the demand on the KAMO system increases.

The KAMO service territory encompasses southwest Missouri and northeast Oklahoma. Close to one-half of KAMO's approximate 1,500 megawatts (MW) of peak load is in each of the two states. Currently, transmission capacity is provided by two KAMO owned 69-kV lines and the 345-kV multi-owner Oklahoma, Arkansas, Missouri (OAM) line. Should any of the existing transmission line connections between the two systems be unavailable due to weather, maintenance, KAMO may not be able to serve its Oklahoma load. At such times, KAMO's only option is to rely on non-firm transmission capacity from the Southwest Power Pool (SPP). Non-firm transmission capacity is just that, non-firm and is not guaranteed to be available when needed. As such, transmission capacity may or may not be available to KAMO during times of need such as peak demand periods or loss of lines or generation resources.

KAMO's only other option under such conditions at this time would be to shed firm member load through measures such as rolling black-outs.

To eliminate the transmission bottleneck, KAMO proposes to build a new 345-kV electrical transmission line from a point near the Kansas-Missouri border west of Jasper, Missouri in Jasper County to the GRDA Coal-Fired Complex near Chouteau, Oklahoma in Mayes County. This proposed electrical transmission line would significantly increase the transmission system capacity helping KAMO to avoid blacking-out large numbers of consumers due to insufficient capacity.

The proposed 345-kV line would connect a new proposed Blackberry Substation in western Jasper County with its new proposed Chouteau 345/161-kV Substation in Mayes County and then on to GRDA's Coal-Fired Complex. The proposed single circuit, 161-kV line would continue approximately two miles west from the new Chouteau 345/161-kV Substation to AECI's Chouteau Gas Plant. These new lines and substations would provide the components necessary to create the needed transmission capacity within the KAMO system to meet industry reliability standards.

RUS has reviewed and accepted KAMO's 2007-2017 Long-Range Transmission Plan for its Missouri and Oklahoma systems and KAMO's study entitled Special Project for Construction of Blackberry, Missouri to Chouteau, Oklahoma 345-kV Line Project which provide the technical justification for the proposed project.

* * * * *

2.0 DESCRIPTION OF THE STUDY AREA

2.1 INTRODUCTION

The route corridor study area for the Blackberry to Chouteau 345-kV line extends from the proposed Blackberry Substation in Jasper County, Missouri, to the proposed new Chouteau 345/161-kV Substation in Mayes County, Oklahoma and on southwest to the GRDA Coal-Fired Complex, also in Mayes County (Figure 2-1). This corridor study area extends through portions of seven counties, including Jasper County, Missouri, Crawford and Cherokee counties in Kansas, and Ottawa, Craig, Delaware, and Mayes counties in Oklahoma. Communities within the study area, such as Baxter Springs, Picher, Commerce, Miami, Narcissa, Vinita, Afton, and Big Cabin, were excluded from the route corridor. However, upon further evaluation of the study area in the Macro-Corridor Report, Crawford County, Kansas was removed from the study area leaving only six counties to be evaluated further as part of the Macro-Corridor (Figure 2-1). A more detailed explanation of how the Macro-Corridor was developed can be found in the Macro-Corridor Report prepared for RUS and in Section 3.3 of this report. The Macro-Corridor Report was made available to the public in June 2007, and can be viewed at the RUS website at http://usda.gov/rus/water/ees/ea.htm.

The route corridor study area for the Chouteau to AECI Plant 161-kV line extends from the proposed new Chouteau Substation in Mayes County, Oklahoma west to AECI's Chouteau Gas Plant.

The following text provides a description of the existing environment found in the route corridor study area of the proposed project. Included in this section is general information that describes the natural and human resources found within this route corridor study area.

2.2 VEGETATION

Vegetation throughout the study area forms a mosaic of different community types. These types range from timbered hilly areas to mixed warm and cool season pastures to minor amounts of cultivated cropland. There are no unique or unusual vegetation communities in the study area. Some scattered native prairie hay meadows may occur in the study area. More level areas generally have been cleared for agricultural use, while areas along drainageways and in more hilly areas are wooded. The agricultural land in Oklahoma is mostly used as pastureland sparsely intermixed with row crop production, such as corn, wheat, and sorghum. Most of the woodlands are limited to the more riparian areas and the dominant tree species within the wooded areas are bottomland hardwoods such as pin oaks. Wooded areas in the eastern half of Ottawa and Mayes County in Oklahoma are dominated by oak-hickory forests (Oklahoma Department of Agriculture, Food and Forestry 2007).

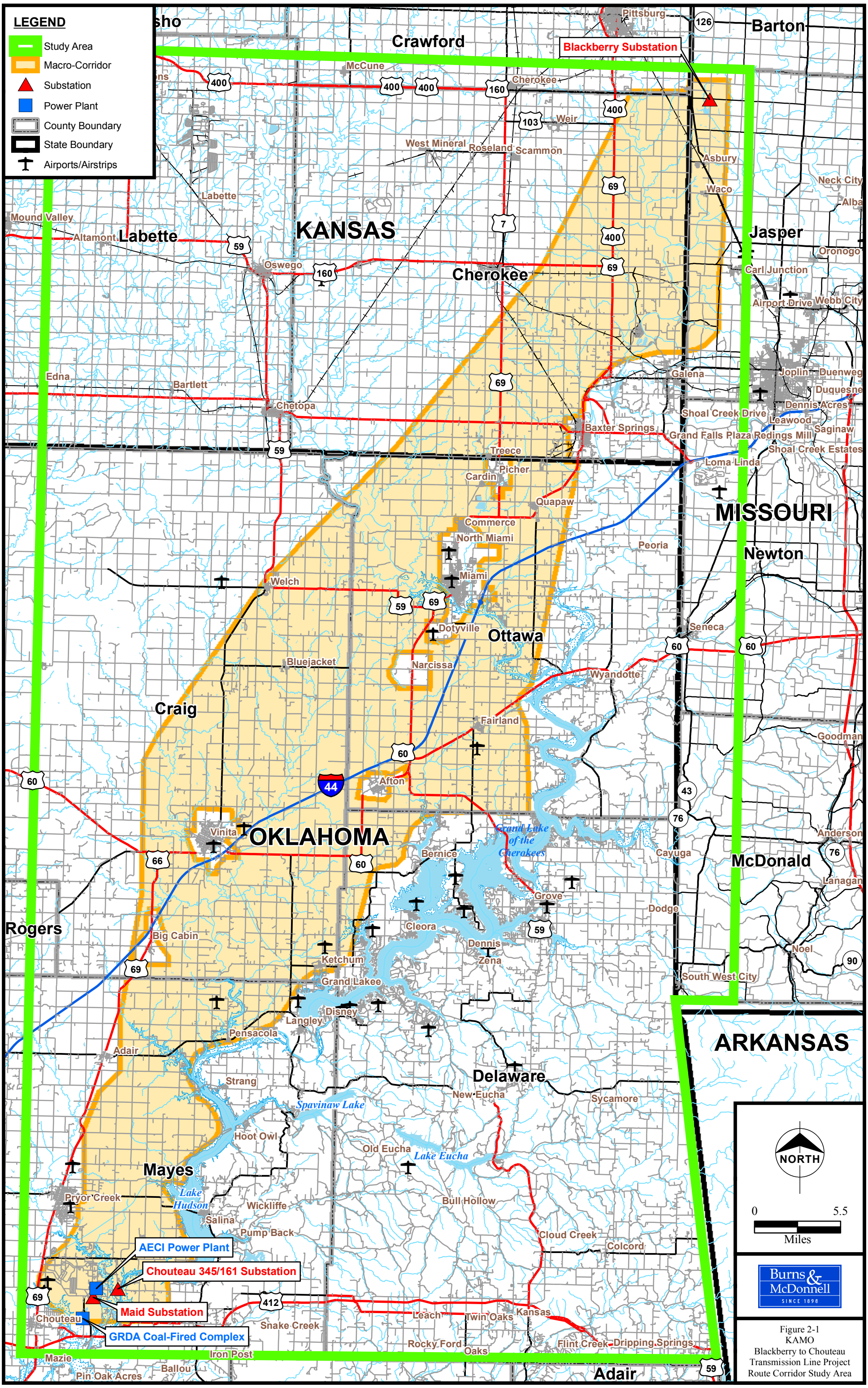

Figure 2-1
KAMO
Blackberry to Chouteau
Transmission Line Project
Route Corridor Study Area

Vegetation near the proposed Blackberry Substation site consists of pasture and cultivated crops. The proposed Chouteau Substation site is surrounded by cleared ROWs composed of herbaceous shrubs and grasslands with deciduous woodlands on both the east and west sides. Existing transmission lines occur throughout the area to the north and south.

2.3 WILDLIFE

The abundance and variety of vegetative communities provides habitat for numerous species of wildlife. Wildlife includes both game species such as bobwhite quail, dove, cottontail rabbit, fox squirrel, white-tailed deer, eastern wild turkey, furbearers, and waterfowl, as well as, numerous non-game species including rodents, bats, songbirds, shorebirds, amphibians, and reptiles.

2.4 THREATENED AND ENDANGERED SPECIES

The Endangered Species Act of 1973 (ESA) affords legal protection to those species and their habitats determined to meet the specified criteria for listing by the federal government as either threatened or endangered. The ESA defines a federally endangered species as “any species which is in danger of extinction throughout all or a significant portion of its range.”

Preliminary investigation identified several federally listed species as potentially occurring in the counties included in the study area, including the American burying beetle (*Nicrophrus americanus*), eskimo curlew (*Numenius borealis*), gray myotis (*Myotis griseascen*s), interior least tern (*Sterna antillarum*), Neosho madtom (*Notrus placidus*), Ozark cavefish (*Amblyopsis rosae*), piping plover (*Charadrius melodus*), and the western prairie fringed orchid (*Platanthera paraeclara*). The bald eagle (*Haliaeetus leucocephalus*) occurs within the study area; however, it was de-listed from federal status in June 2007. Although the bald eagle is no longer on the endangered or threatened species list, it is still protected by the Bald Eagle Protection Act.

Federally-protected species such as the American burying beetle, bald eagle, and gray myotis may occur in the study area. Others such as the interior least tern, piping plover, and eskimo curlew are not expected due to the lack of suitable habitat in the area. The Neosho madtom and Ozark cavefish may occur in the area, but their aquatic habitat will not likely be altered during the project. Table 2-1 provides a complete list of the federal and state listed species potentially occur or that once occurred in the study area. Many of the state-listed species such as the ones in Cherokee County, Kansas are listed because they are at the edge of their range in the state; however, they may be more common in adjoining states.

Table 2-1 Federal and State Threatened and Endangered Species

Common Name	Scientific Name	Federal Status	State Status					
			Oklahoma				Kansas	Missouri
			Delaware	Ottawa	Craig	Mayes	Cherokee	Jasper
American bittern	*Botaurus lentiginosus*							E
American burying beetle	*Nicrophorus americanus*	E					E	
Arkansas darter	*Etheostoma cragini*	C	C	C	C	C	T/CH	C
Bald eagle	*Haliaeetus leucocephalus*		E				T	
Barn owl	*Tyto alba*							E
Black-tailed jackrabbit	*Lepus californicus*							E
Broadhead skink	*Eumeces laticeps*						T	
Butterfly	*Ellipsaria lineolata*						T/CH	
Cave salamander	*Eurycea lucifuga*						E/CH	
Common map turtle	*Graptemys geographica*						T	
Eastern narrowmouth toad	*Gastrophryne carolinensis*						T/CH	
Eastern newt	*Notophthalmus viridescens*						T/CH	
Eastern spotted skunk	*Spilogale putorius*						T	
Elktoe mussel	*Alasmidonta marginata*						E/CH	
Ellipse mussel	*Venustaconcha ellipsiformis*						E/CH	
Eskimo curlew	*Numenius borealis*	E					E	
Flat floater mussel	*Anodonta suborbiculata*						E	
Flutedshell mussel	*Lasmigona xostata*						T/CH	
Gray myotis	*Myotis griseascens*	E	E	E			E/CH	E
Greater prairie chicken	*Tympanuchus cupido*							E
Green frog	*Rana clamitans*						T/CH	
Grotto salamander	*Typhlotriton spelaeus*						E/CH	
Interior least tern	*Sterna antillarum*	E					E	
Longtail salamander	*Eurycea longicauda*						T/CH	
Many-ribbed salamander	*Eurycea multiplicata*						E/CH	
Neosho madtom	*Noturus placidus*	T		T			T/CH	E

Common Name	Scientific Name	Federal Status	State Status					
			Oklahoma				Kansas	Missouri
			Delaware	Ottawa	Craig	Mayes	Cherokee	Jasper
Neosho mucket	*Lampsilis rafinesqueana*	C	E	E			E/CH	C
Northern harrier	*Circus cyaneus*							E
Oklahoma cave crayfish	*Cabarus tartarus*		E					
Ouachita kidneyshell	*Ptychobranchus occidentalis*						T/CH	
Ozark cavefish	*Amblyopsis rosae*	T	T	T				E
Peregrine falcon	*Falco peregrinus*						E	
Piping plover	*Charadrius melodus*	T					T	
Rabbitsfoot	*Quadrula cylindrixa*						E/CH	
Redbelly snake	*Storeria occipitomaculata*						T/CH	
Redfin darter	*Etheostoma whipplei*							E
Redspot chub	*Nocomis asper*						T/CH	
Snowy plover	*Charadrius alexandriunus*						T	
Spring peeper	*Pseudacris crucifer*						T/CH	
Western fanshell	*Cyprogenia aberti*						E/CH	
Western prairie fringed orchid	*Platanthera paraeclara*	T			T			

E – Endangered
T – Threatened
C – Candidate
CH – State designated critical habitat (Kansas only)

American Burying Beetle

The American burying beetle is currently listed as a federally endangered species. American burying beetles, while once found throughout the eastern United States, are currently known to exist in eight states, including Rhode Island, Massachusetts, South Dakota, Nebraska, Kansas, Arkansas, Texas, and Oklahoma (United States Fish & Wildlife Service (USFWS) 2007). The American burying beetle is a habitat generalist and capable of traveling long distances (USFWS 1991). A viable population of the species is known to exist in over 20 counties of Oklahoma, all in the eastern half of the state (USFWS 2007). The USFWS, therefore, determined American burying beetles could occur in the project area.

The American burying beetle is nocturnal, scavenging for food during the nighttime. Their lifespan is only one year. Reproduction occurs only once during their lifespan, although in warmer areas such as

Oklahoma it may be two (USFWS 1991). In temperatures less than 60 degrees Fahrenheit (°F), these beetles bury themselves in the ground to over winter. Survival and reproduction of the American burying beetle is dependent on the presence of small vertebrate carcasses. These beetles feed and lay eggs on the carcass, leaving the larvae to feed on the carcass while they mature (USFWS 2007).

Eskimo Curlew

The eskimo curlew is currently listed as a federally endangered species. The eskimo curlew is thought to be extinct worldwide. The last confirmed sighting took place in Nebraska in 1987. The range of the bird varies by season. The project area lies in the northern migration pattern from South America through the Central United States and on to Alaska (USFWS 2007).

Gray Myotis

The gray myotis (gray bat) is currently listed as a federally endangered species. The gray bat occurs in limestone caves throughout the southeastern United States. Gray bats are known to inhabit Ottawa and Delaware Counties in Oklahoma, Cherokee and Crawford Counties in Kansas, and Jasper and Newton Counties in Missouri (USFWS 2007). However, populations of these bats are generally isolated and occur in only a few caves of Missouri. Gray bats are very selective when picking a cave to hibernate in. Roughly 95 percent of the entire gray bat population hibernates in only eight caves. Two in Tennessee, three in Missouri, and one each in Kentucky, Alabama, and Arkansas (USFWS 2007)

The gray bat inhabits caves all year long. During the winter months, they hibernate in caves with temperatures between 42 and 52 degrees Fahrenheit (°F). Winter caves are deep with vertical walls. Summer caves must be warm (57-77°F) or with restricted rooms that can trap the body heat of roosting bats. Summer caves are located close to rivers or lakes where the bats feed. Bats are known to range at least 12 miles from their colony to feed (USFWS 2007). Gray bats feed on mosquitoes, caddis flies, and other cool-night insects over water or land and among trees. Stone flies, mayflies, and beetles are also part of their diet later in the summer. Females can produce one offspring per year and are sexually mature within one year. Males, however, are not sexually mature until their second year of life (Schwartz 1981). Gray bats are vulnerable to human disturbance. Disturbing these bats in the winter can cost the bats energy and significantly decreases their chances for survival over the winter months. Disturbance in the summer months in maternity caves can lead to large-scale mortality of flightless young. If the mothers become stressed, they may abort their young before they are born. Most human disturbance is created by cave exploration (USFWS 2007).

Interior Least Tern

Three subspecies of the least tern occur in the United States. One of these three subspecies, the interior least tern (*Sterna antillarum*), occurs in the project study area and is currently listed as a federally endangered species. The interior least tern inhabits sandbars along rivers, sand and gravel pits, or lake and reservoir shorelines from April to August. The interior least tern breeds in isolated areas along the Missouri, Mississippi, Ohio, Red, and Rio Grande river systems. Their winter home is not known, but probably includes coastal areas of Central and South America (USFWS 2007).

The cause for the reduction of the interior least tern in the project area is likely a result of the construction of dams, reservoirs, and other changes to river systems. The once wide river channels with scattered sandbars have been replaced by narrow forested river corridors (USFWS 2007).

Neosho Madtom

The Neosho madtom is currently listed as a federally threatened species. The Neosho madtom historically has occurred in Kansas, Missouri, and Oklahoma and is presently only found in the Neosho, Cottonwood, Spring, and Illinois rivers. The Neosho and Spring rivers are located within the study area boundary. Populations of the madtom exist in Jasper County, Missouri; Cherokee county, Kansas; and Ottawa and Craig counties in Oklahoma (USFWS 2007).

The Neosho madtom prefers shallow riffles with loose uncompacted gravel bottoms. They may also be found in areas with sandy substrate and leaf litter. The lifespan of the Neosho madtom is approximately three years. The reproductive habits are still unknown; however, spawning is believed to occur in June and July (USFWS 2007).

Ozark Cavefish

The Ozark cavefish is currently listed as a federally threatened species. This fish occurs only in caves in southwestern Missouri, northwestern Arkansas and northeastern Oklahoma. Currently, 15 caves have cavefish populations (USFWS 2007). The Ozark cavefish lives in caves with exceptionally high water nutrients. Water quality levels are high and usually contain bat guano or brown leaf litter. The Ozark cavefish has no pigmentation, but has well developed sensory-pallipae that enables it to survive in this environment. The cavefish feeds on salamander larvae, small crustaceans and microscopic organisms (USFWS 2007).

The factors leading to the decline of the Ozark cavefish population include destruction of habitat, collecting of specimens, and disturbance by spelunkers. The success of the Ozark cavefish is also related

to the presence of bats in the caves such as the gray myotis. The organisms on which the cavefish feed rely on bat guano as their primary source of energy (USFWS 2007).

Piping Plover

The piping plover is a federally threatened species. Piping plovers are migratory birds that historically bred along the Atlantic Coast, the northern Great Plains, and around the Great Lakes. Over the winter, they can be found along the southern Atlantic and Gulf coasts, and in the Bahamas and West Indies. Current populations occur throughout their historic range in greatly reduced numbers. Piping plovers migrate through Oklahoma each spring and fall (USFWS 2007).

The piping plovers nest on sandy beaches along oceans and lakes or on the sand bars and bare islands or rivers. The population decrease of the piping plover is largely due to the loss of beach habitat and the channelization and damming of rivers. The nesting habits of these plovers on beaches used by humans are very unsuccessful (USFWS 2003).

Western Prairie Fringed Orchid

The western prairie fringed orchid is listed as a federally threatened species. This species historically occurred throughout the tallgrass regions of North America including the Dakotas, Nebraska, Missouri, Kansas, Oklahoma, Missouri, Iowa, Minnesota and Manitoba and only west of the Mississippi River. The western prairie fringed orchid currently exists in only six states and Canada. While it historically occurred in the study area, it is believed to have been extirpated from Kansas, Missouri, and Oklahoma (USFWS 1996).

The western prairie fringed orchid occurs in moist tallgrass prairies and sedge meadows. It is commonly found with sedges, reedgrass, and rushes or where those plants meet big bluestem, little bluestem, and switchgrass (USFWS 2007). This orchid is a perennial and lives for approximately three years. Vegetative shoots emerge in late May but flowers do not display until mid-June to late July. Flowering occurs for about 21 days. Pollination occurs only by hawkmoths (USFWS 2007).

Conversion of prairie grasslands to croplands is the main reason for the declining populations of the western prairie fringed orchid. These orchids do not respond well to heavy grazing activities.

2.5 LAND USE

The study area is located in the Central Lowlands physiographic province. Topography of the area ranges from relatively flat, rolling hills to moderately steep areas around drainage valleys. Drainage flows to the south towards the large man-made lakes in the study area along the Neosho River. A large portion of the

study area is drained by the Spring River and the Neosho River. Numerous creeks and rivers occur throughout the area. These drainageways are predominantly contained within narrow, highly-incised stream channels.

The proposed Blackberry Substation site is located on pasture land mixed with cultivated crops. The proposed Chouteau Substation site is surrounded by cleared ROWs composed of herbaceous shrubs and grasslands and deciduous woodlands on both the east and west sides. Existing transmission lines occur in the area to the north and south.

All of the alternate corridors for the proposed transmission line extend in a general northeast/southwest orientation between the Blackberry Substation in western Jasper County, Missouri and the Chouteau 345/161-kV Substation in southwestern Mayes County, Oklahoma. Each of the alternate corridors traverses varying amounts of wooded and agricultural lands, intermixed with rural residential development.

The region of southwestern Missouri, southeastern Kansas and northeastern Oklahoma contains numerous Superfund sites that were a part of the Tri-State mining district. The area was used heavily for zinc and lead mining from 1850 to 1950. Cleanup of the sites began in the 1980's. Numerous environmental consequences remain today including open mine shafts, collapsed mine shafts, high subsidence areas, water contamination, ground contamination, as well as potential lead contamination to humans by ingestion. Large chat piles remain scattered throughout the mining district today.

The study area contains primarily undeveloped rural lands. Based on a geographic information system (GIS) analysis of the National Land Cover Data (NLCD) 2001 maps, the most prominent land covers within the study area include cropland and pastureland (Figure 2-1). Smaller concentrations of forestland and grassland are interspersed throughout the area. Some wetland areas are located along streams and lakes. The northern portion of the study area is dominated by cropland, while the southern portion is dominated by pastureland. Developed land within the study area is minimal because most communities were excluded from the study area. Below is a description of the land cover in the study area by county:

- Jasper County, MO – primarily cropland, interspersed with pastureland; some concentrations of deciduous forest and woody wetlands.
- Cherokee County, KS – primarily cropland, with interspersed areas of pastureland and deciduous forest; woody wetlands along streams; small area of barren land associated with the Tri-State Mining District.

- Ottawa County, OK – mostly pastureland, with concentrations of cropland; woody wetlands along river; area of barren land associated with the Tri-State Mining District.
- Craig County, OK – majority pastureland; cropland, and deciduous and evergreen forest fairly equally dispersed throughout the area.
- Mayes County, OK – mostly pastureland, with dispersed areas of cropland, grassland and deciduous forest; area of more heavily forested land towards southern end of corridor; some smaller concentrations of woody wetland and emergent herbaceous wetland.

The following sections describe some of the land uses in the macro-corridor study area in greater detail. These land uses include agriculture, urban and residential, and land use regulations.

2.5.1 Agriculture

A review of the lands within the study area reveals that the majority is used for agriculture. Table 2-2 provides information on the agricultural characteristics for the study area. Approximately 1,825,826 acres or 74 percent is farmland for the six county study area. Craig County has the highest percentage of farmland and Delaware County the lowest for the study area. Cherokee County has 75 percent of farmland acres in cropland and Craig County has the lowest at 35 percent. As expected, Craig County has the highest percentage of pastureland at 73 percent. Delaware County has the highest woodland acreage for the study area at 19 percent and Jasper County has the highest Conservation Reserve Program (CRP)/Wetland Reserve Program (WRP) acres (3 percent).

Table 2-2 Agricultural Characteristics Within Study Area

	Cherokee Co., KS	Jasper Co. MO	Craig Co. OK	Mayes Co. OK	Ottawa Co. OK	Delaware Co. OK
Proportion of Land in Farms	77.3	70.5	89.5	72.0	75.1	59.5
Land in Farms	290,552	288,792	435,804	302,172	226,436	282,106
Number of Farms	746	1,390	1,289	1,552	1,137	1,393
Total Cropland	218,664	167,944	154,145	151,357	124,952	124,053
Total Harvested Cropland	194,128	117,772	96,909	92,069	91,643	64,648
Total Pastureland	70,455	132,226	318,841	182,039	116,451	178,752
Total Woodlands	11,280	26,001	21,022	32,589	18,890	53,582
CPR/WRP lands	1,928	8,852	2,049	161	1,089	125

Source: USDA, National Agricultural Statistics Service, http://www.nass.usda.gov/Census/Pull_Data_Census

Some of the pastureland in Craig County is in the Federal Grassland Reserve Program. This program is a voluntary program to assist landowners and agriculture operators in restoring and protecting grassland that contains forbs and shrublands. Grasslands provide critical ecological benefits and play a key role in environmental quality, as well as contributing to the economies of many rural areas. This voluntary

program helps protect valuable grasslands from conversion to other land uses, thus helping to ensure this national resource is available to future generations.

When properly managed, grasslands and shrublands can result in cleaner water supplies, healthier riparian areas and reduced sediment loadings in streams and other water bodies. These lands are vital for the production of forage for domestic livestock and provide forage and habitat for maintaining healthy wildlife populations.

These lands also improve the aesthetic character of the landscape, provide scenic vistas and open space, provide for recreational activities and protect the soil from water and wind erosion.

2.5.2 Urban and Residential

The majority of the study area covers predominately rural areas. The larger cities and towns in the area such as Baxter Springs, Kansas; and Miami, Vinita, Narcissa, and Big Cabin, Oklahoma were not included in the study area because of their potential routing constraints. Other, more rural towns within the study area such as Crestline in Kansas; Welch, Fairland, and Bluejacket in Oklahoma, and Asbury in Missouri generally occur along major highways and intersecting roads.

Farmsteads exist throughout the study areas and are generally scattered across the landscape. More densely populated areas occur along the highways, interstates, and major roads that connect the more urban communities. The population densities and growth rates for all localities within the study area are shown in Table 2-3. Of the towns remaining in the study area, Fairland, Oklahoma is the largest with an estimated 2006 population of 1,017 persons. Waco, Missouri is the smallest with an estimated 2006 population of 90 persons. Bluejacket, Oklahoma has had the largest percent growth with 62.9 percent increase in their population since 1990.

Table 2-3 Population Change in Study Area

	Population			% Change
	1990	2000	2006 (est.)	1990 to 2006
Oklahoma				
Bluejacket	175	274	285	62.9%
Fairland	916	1,025	1,017	11.0%
Missouri				
Asbury	220	218	227	3.2%
Waco	86	86	90	4.7%

Source: US Census Bureau, 1990 and 2000 Census & 2006 Population Estimates

2.5.3 Land Use Regulations

None of the six counties in the study area have a zoning code, although several have floodplain ordinances. Individual cities and towns in these counties may have zoning regulations; however, they were not reviewed because the transmission line will not be routed through any incorporated areas.

2.6 RECREATION

There are several state parks and wildlife areas located in the study area (Figure 2-2). These include the Wah-Sha-She Prairie State Wildlife Area, and the Mined Land Wildlife Area. The Wah-Sha-She Prairie State Wildlife Area is located in Jasper County, Missouri just north of Asbury and south of the location for the Blackberry Substation. The Mined Land Wildlife Area consists of several different parcels of lands scattered throughout Crawford and Cherokee County, Kansas between the towns of Oswego, Columbus, and Pittsburg. Nationwide River Inventory streams exist in the corridor. These include Shoal Creek and the Spring River in Kansas.

2.7 TRANSPORTATION AND UTILITIES

The primary roadways in the study area are Interstate Highway 44 and U.S. Highway 69. Interstate Highway 44 runs southwest-northeast through the study area from Joplin, Missouri to Tulsa, Oklahoma, both located outside of the study area. U.S. Highway 69 runs through the entire study area and runs predominately north-south from Pittsburg, Kansas located outside of the study area to Chouteau, Oklahoma. The Blackberry Substation would be accessed from Highway 126, which is just north of the substation property. Highway 126 can be accessed from U.S. Highway 69. The Chouteau 345/161-kV Substation can be accessed from Highway 412B, which can be accessed from U.S. Highway 69 via Highway 69A or U.S. Highway 412. Interstate Highway 44 and U.S. Highway 69 provide the main transportation routes in the area. In addition to Interstate Highway 44 and U.S. Highway 69, an extensive network of county roads and highways are present (Figure 2-3). Numerous other paved and unpaved roads provide access. These roads are generally located along section lines and create a grid of roads across the study area.

Several rail lines provide service to customers in the local region (Figure 2-3). The Union Pacific Railroad (UP) runs predominantly north-south through Vinita and Chouteau, providing service to the GRDA Coal-Fired Complex. Two Burlington Northern Santa Fe Railroad (BNSF) rail lines intersect in the study area in the town of Afton, Oklahoma. One of the BNSF rail lines runs north-south through Columbus, Kansas and Miami, Oklahoma. The other BNSF rail line runs east-west through Vinita. In addition, the South Kansas & Oklahoma Railroad runs through the northern portion of the study area.

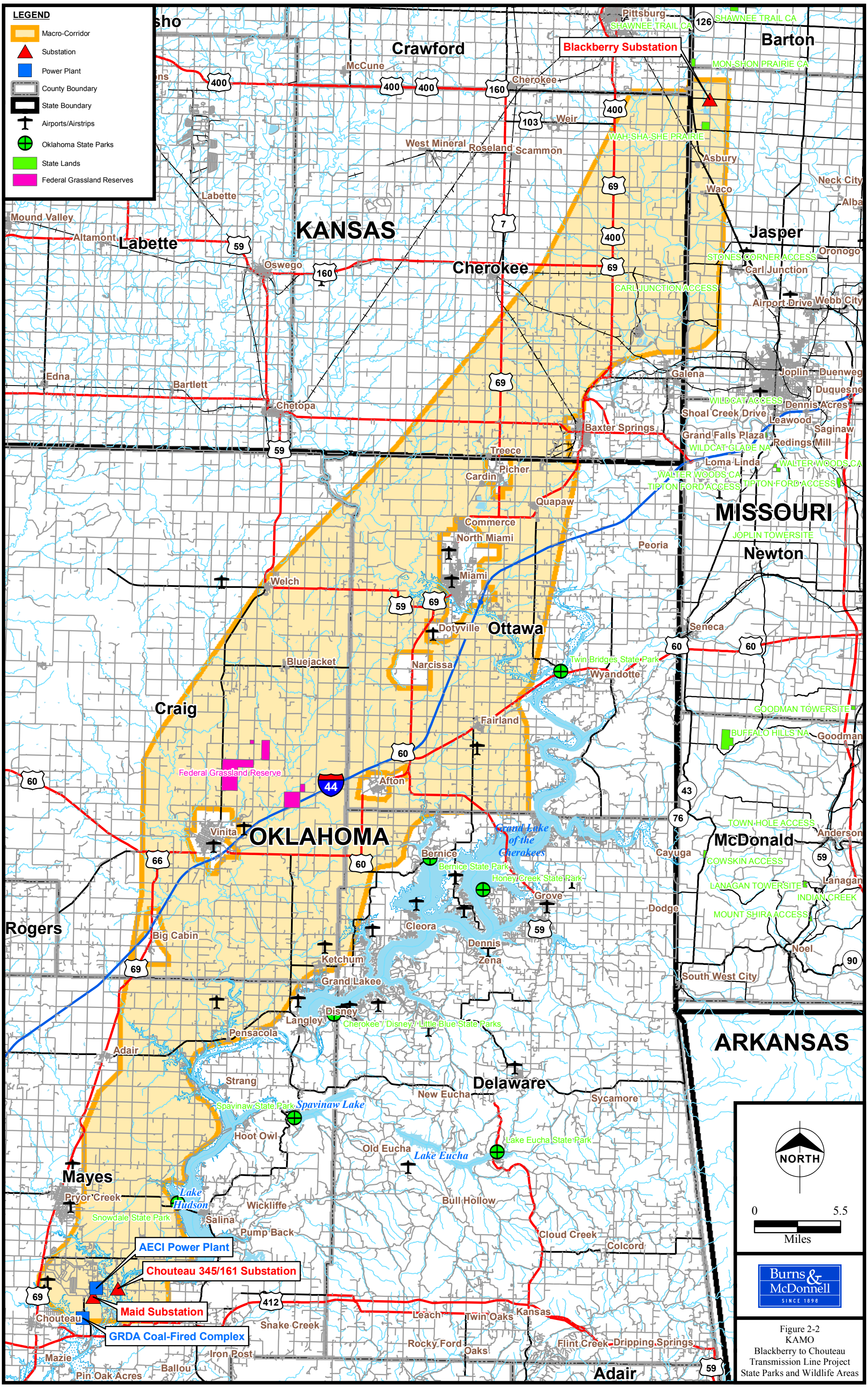

Figure 2-2
KAMO
Blackberry to Chouteau
Transmission Line Project
State Parks and Wildlife Areas

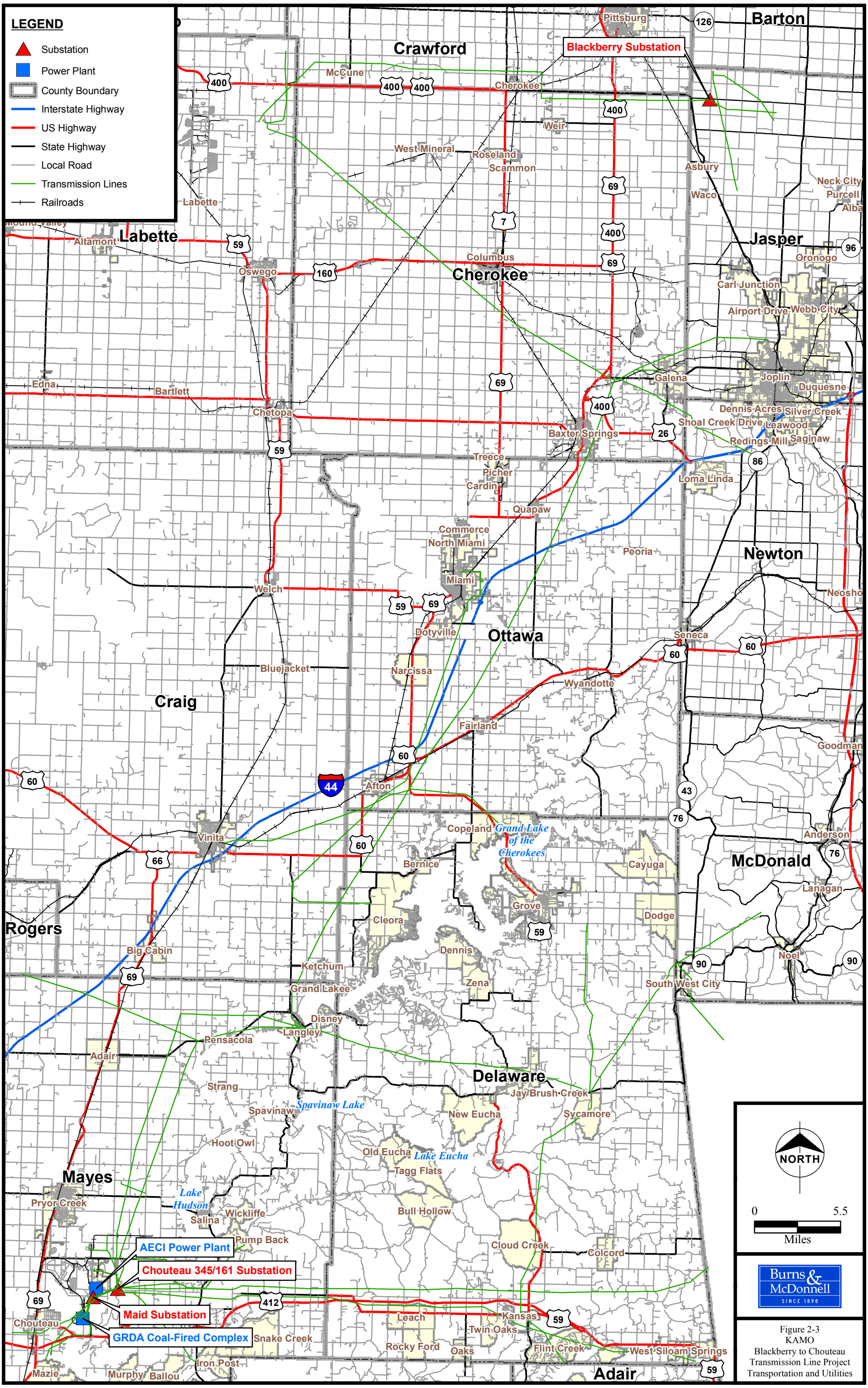

Figure 2-3
KAMO
Blackberry to Chouteau
Transmission Line Project
Transportation and Utilities

Several transmission lines occur within the study corridor (Figure 2-3). The transmission lines are predominantly American Electric Power (AEP) or GRDA transmission lines. Numerous distribution lines are located along area roadways providing electrical service to local residents and commercial and industrial customers.

2.8 SOCIOECONOMIC PATTERNS

In order to identify general socioeconomic patterns in the project area, various socioeconomic characteristics have been analyzed, including population growth trends, racial and ethnic characteristics, economic indicators, and employment data. Data is analyzed for Kansas, Missouri, and Oklahoma as well as the six counties included in the study area.

2.8.1 Population Growth Trends

The 2006 population estimate for the State of Oklahoma was 3,579,212. The 2006 estimate was 2,764,075 for the State of Kansas and 5,842,713 for the State of Missouri. As shown in Table 2-4, Population Change, Oklahoma, Kansas and Missouri have experienced similar rates of growth. Between the years 1990 and 2006, the population of Oklahoma grew by 13.8 percent. During this same time period, the population of Kansas grew by 11.6 percent, and the population of Missouri grew by 14.2 percent.

Table 2-4 Population Change

	Population			% Change
	1990	2000	2006 (est.)	1990 to 2006
Oklahoma	3,145,585	3,450,654	3,579,212	13.8%
Mayes County	33,366	38,369	39,774	19.2%
Craig County	14,104	14,950	15,046	6.7%
Ottawa County	30,561	33,194	33,026	8.1%
Delaware County	28,070	37,077	40,061	42.7%
Kansas	2,477,574	2,688,418	2,764,075	11.6%
Cherokee County	21,374	22,605	21,451	0.4%
Missouri	5,117,073	5,595,211	5,842,713	14.2%
Jasper County	90,465	104,686	112,505	24.4%

Source: US Census Bureau, 1990 and 2000 Census & 2006 Population Estimates

Of the six counties in the study area, Jasper County has the largest population, with a 2006 population estimate of 112,505. The 2006 Population estimate was 40,061 for Delaware County, 39,774 for Mayes County, 33,026 for Ottawa County, 21,451 for Cherokee County, and 15,046 for Craig County. Among the six counties, growth rates have varied (Table 2-4). The two counties with the highest population, Jasper and Delaware, have also experienced the highest growth rates. The population change between the

years of 1990 and 2006 was 24.4 percent for Jasper County, 42.7 percent for Delaware County, 19.2 percent for Mayes County, 8.1 percent for Ottawa County, 6.7 percent for Craig County, and 0.4 percent for Cherokee County.

2.8.2 Racial and Ethnic Characteristics

Table 2-5, State and County Population by Race, displays data on race and ethnicity in order to assess the racial composition of the population in the study area. Data is reported for the 2000 Census at the county and state levels.

Oklahoma

As shown in Table 2-5 the racial composition of Oklahoma's population is 76.2 percent white, 7.6 percent black or African American, 7.9 percent American Indian, 1.4 percent Asian, 0.1 percent Hawaiian or

Table 2-5 State and County Population by Race

	Total Pop.	White	Black or African American	American Indian/ Alaskan	Asian	Hawaiian/ Pacific Islander	Some other race	Two or more races	Hispanic*
Oklahoma	3,450,654	76.2%	7.6%	7.9%	1.4%	0.1%	2.4%	4.5%	5.2%
Mayes County	38,369	72.1%	0.3%	19.1%	0.3%	0.01%	0.6%	7.5%	1.9%
Craig County	14,950	68.5%	3.1%	16.3%	0.2%	0.03%	0.5%	11.4%	1.2%
Ottawa County	33,194	74.1%	0.6%	16.5%	0.3%	0.1%	1.5%	6.8%	3.2%
Delaware County	37,077	70.2%	0.1%	22.3%	0.2%	0.04%	0.6%	6.5%	1.8%
Kansas	2,688,418	86.1%	5.7%	0.9%	1.7%	0.05%	3.4%	2.1%	7.0%
Cherokee County	22,605	92.3%	0.6%	3.5%	0.2%	0.04%	0.5%	2.9%	1.3%
Missouri	5,595,211	84.9%	11.2%	0.4%	1.1%	0.1%	0.8%	1.5%	2.1%
Jasper County	104,686	92.6%	1.5%	1.3%	0.7%	0.1%	1.6%	2.2%	3.5%

*Of any race
Source: US Census Bureau, 2000 Census

Pacific Islander, 2.4 percent of some other race, and 4.5 percent of two or more races. Furthermore, 5.2 percent of Oklahoma's population is Hispanic.

The four Oklahoma counties of Mayes, Craig, Ottawa and Delaware have a similar percentage of white residents as compared to Oklahoma as a whole. White residents account for 72.1 percent of the population in Mayes County, 68.5 percent in Craig County, 74.1 percent in Ottawa County, and 70.2 percent in Delaware County. The population of Oklahoma is 76.2 percent white.

The four counties differ from the state in that a lower percentage of the population is African American while a higher percentage is American Indian. African American residents account for 0.3 percent of the population in Mayes County, 3.1 percent in Craig County, 0.6 percent in Ottawa County, and 0.1 percent in Delaware County. This is compared to 7.6 percent African American in Oklahoma. American Indian

residents account for 19.1 percent of the population in Mayes County, 13.6 percent in Craig County, 16.5 percent in Ottawa County, and 22.3 percent in Delaware County. This is compared to 7.9 percent American Indian in Oklahoma.

Additionally, Mayes, Craig, and Ottawa counties have a lower percentage of Hispanic residents as compared to Oklahoma. Hispanic residents account for 1.9 percent of the population in Mayes County, 1.2 percent in Craig County, 3.2 percent in Ottawa County, and 5.2 percent in the State of Oklahoma as a whole.

Kansas

The population of Kansas is 86.1 percent white, 5.7 percent black or African American, 0.9 percent American Indian, 1.7 percent Asian, 0.05 percent Hawaiian or Pacific Islander, 3.4 percent of some other race, and 2.1 percent of two or more races (Table 2-5). Seven percent of the population of Kansas is Hispanic.

The racial composition of the population in Cherokee County is comprised of slightly higher percentages of white and American Indian residents and slightly lower percentages of African American residents as compared to the State of Kansas as a whole. In Cherokee County, 92.3 percent of the population is white, 0.6 percent is African American, and 3.5 percent is American Indian. Hispanic residents account for 1.3 percent of the population in Cherokee County.

Missouri

In Missouri, 84.9 percent of the population is white, 11.2 percent is black or African American, 0.4 percent is American Indian, 1.1 percent is Asian, 0.1 percent is Hawaiian or Pacific Islander, 0.8 percent is of some other race, and 1.5 percent is of two or more races (Table 2-5). Furthermore, 2.1 percent of the population of Missouri is Hispanic.

The racial composition of the population in Jasper County is comprised of slightly higher percentages of white and American Indian residents and slightly lower percentages of African American residents as compared to the State of Missouri as a whole. In Jasper County, 92.6 percent of the population is white, 0.3 percent is African American, and 1.9 percent is American Indian. A slightly higher percentage of the population is Hispanic in Jasper County, 3.5 percent, as compared to Missouri.

American Indian Tribes

The study area for the proposed transmission line project extends through former American Indian reservation land in Oklahoma. These lands are identified in the 2000 Census as Oklahoma Tribal

Statistical Areas (OTSA) for the purpose of statistical analysis. The routes pass through both the Cherokee and Miami OTSA. Additional OTSA's are also delineated for much of the State of Oklahoma.

The Cherokee Nation is currently headquartered in Tahlequah, Oklahoma, and the Miami Tribe of Oklahoma is headquartered in Miami, Oklahoma. Furthermore, there are four additional tribes that are based in Miami, including the Ottawa Tribe of Oklahoma, the Seneca-Cayuga Tribe of Oklahoma, the Modoc Tribe of Oklahoma, and the Peoria Tribe of Oklahoma. Three additional tribes of Northeast Oklahoma include the Quapaw Tribe of Oklahoma based in Quapaw, Oklahoma, the Wyandotte Nation of Oklahoma based in Wyandotte, Oklahoma, and the Eastern Shawnee Tribe based in Seneca, Missouri. The Osage Nation is based in Pawhuska, Oklahoma. The United Keetoowah Band of Cherokee Indians in Oklahoma is based in Tahlequah, Oklahoma. The Wichita and Affiliated Tribes of Waco, Keechi and Tawakonie are based in Anadarko, Oklahoma.

2.8.3 Economic Indicators

Table 2-6, State and County Economic Indicators, is a comparison of select economic indicators from the 2000 Census. Data is analyzed at the county and state level. The 2000 Census reports income and poverty levels for the year 1999.

Table 2-6 State and County Economic Indicators

	Total Population	Median Household Income, 1999	Population Below Poverty in 1999	Civilian Labor Force	Unemployment Rate
Oklahoma	3,450,654	$33,400	14.7%	1,632,128	5.3%
Mayes County	38,369	$31,125	14.3%	17,458	5.4%
Craig County	14,950	$30,997	13.7%	6,626	3.9%
Ottawa County	33,194	$27,507	16.6%	15,077	6.0%
Delaware County	37,077	$27,996	18.3%	15,779	6.6%
Kansas	2,688,418	$40,624	9.9%	1,374,698	4.2%
Cherokee County	22,605	$30,505	14.3%	10,846	5.5%
Missouri	5,595,211	$37,934	11.7%	2,806,718	5.3%
Jasper County	104,686	$31,323	14.5%	52,511	6.6%

Source: US Census Bureau, 2000 Census

Oklahoma

As shown in the above table, the median household income in Oklahoma in 1999 was $33,400 and the poverty rate was 14.7 percent. The unemployment rate in 2000 was 5.3 percent for the state. By comparison, all four counties had slightly lower median household incomes than the state level. The median was $31,125 for Mayes County, $30,997 for Craig County, $27,507 for Ottawa County, and $27,996 for Delaware County. Poverty rates were lower than the state in Mayes (14.3 percent) and Craig

(13.7 percent) and higher in Ottawa (16.6 percent) and Delaware (18.3 percent). The unemployment rate varied from 5.4 percent in Mayes County, 3.9 percent in Craig County, 6 percent in Ottawa County, and 6.6 percent in Delaware County.

Kansas

Referring again to Table 2-6 above, the median household income in Kansas in 1999 was $40,624 and the poverty rate was 9.9 percent. The unemployment rate in 2000 was 4.2 percent for the state. Cherokee County had a lower median household income and higher poverty and unemployment rates as compared to the state. The Cherokee County median household income was $30,505, the poverty rate was 14.3 percent, and the unemployment rate was 5.5 percent.

Missouri

In 1999, the median household income in Missouri was $37,934 and the poverty rate was 11.7 percent. The Missouri unemployment rate was 5.3 percent in 2000. Jasper County had a lower median household income ($31,323) and higher poverty (14.5 percent) and unemployment (6.6 percent) rates as compared to the state.

2.8.4 Employment by Industry

As shown in Table 2-7, Employment by Industry, the patterns of employment broken down by industry are similar throughout the project area. The top two industries in all of the counties include educational, health and social services as well as manufacturing. The percent employed in educational, health and social services was 20.5 percent in Oklahoma, 17.4 percent in Mayes County, 23.5 percent in Craig County, 23.9 percent in Ottawa County, 17.2 percent in Delaware County, 21.9 percent in Kansas, 22 percent in Cherokee County, 20.4 percent in Missouri, and 19.7 percent in Jasper County. The percent employed in manufacturing was 12.5 percent in Oklahoma, 25.1 percent in Mayes County, 14.9 percent in Craig County, 17.7 percent in Ottawa County 21.3 percent in Delaware County, 15 percent in Kansas, 25.5 percent in Cherokee County, 14.8 percent in Missouri, and 21.7 percent in Jasper County.

In the states of Oklahoma and Kansas, as well as the five counties in these states, the industry with the lowest percentage of employment was information. The percent employed in information was 2.7 percent in Oklahoma, 1.7 percent in Mayes County, 1.8 percent in Craig County, 0.9 percent in Ottawa County, 1.5 percent in Delaware County, 3.3 percent in Kansas, and 2.8 percent in Cherokee County. In the State of Missouri as well as Jasper County, the industry with the lowest percentage was agriculture, natural resources and mining. The percent employed in this industry was 2.2 percent in Missouri and 1.8 percent in Jasper County.

Table 2-7 Employment by Industry

	Oklahoma					Kansas		Missouri	
	State	Mayes	Craig	Ottawa	Delaware	State	Cherokee	State	Jasper
Agriculture, natural resources, mining	4.1%	3.9%	6.2%	4.9%	5.0%	3.8%	3.8%	2.2%	1.8%
Construction	6.9%	8.5%	5.9%	6.3%	9.8%	6.5%	8.5%	6.9%	6.0%
Manufacturing	12.5%	25.1%	14.9%	17.7%	21.3%	15.0%	25.5%	14.8%	21.7%
Wholesale trade	3.4%	3.4%	3.9%	2.7%	2.4%	3.3%	2.8%	3.7%	2.9%
Retail trade	12.0%	11.0%	11.3%	10.3%	12.0%	11.5%	10.4%	11.9%	13.5%
Transportation and utilities	5.6%	7.2%	9.2%	5.0%	5.2%	5.2%	5.5%	5.7%	6.7%
Information	2.7%	1.7%	1.8%	0.9%	1.5%	3.3%	1.0%	3.0%	2.0%
Financial	6.0%	3.5%	3.5%	3.9%	4.9%	6.1%	3.4%	6.7%	4.3%
Professional and business	7.3%	4.5%	4.4%	3.4%	4.1%	7.2%	3.3%	7.5%	4.9%
Educational, health and social services	20.5%	17.4%	23.5%	23.9%	17.25	21.9%	22.0%	20.4%	19.7%
Leisure, hospitality, food services	7.5%	6.0%	6.3%	10.5%	8.1%	7.0%	5.5%	7.8%	8.1%
Other services	5.6%	4.5%	3.9%	6.2%	4.9%	4.6%	4.9%	5.0%	5.7%
Public administration	5.9%	3.4%	5.1%	4.3%	3.4%	4.4%	3.5%	4.6%	2.6%

Source: US Census Bureau, 2000 Census

2.9 WATER RESOURCES

The Grand (Neosho) River is recognized by the U.S. Army Corps of Engineers (USCOE) as being navigable in the proposed project area. None of the other water courses in the study area are designated as being navigable, Outstanding Resource Waters, Cold Water Aquatic Habitats, National, or Wild and Scenic Rivers, or special water resources (exceptional waters). In addition to the streams identified above, all of the alternate routes traverse a number of unnamed tributaries.

No creeks, streams, or rivers are located at either of the proposed substation sites. The Chouteau Substation site lies between the Neosho River to the east and Pryor Creek to the west; however, the site is not located within the floodplain of either stream.

2.10 WETLANDS

Wetlands are defined by the USCOE as “areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions” (USCOE 1987). This definition of a wetland is for regulatory purposes, of which the USCOE has jurisdiction through Section 404 of the Clean Water Act. In order to be classified as jurisdictional, a wetland must meet three criteria; hydrophytic vegetation, hydric soils, and wetland hydrology. Hydrophytic vegetation has the ability to grow and efficiently compete under anaerobic conditions (the soil is essentially void of oxygen). Hydric soils are created under long-term inundation or saturation of a site, which causes the removal of oxygen

from the soil profile and the eventual production of reducing conditions. Wetland hydrology is present if an area is inundated permanently or temporarily for a sufficient period during the growing season.

The types of wetlands likely to occur in the study area include freshwater emergent wetlands, freshwater forested/shrub wetlands, and riverine. No wetlands depicted on the NLCD maps are located on the proposed Blackberry or Chouteau Substation site. National Wetlands Inventory (NWI) maps were not used in the assessment of wetlands because they were not available throughout the study area in digital form.

2.11 FLOODPLAINS

A review of Flood Hazard Boundary Maps developed by the Federal Emergency Management Agency (FEMA) revealed that some of the route corridors investigated for the proposed transmission lines cross Special Flood Hazard Areas subject to 100-year floodplains associated with the Spring River and the Neosho River. The floodplains extend along the creeks throughout the project area. The review of the Flood Hazard Boundary Maps also revealed that neither of the proposed substation sites is located within 100-year floodplains.

2.12 SOILS

The dominant soils at the area developed under grassland vegetation. They have a dark colored surface horizon and are nutrient rich. Smaller areas developed under forests or are on steep slopes or floodplains. General soil map units, sometimes called soil associations, describe the distinctive soil patterns of a broad geographic area. General soil associations consist of one or more major types of soil and are used to define suitable land use for large areas of land. Table 2-8 describes the soil characteristic associated with each soil association.

Table 2-8 Soil Associations by County

Soil Association	Description
Jasper County, MO	
Opolis-Cherokee-Medoc	Level or very gently sloping
Barden-Sylvania-Barco	Very gently sloping to strongly sloping
Maplegrove-Newtonia-Eldorado	Very gently sloping
Rueter-Pomme	Very gently sloping to strongly sloping
Verdigris-Hepler-Bearthicket	Level
Cherokee County, KS	
Parson-Dennis	Deep, nearly level and gently sloping, somewhat poorly drained and moderately well drained, silty soils; on uplands. Management concerns include soil erosion caused by water.

Soil Association	Description
Cherokee County, KS (continued)	
Taloka-Dennis	Deep, nearly level and gently sloping, somewhat poorly drained and moderately well drained, silty soils; on uplands. Management concerns include erosion control.
Dennis-Bates-Parsons	Deep and moderately deep, nearly level to moderately sloping, well drained to somewhat poorly drained, silty and loamy soils; on uplands. Management concerns include erosion control.
Kanima	Deep, moderately sloping to steep, well drained, shaly and silty soils; on uplands.
Hepler-Osage	Deep, nearly level, somewhat poorly drained and poorly drained, silty and clayey soils; on terraces and flood plains. Management concerns include flood control.
Cherokee-Hepler	Deep, nearly level, somewhat poorly drained, silty soils; on uplands, terraces, and flood plains.
Delaware County, OK	
Sallisaw-Elsah-Staser	Deep, Gravelly or loamy, nearly level to sloping soils on flood plains and benches. Management concerns include flood control.
Eldorado-Newtonia-Okemah	Deep, loamy, nearly level to strongly sloping soils on prairie uplands. Management concerns include maintaining soil structure.
Clarksville-Baxter-Locust	Deep, stony and cherty, very gently sloping to steep soils on timbered uplands.
Baxter-Locust	Deep, cherty and loamy, nearly level to gently sloping soils on timbered uplands.
Hector-Linker	Very shallow to deep, stony and loamy, gently sloping to steep soils on uplands. Management concerns include erosion control.
Parsons-Dennis	Deep, Loamy, nearly level to very gently sloping soils that have a clayey or loamy subsoil; on prairie uplands. Management concerns include drainage and water erosion.
Ottawa County, OK	
Dennis-Parsons-Bates	Deep and moderately deep, nearly level to moderately sloping, well drained to somewhat poorly drained, silty and loamy soils; on uplands.
Dennis-Taloka	Deep, nearly level and gently sloping, somewhat poorly drained and moderately well drained, silty soils; on uplands.
Osage-Verdigris-Lightning	Nearly level, poorly to well drained, silt loam to clay; flood plains.
Craig-Eldorado	Moderately deep and shallow, some acidic; upland
Newtonia-Summit	Gently to moderately sloping, well drained, silty clay loam to clay; upland.
Bodine-Baxter	Nearly level to steep, well drained; upland.
Huntington-Etowah	Nearly level to moderately sloping; flood plains and benches.
Craig County, OK	
Dennis-Parsons-Taloka	Deep, nearly level to gently sloping, moderately well drained, loamy soils, shale or clay; uplands. Management concerns include soil structure maintenance.

Soil Association	Description
Craig County, OK (continued)	
Summit-Bonham-Lula	Deep, nearly level to gently sloping, well drained, loamy; on uplands. Management concerns include erosion by water, and soil structure maintenance.
Verdigris- Radley-Lightning	Deep, nearly level, loamy, poorly drained; uplands. Management concerns include soil structure maintenance.
Hector-Linkler	Very shallow to moderately deep, poorly drained, loamy with clayey subsoil; flood plains. Management concerns include erosion by water.
Craig-Eldorado	Deep, very gently sloping to sloping, loamy with clayey subsoil; uplands. Management concerns include erosion by water.
Clarksville-Nixa	Deep, nearly level to strong sloping, excessively to moderately well drained, loamy with clayey subsoil; uplands. Management concerns include erosion by water and soil structure maintenance.
Bates-Collinsville-Vinita	Moderately deep to very shallow, very gently sloping to steep, well drained to excessively well drained, loamy with clayey subsoil; uplands.
Talpa-Summit	Very shallow to moderately deep, level to sloping, well drained, loamy with clayey subsoil; uplands.
Mayes County, OK	
Dennis-Parsons-Taloka	Deep, nearly level to moderately steep, moderately well drained to somewhat poorly drained, loamy soils that have a loamy or clayey subsoil; over loamy or clayey sediment or shale; on uplands. Management concerns include erosion control and soil structure maintenance.
Summit-Lehapah-Mayes	Deep or shallow, nearly level to sloping, somewhat poorly drained or well-drained, loamy soils that have a loamy or clayey subsoil; over limestone, shale, or loamy or clayey sediment; on uplands. Management concerns include erosion control and soil structure maintenance.
Riverton-Craig-Eldorado	Deep, very gently, sloping to sloping, well-drained, loamy soils that have loamy or clayey subsoil; over limestone or gravelly sediment; on uplands. Management concerns include erosion control and soil structure maintenance.
Verdigris-Quarles	Deep, nearly level or very gently sloping, moderately well drained and poorly drained soils that is loamy throughout; over loamy or clayey sediment; on flood plains. Management concerns include flood protection and soil structure maintenance.
Clarksville-Nixa	Deep, nearly level to moderately steep, somewhat excessively drained and moderately well drained soils that are loamy throughout; over cherty limestone; on uplands. Management concerns include erosion control and soil structure maintenance.
Collinsville-Bates	Very shallow to moderately deep, very gently sloping to steep, well drained and somewhat excessively drained soils that are loamy throughout; over sandstone; on uplands. Management concerns include erosion control and soil structure maintenance.

Soil Association	Description
Mayes County, OK (continued)	
Sallisaw-Cannon	Deep, nearly level or very gently sloping, well-drained soils that is loamy throughout; over cherty or loamy sediment; on terraces and flood plains. Management concerns include flood protection and soil structure maintenance.
Hector-Enders	Shallow to deep, very gently sloping to very steep, well-drained, loamy soils that have loamy or clayey subsoil; over sandstone or shale; on uplands. Management concerns include erosion control and soil structure maintenance.

The Natural Resources Conservation Service (NRCS) Web Soil Survey was accessed online in order to identify prime and other important farmland soils in the project area. The NRCS defines prime farmland soils in the Farmland Protection Act (7 CFR 658.2) as soils with an adequate and dependable source of water, favorable temperatures and growing season, acceptable acidity/alkalinity level, few or no rocks, sufficient permeability for water and air, and slopes averaging zero to six percent. A complete table of soil types and acreages by county can be found in Appendix A. Of the 46 soil types in Mayes County, Oklahoma, 23 are classified as prime farmland soils. These 23 prime soils total 213,214 acres, or 49 percent of the county. There are 51 soil types found in Craig County, Oklahoma, 28 of which are classified as prime farmland soils. These 28 prime soils total 308,744 acres, or 63 percent of the county. Of the 47 soil types in Ottawa County, Oklahoma, 23 are classified as prime farmland soils. These 23 prime soils total 167,580 acres, or 54 percent of the county. There are 44 soil types found in Delaware County, Oklahoma, 28 of which are classified as prime farmland soils. These 28 prime soils total 212,670 acres, or 42 percent of the county. In Cherokee County, Kansas, there are 31 soil types. Eighteen of these soil types are classified as either prime farmland, farmland of statewide importance, or prime farmland if drained. These 18 prime soils total 325,561 acres, or 86 percent of the county. In Jasper County, Missouri, there are 52 soil types. Thirty-eight of these soil types are classified as either prime farmland, farmland of statewide importance, or prime farmland if drained. These 38 prime soils total 330,661 acres, or 81 percent of the county.

2.13 CULTURAL RESOURCES

On May 31, 2007 background research was conducted at the Missouri Cultural Resource Inventory in Jefferson City, Missouri. Additional background research was conducted in June, 2007 at the Kansas State Historical Society Site Files and the Oklahoma Archeological Survey Site Files in Norman and at the offices of the State Historic Preservation Office (SHPO) in Oklahoma City. The study area has a long history of habitation, both by prehistoric Native American groups and Euro-American settlers. In Oklahoma the study area is, for the most part, in the Oklahoma Cross Timbers research area, as defined by the Oklahoma Archeological Survey. This is a transition area between the Woodlands to the east and

the Plains to the west. In general, cultural resource site locations are tied to water availability and Oklahoma, Missouri, and Kansas all recommend surveys for stream crossings or where the proposed routing will parallel perennial water.

The background investigation indicated that much of the study area has never been subjected to an intensive archaeological survey. However, the surveys that have been completed indicate that there is a moderate to high probability that archaeological sites exists throughout the macro-corridor (Figure 2-1). There are 31 NRHP listed properties known in the study area (Table 2-9).

Table 2-9 National Register of Historic Places by State and County

	Kansas	Missouri	Oklahoma			
	Cherokee	Jasper	Delaware	Ottawa	Craig	Mayes
Building	3	0	1	8	3	3
Roadway	0	0	0	1	0	0
Cemetery	0	0	1	1	0	0
Ceremonial Site	0	0	1	0	0	0
Church	0	0	1	1	1	0
Battlefield	0	0	0	0	0	1
Bridge	1	0	0	1	0	0
Courthouse	0	0	1	0	1	0
Archaeological Site	0	0	0	0	0	1
Total	**4**	**0**	**5**	**12**	**5**	**5**

There are 157 recorded archaeological sites within the study area, of which 101 of the archaeological sites are in Kansas and 56 are in Oklahoma. No archaeological sites are recorded in Missouri within the study area and none of the sites recorded in Kansas have been determined eligible; however, many of the sites eligibility is still unknown. Four of the archaeological sites in Oklahoma are listed on or are eligible for listing on the NRHP. The four sites are the Cabin Creek Site, the Tar Creek Mining District, the 2nd Cabin Creek Battlefield Site, and the Peoria Dance Ground Site.

At the public meetings, one comment was received regarding a possible historic site east of Columbus, Kansas known as the Agricultural and Industrial Institute. The site includes 400 acres of land (Kansas State Historical Society 1977). Only one building had been constructed on the site. In addition to the Institute, the surrounding area may have been a settlement established for former slaves. It appears from the copies of photographs enclosed with the public comment form that Institute Hill may now be the site of a rural water tower.

2.14 VISUAL CHARACTER

The visual character of an area is a function of the terrain, land cover and land use. Within the study area the land cover is dominated by agricultural fields, woodlands, and pasture/grasslands. Highways, local roads and railroads cross the area. Route 66, a designated state scenic byway, traverses from Quapaw to Vinita. In addition, multiple transmission lines, distribution lines and other types of development occur contributing to the overall visual character of the area.

The majority of the area is flat. Pastures and croplands are scattered across the study area with small stream and tributaries and their associated riparian areas and wetlands. The terrain on the western portion of the study area becomes very hilly and rocky. Populations within the study area are centered around the small towns. Several small farming communities and rural residences are scattered throughout, contributing to the visual character of the area. However, no designated scenic areas occur within the study area.

* * * * *

3.0 ALTERNATIVES ANALYSIS

KAMO has considered a number of alternatives to address the current transmission system capacity needs. These alternatives are discussed below.

3.1 NO-ACTION

Under the No-Action alternative, KAMO would continue to maintain and operate its existing system. As indicated in Section 1.3, transmission capacity issues would continue to exist, preventing KAMO from bringing in needed power from the Missouri system during peak or storm outage periods or from transferring excess power from Oklahoma back to Missouri. Uncertainties with the availability of SPP transfer capacity in peak periods and associated costs would continue to exist. Under certain conditions, such as an outage of AECI's Chouteau Gas Plant or the OAM 345-kV transmission line, KAMO could not meet the North American Electric Reliability Council (NERC) performance standards and thus likely blacking out large numbers of consumers. Additionally, during periods of low electrical load in Oklahoma, AECI's ability to move excess energy from the Chouteau Gas Plant is limited by the capacity of the KAMO transmission system. SPP capacity is currently required instead to get this energy to Missouri. SPP capacity has often been unavailable to KAMO, resulting in available power being stranded in Oklahoma and unavailable for use elsewhere, including serving the other G&T members of AECI.

3.2 ELECTRICAL ALTERNATIVES

3.2.1 New 345-kV Line

KAMO has identified construction of approximately 100 miles of new 345-kV transmission line, over new ROW as a potential solution to its transmission capacity and reliability concerns. The proposed line would extend from a new substation, Blackberry, located along an existing 345-kV transmission line in northwestern Jasper County, Missouri. The new line would extend south to the GRDA Coal-Fired Complex (to which KAMO has existing transmission connections and rights). Additionally, KAMO would construct the new Chouteau 345/161-kV Substation adjacent to existing GRDA transmission lines to facilitate connection of the proposed project to both GRDA's Coal-Fired Complex and to AECI's Chouteau Gas Plant.

3.2.2 New 161-kV Line

KAMO studied a new high capacity 161-kV line between existing locations in Oklahoma and Missouri to address transmission capacity issues. The new 161-kV line could be largely constructed within existing KAMO rights-of-way through the upgrading of existing 69-kV lines to either single-circuit 161-kV lines or double-circuit 161/69-kV lines. Such line construction would also require upgrades or conversions of

several 69-kV substations by adding 161-kV equipment. Use of existing rights-of-way for this proposed alternative would be in close proximity to the existing OAM line, increasing the likelihood that both lines could be lost during a storm or weather event. The conductor used for this option, in an attempt to create substantial transmission capacity would need to be a special, large diameter, high temperature conductor. The studies showed that this alternative would provide additional transmission capacity, but would also cause a number of problems. This solution would create much less additional capacity between the two systems compared to the 345-kV solution, allowing the bottleneck to redevelop in the near future. The nature of the 161-kV improvement option would create a higher electrical impedance path, resulting in higher flows on KAMO's 69-kV system and on neighboring utilities systems. This situation would result in a number of facilities becoming overloaded under the 161-kV option.

3.2.3 Existing 69-kV System Upgrades

Upgrades to KAMO's existing 69-kV system would potentially provide some relief to the transfer capacity concerns. By upgrading 69-kV conductors, KAMO could increase the transmission capacity by 166 MW. This alternative, however, would not provide a direct connection to AECI's Chouteau Gas Plant and would therefore not improve capacity issues associated with excess power, during low KAMO load periods, being unavailable to AECI.

3.2.4 SPP Transmission Capacity

Currently, KAMO relies on SPP transmission capacity only on occasion. Often this capacity is unavailable to KAMO when most needed. As an alternative to line construction options, KAMO could purchase long term capacity on the SPP transmission system. Although this alternative would not require new line construction, it could require significant upgrades (approximately $100 million) throughout the SPP and KAMO systems. Additionally, KAMO would be required to purchase at least 300 MW of capacity at a present worth cost of approximately $120 million. Much of this capacity would be unnecessary for a substantial portion of the year. Such an agreement with SPP would likely result in significant expense to KAMO.

3.2.5 Alternative Selected

KAMO has selected the construction of a new 345-kV line as the proposed alternative to address the current system transfer and reliability issues. Unlike the other alternatives evaluated, construction of a new line provides a robust solution that addresses all of KAMO's needs, including transfer capacity from Missouri to Oklahoma as well as Oklahoma to Missouri, excess power at the Chouteau Gas Plant, and separation of existing facilities to increase reliability during storm events.

Of the other alternatives evaluated, the No-Action alternative would result in continued system reliability and transfer issues. Conversion of existing 69-kV lines to 161-kV could solve some but not all of the capacity transfer issues. Additionally, the proximity of the 161-kV lines to other transfer facilities would create reliability concerns as a storm or icing event could result in the loss of these and other facilities, compounding the existing concerns. Also, neither reconductoring existing 69-kV lines nor firm availability of SPP capacity would address all of the transfer capacity and reliability issues, with the SPP alternative resulting in significant, and likely unnecessary, costs.

3.3 ALTERNATE ROUTES

3.3.1 Route Corridor Selection Process

The route corridor selection process began with the development of a macro-corridor study followed by development of alternate route corridors for KAMO's proposed Blackberry to Chouteau 345-kV transmission line. These route corridors were evaluated based on a variety of engineering, social, and natural resource criteria. These criteria reflected the natural and human resources present within the study area, engineering and economic considerations, and the concerns expressed by federal, state, and local resource agencies and the public.

The first step in the routing process established the boundaries of the study area to be investigated. After establishing the study area, the next step identified a potential macro-corridor and route corridor alternatives. Macro-corridors are large areas within which a potential transmission line could be located; in this case the macro-corridor ranges from approximately 3 to 13.5 miles in width (Figure 2-1). Route corridors consist of narrower areas, approximately one mile wide, located within the macro-corridor. Route corridors narrowed the macro-corridor into more manageable areas within which natural and human resources could be quantified and compared (Figure 3-1). The objective was to identify a potential macro-corridor and route corridors that minimized impacts on natural and human resources and provided cost-effective project options. A more detailed description of how the macro-corridor was developed can be found in the Macro-Corridor Report on the RUS website at http://usda.gov/rus/water/ees/ea.htm.

The process to develop initial route corridors included three main activities:

- Review of USGS topographic maps, NLCD maps, aerial photographs, Soil Conservation Service (SCS) Soil Survey maps, USDA NRCS Soil Survey Geographic (SSURGO) data and Soil Data Mart data, and the Oklahoma Center for Geospatial Information (OCGI) Gap Analysis Program (GAP)
- Contacts with local, state, and federal resource agencies (carried out as part of the RUS scoping process for the overall project environmental assessment)

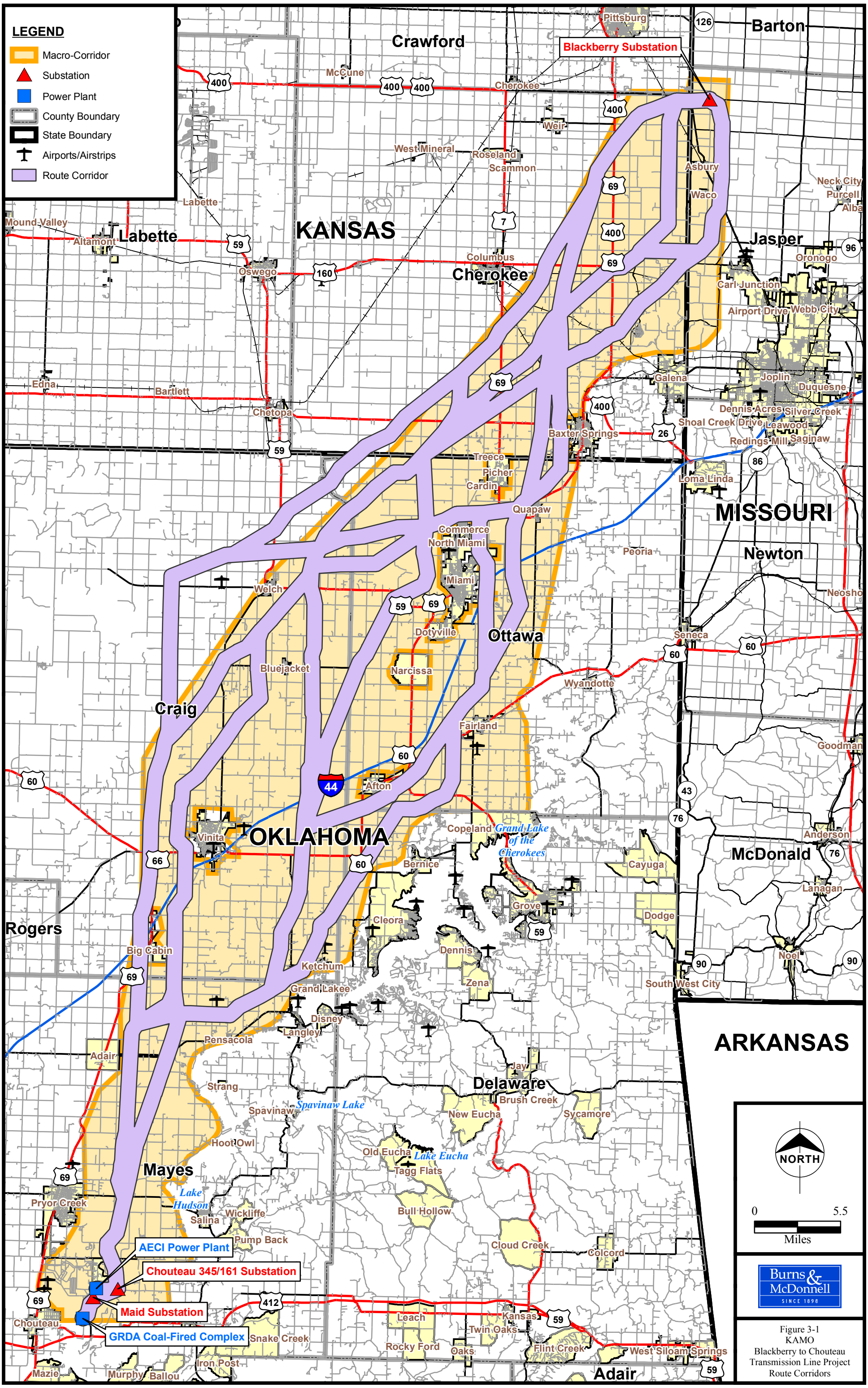

Figure 3-1
KAMO
Blackberry to Chouteau
Transmission Line Project
Route Corridors

- Field reconnaissance of the study area

The purpose of these activities was to identify potential constraints (natural or human resources that conflict with the location of new transmission line facilities) and opportunities (locations or areas well-suited for the location of new transmission line facilities) within the macro-corridors to consider when developing route corridors. Generally, constraint areas would be avoided, or at least minimized during the route corridor development process, and opportunities would be used, to the extent practicable, to develop route corridors between the two substations. Within the backdrop of constraints and opportunities, practical considerations such as total project length and potential cost issues are also considered.

In order to provide flexibility within the route corridor for the eventual location of the actual route alignment while keeping the route corridors manageable in size, route corridors approximately 0.5 mile wide were developed. The entire area within the macro-corridor was reviewed to determine if areas suitable for route corridors were present. That is, investigation of the macro-corridor was not limited only to the central area of the macro-corridor, but the northern, southern, and all areas in between were considered. Route corridors were developed to avoid constraints, take advantage of opportunities, and use all portions of the macro-corridor as appropriate (Figure 3-1).

Following the identification of the macro-corridor and route corridor alternatives, a screening process was used to identify and compare the route corridors appropriate for more detailed evaluation. This entire process resulted in the selection of a proposed route corridor and an alternate route corridor for the project. The proposed route corridor should provide reliable electric power while minimizing overall adverse impacts on the human and natural environment in a cost-effective manner.

Ultimately, a network of 62 route corridor segments was established for the development of routing options between the Blackberry Substation and the Chouteau Substation. When combined, 188 preliminary route corridors were identified within the macro-corridor. The large number of corridors is due to the many combinations of corridor segments that could be combined to complete a line from the Blackberry Substation to the Chouteau Substation. The preliminary corridors generally use all portions of the macro-corridor. There are possible route corridors and route corridor variations in the northern, central, and southern portions of the corridor.

The preliminary route corridors were developed in similar fashion to the macro-corridor itself. Preliminary route corridors took advantage of existing infrastructure (electrical transmission lines and

roadways) to the extent practicable, while avoiding constraints such as the communities of Baxter Springs, Miami, and Vinita, and Grand Lake of the Cherokees.

All 188 route corridor possibilities were reviewed and investigated in the field to determine if they were reasonable for the potential location of a new 345-kV transmission line. All route corridors were found to provide opportunities for a new line. Additionally, KAMO determined the route corridors were reasonable and feasible based on design and engineering standards. Therefore, all the route corridors initially identified were retained for further evaluation and comparison.

Following is a description of the process used to compare and evaluate the 188 possible route corridor combinations for the Blackberry to Chouteau 345-kV line project. The evaluation was focused on determining a reasonable route that minimized overall impacts to natural and human environments and was economical and engineeringly feasible. Route corridors with high environmental and/or human impacts were screened in the analysis and eliminated from further consideration. The proposed and alternate routes were chosen from the remaining routes based on a combination of factors including impacts and feasibility. For each route corridor, a representative route (hereafter referred to as route or routes) was created and used in the evaluation process to more accurately represent the affects of a new transmission line within each corridor. It is important to emphasize that the screening process described below was used as a tool to organize and manage the data on the alternatives routes and to help distill the number of routes to a manageable number and not to select the specific proposed and alternate routes.

3.4 PUBLIC INVOLVEMENT ACTIVITIES

To determine community values relative to the proposed project, the route selection process included two forms of public input. Input was first obtained through meetings with public officials and local agencies, and second, through public meetings held by RUS. All input was useful in determining the values and attitudes of the residents and public officials regarding the project, thereby enabling the team to identify the most appropriate routing criteria used to evaluate the routes. The public meetings also provided the public with information and the opportunity to ask questions about need for the project, project engineering, ROW issues, electric and magnetic fields (EMFs), the route selection process and criteria to select the proposed route, as well as a forum to voice concerns with the proposed project. The project team was also able to obtain information on specific human and natural resources within the project area for consideration in the routing process.

3.4.1 Public Officials

RUS began consultation with local officials regarding the project in the Spring of 2007. Burns & McDonnell and RUS representatives sent agency letters on April 13, 2007 to 52 public offices (Appendix B) requesting information on new or proposed developments and other resources in the study area. All of the contacted agencies were notified by letter in early July about the public scoping meetings on July 24th and 25th, 2007. The agencies were invited to attend and provide comments on the project. A separate agency meeting was not requested of RUS and agencies were encouraged to attend the public meetings in July. RUS and KAMO met with local agency personnel from the USFWS, on July 25, 2007 to inform them of the project and to gather information on the potential impacts to threatened and endangered species in the study area. At that time, the USFWS requested an evaluation of impacts to the American burying beetle and the gray myotis.

3.4.2 Public Scoping Meetings

To provide residents of the area with information about the project and gather public input on route alternatives and community values, RUS held two open-forum, informational scoping meetings on July 24th and 25th, 2007. Notices were published in the local papers and posted on the RUS website. Information about the project and a map of the study area (Macro-Corridor Report) were also on the RUS website, with a link to the Macro-Corridor Study placed on the KAMO website at www.kamopower.com. A full report of the Scoping Meetings can be found on the RUS website at http://usda.gov/rus/water/ees/ea.htm.

The meetings included displays with information on project need, engineering (design), route alternatives, and ROW requirements. Representatives from RUS, KAMO, and Burns & McDonnell were present to address the public's questions and take comments. Preliminary route segments developed for the proposed transmission line were depicted on 1:1,000 aerial photography and available for public review. No proposed or alternate route or route segments had been identified at the time of the workshop. Photographs and drawings showing the types of structures that would be used for the project were displayed. KAMO staff discussed ROW acquisition and maintenance.

Participants at the open house received a written questionnaire to communicate their opinions on the routing criteria, the segment locations and issues of concern regarding the project. The results from the questionnaire are discussed in the next section.

3.4.3 Segment Adjustments and Additions

As a result of information and additional data received at the agency and public scoping meetings, several route corridor segments were added. The reasons for these modifications are discussed below. Refer to Appendix C for these modifications and additional maps.

At the Vinita, Oklahoma public meeting, several comments were received concerning population densities near the route corridor segment east of Welch, Oklahoma. The public suggested that the area five miles to the west of Welch is less densely populated and would provide a routing opportunity with fewer residential impacts. In response to these comments, the area northwest of Welch was investigated using aerial photography and site visits. Based on these investigations, a reasonable alternative was identified to address the public concerns. The new corridor segment was developed approximately one mile north of Welch, Oklahoma. It continues approximately five miles to the west and then south to connect to a previously proposed corridor segment located west of Big Cabin, Oklahoma.

Comments received at the Baxter Springs, Kansas public meeting focused on the area two and a half miles southeast of Columbus, Kansas. Originally, all corridor segments coming out of the proposed Blackberry Substation would have been routed through this mile-wide corridor area. Concerns were raised that no alternatives were available for this “bottleneck” area. The areas to the east and west of the bottleneck were investigated using aerial photography and site visits. Based on the results of these investigations, two reasonable alternatives were added to address the public’s concern. To provide additional options, one corridor segment was added to the east of Crestline and another was added to the west. The eastern route runs to the southwest and connects to a previously proposed corridor segment near Carl Junction, Missouri to an existing proposed corridor segment two miles north of Baxter Springs, Kansas. The western corridor segment connects the existing proposed western corridor segment three miles north and west of Crestline, Kansas to the newly developed western corridor segment northwest of Welch, Oklahoma. In addition to those two corridor segments, one small corridor segment was developed two and a half miles northwest of Treece, Kansas to allow the new northwestern corridor segment to connect to existing proposed corridors to the south.

Other comments and concerns received as a result of the public meetings included health effects, safety risks, sensitive and endangered wildlife, decreased property values, historical properties, local benefits, future growth issues, environmental process, electric and magnetic field effects, disruption to farming operations, loss of native grasslands, fair compensation, noise and visual disturbance, and environmental degradation. A full report of the scoping meetings is available to the public and can be viewed on the RUS website at http://usda.gov/rus/water/ees/ea.htm.

Following completion of the public scoping meetings, the corridor segment network was finalized for further evaluation. The corridor network consisted of 62 segments, comprising 188 different combinations, or routes. These routes were next considered in detail to identify a recommendation for proposed and alternate routes for the project.

3.4.4 Blackberry to Chouteau 345-kV

3.4.4.1 Route Screening

In order to compare the potential routes to each other, the characteristics of each route need to be quantified. Based on site investigations of the study area, information from Federal, state and local agencies and public comments at public scoping meetings, a list of criteria appropriate for the study area was developed. These criteria were designed to address the potential concerns of agencies (wetland and land use), the public (proximity to residences and visibility), and KAMO (such as project cost and reliability). They include social, environmental and engineering criteria. Table 3-1 shows the routing criteria developed for this project.

Table 3-1 Routing Criteria

Routing Criteria	Measure
Total Length	Miles
Length Not Along Existing T-Line	Miles
Residences Within 0-150 ft.	Number
Residences Within 151-500 ft.	Number
Public Facilities Within 500 ft.	Number
Historic/Archaeological Sites Within 500 ft.	Number
Agricultural Cropland Within ROW	Acres
Pasture/Grassland Within ROW	Acres
Woodland Within ROW	Acres
Wetlands within ROW	Acres
Streams Crossed	Number
Length Through Superfund Area	Miles
Heavy Angles over 30 Degrees	Number
Road Crossings	Number

Each routing criterion was quantified for each route segment. Appendix D contains a listing of segments and the data for each routing criterion. Quantities for each segment were then summed for all the segments composing a complete route to yield the total for that route. Routing criteria were quantified using GIS software or were calculated by measuring information directly from the 2006 color aerial

photography. Appendix D contains the criteria data for each route in the analysis. Following is a description of each of the routing criteria factors.

Total Length is a general indicator of the overall presence of the project. Length is also an indicator of construction costs. The longer the proposed route, the more expensive it would be if all other factors were equal. Also, the longer the line, the more impacts it is likely to have along the study area. **Length not along Existing Transmission Lines** provides information on the amount of new corridor that would be created by the proposed project. Standard routing principals favor the use of existing corridors where practicable, rather than introducing new corridors throughout the landscape, as this is generally considered to have less impact than creating new ROW. Existing utilities found in the project area are described in Section 2.7.

Residences within 0-150 feet and 151-500 feet from the centerline of each segment were counted using GIS data and verified with field reconnaissance. **Public Facilities Within 500 Feet**, which include parks, churches, cemeteries, and schools, were also counting using GIS data and verified with field reconnaissance. **Historic/Archaeological Sites Within 500 Feet**, which includes sites that are listed or are eligible for listing on the NRHP, were counted.

The land use categories reflect the major land uses in the study area. **Agricultural Cropland Within the ROW** was measured using color aerial photography and GIS NLCD maps. **Pasture/Grassland Within the ROW** was measured using color aerial photography and GIS NCLD maps as well. **Woodland Within the ROW**, was also measured from the color aerial photography and GIS NLCD maps. **Wetlands Within the ROW** was measured using GIS NLCD maps. Acres of agricultural land, woodland and wetlands within the ROW were calculated considering the length of each land use crossed and a representative 150-foot wide ROW. **Stream Crossings** were measured using GIS National Hydrographic Dataset produced by the USGS. **Length Through Superfund** was measured using color aerial photography and data from the EPA identifying the Tri-State Mining District superfund area boundaries.

Heavy Angles represents the number of angles greater than 30 degrees that would be required for each segment. Heavy angles require a larger, more visible structure. These structures are more expensive and may result in greater land disturbance during construction and permanently as a result of the larger structure foundation. The number of such angles required for each segment was estimated from the route maps using a protractor. **Road Crossings** were counted for each segment. Road crossing are locations

the line would be visible to motorists, require agency permits, and affect design through structure placement and ground clearance requirements.

Burns & McDonnell quantified the 14 route criteria for each of the potential routes (188). No route had the lowest score for all of the measured criteria. While a particular route may have been the shortest, it ranked higher in other criteria. Additionally, the routing criteria included such units as length, acres, and numbers of particular resources. These units are not comparable, but all of them needed to be considered with the others as part of the overall evaluation. With this level of complexity resulting from the number of routes and variations on the individual criteria measurements, it was not possible to conduct a route-by-route comparison to identify a corridor that would minimize overall potential impacts. Therefore, Burns & McDonnell used the statistical z-score analysis as a tool to screen the route alternatives and identify a set of routes warranting further investigation and comparison.

Once the route criteria data totals comprising each route were summed, a z-score was calculated for each criterion for each route. The z-score analysis determines the mean value within a set of data and compares each individual route value to the mean, determining the degree of difference (standard deviation) each route is from the mean for each criterion. For example, the total length of all the routes would be quantified and the mean value (or average value) for the entire set of routes determined. Next, the total length for each route would be compared to the mean value. If the individual route length was equal to the mean value, the z-score would be zero, as there would be no difference. If the total length was greater than the mean, the z-score would be a positive number; if the total length was less than the mean, the z-score would be a negative value. The more the individual value exceeded the mean, the higher the positive number. Conversely, the further below the mean, the more negative the z-score. Z-scores were determined for each criterion of each route.

Following calculation of the raw z-scores, Burns & McDonnell applied a weight factor to each routing criterion (Table 3-1) to give greater consideration in the evaluation to those criteria that are more important in the overall project evaluation. If weight factors were not applied, each routing criterion would be considered equal to every other routing criterion. While all criteria used need to be considered in the overall routing process because they have the capacity to influence the potential impacts, design and cost of the project, they do not necessitate equal consideration. For example, a stream crossing must be considered in the evaluation. Due to ROW clearing and earth disturbing activities, stream crossings are locations where aquatic systems could be impacted by the project. Additionally, streams need to be considered in the design process to ensure that structures are not placed in the stream channel but rather are located a sufficient distance from the stream to ensure stream bank and structure stability and to

maintain safe clearances for the conductors. While such crossings need to be considered, they are generally easy to accommodate and address. On the other hand, landowners overwhelmingly feel that proximity to homes is more important than design or environmental issues.

Weights were established and assigned to each routing criterion. Table 3-2 lists the initial routing criteria and their weights. Weights were established based on comments from federal, state and local agencies, the public, and Burns & McDonnell's professional judgment from work on similar projects both within Oklahoma and throughout the country. A weight scale from 1-10, with 1 representing the lowest consideration and 10 representing the highest consideration, was used.

Initially, 14 different criteria were assessed for each route. However, during the analysis, only small differences in the number of public facilities and historic/archaeological sites between the routes were identified. The small differences in these two criteria between routes did not help characterize any difference between routes. They were therefore removed from the final analysis.

Table 3-2 Weights of Routing Criteria

Routing Criteria	Weights
Residences Within 0-150 ft.	10
Residences Within 151-500 ft.	9
Length Not Along Existing T-Line	8
Wetlands within ROW	8
Total Length	7
Public Facilities Within 500 ft.*	6
Historic/Archaeological Sites Within 500 ft.*	5
Woodland Within ROW	5
Angles over 30 Degrees	4
Agricultural Cropland Within ROW	4
Road Crossings	3
Length Through Superfund Area	2
Streams Crossed	2
Pasture/Grassland Within ROW	1

*criterion not included in final analysis

Weights assigned to each criterion were multiplied by the raw z-score calculated for each criterion of each route. In so weighting the z-scores, those criteria determined to merit greater consideration in the analysis were weighted higher and became more significant contributors to the overall screening of the evaluated routes. For instance, stream crossings were weighted 2 while residences within 150 feet were weighted

10. If the raw z-scores for each category ranged from -10 to 10, the weighted scores for stream crossings would range from -20 to 20, while the weighted scores for residences within 150 feet would range from -100 to 100, resulting in residences within 150 feet making a more significant contribution to the overall score in the analysis.

Following application of the weights to each of the routing criteria, a weighted z-score for each criterion of each route was calculated. All the individual criterion weighted z-scores for an individual route were summed to give a total z-score for each route. Both positive and negative weighted z-scores were included in the total z-score. For the total weighted z-scores, positive total z-scores would indicate that the overall route would have greater environmental and engineering considerations than the average for all routes while negative total z-scores would represent routes with lower than average impacts and considerations. The z-score analysis, therefore, allowed the routes to be screened and the routes with the lower overall impact identified for further evaluation.

The total weighted z-scores for the routes evaluated ranged from a low of -58.9 (Route A3) to a high of 68.4 (Route C35). Weighted z-scores for each criterion of each route are provided in Appendix D. Appendix D lists the evaluated routes by the weighted z-scores in ascending order and includes corresponding segments comprising each route. Of the 188 routes evaluated, 88 had negative scores (i.e., less than average overall impacts) and 100 routes had positive scores (i.e., greater than average impacts). Generally, the total z-score for a particular route was only approximately one point different than the total z-scores for the routes ranked immediately above and below it. This reflects minimal difference between route corridors using similar segments. Routes generally were comprised of 10 or more individual segments, with some routes differing from each other by only 1 or 2 segments.

Z-scores only consider the quantified route evaluation criteria and do not take into account factors such as potential future development patterns or other intangible or immeasurable factors. As such, the z-scores are not considered a definitive comparison of routes; rather they provide a useful index of the relative overall potential impacts associated with the alternate routes. The point of this methodology is to organize, manage and screen the extensive data in order to narrow the analysis to a manageable number of routes that could then be evaluated further in making a final recommendation.

Having determined total weighted z-scores for all the alternate routes, Burns & McDonnell arranged the routes by their total weighted z-scores (Appendix D). Routes were listed in ascending order, beginning with routes having the lowest z-scores, continuing to the routes having the highest z-scores.

When ranking the z-scores of the 188 routes in ascending order, several natural breaks occurred (Appendix D). A break occurs when a larger difference between two route z-scores occurred compared to the previous and subsequent score differences, when in ascending order. These first few breaks occurred between A3 (-58.9) and A22 (-48.6), B2 (-42.2) and A4 (-39.3), A27 (-37.8) and A20 (-34.6). In order to narrow the selection field of potential routes, these natural breaks in the data were used. While the first natural break was the most significant, it occurred between the first and second lowest ranked routes. Using this break as an elimination tool would not aide in developing any alternate routes; therefore, the second break in the data was used. This break, 2.9 points, occurred between Route B2 and Route A4. Eight routes had scores lower than the break point. These 8 lowest scoring routes were retained for further consideration.

3.4.4.2 Proposed and Alternate Route Selection

Final selection of a proposed and alternate route corridor was based on eight routes that were retained through the z-score analysis for further detailed analysis. These routes included A1, A2, A3, A7, A8, A19, A22, and B2. As can be seen in Figure 3-2, all of these route corridors use the more westerly corridor segments, and, at the southern end, all use the same alignment for connecting to the proposed Chouteau Substation and the GRDA Coal-Fired Complex. Initially, at the northern end of these routes, two options existed for exiting the proposed Blackberry Substation. The z-score analysis screened all routes using the eastern exit from the proposed Blackberry Substation and therefore, eliminated all of the eastern route corridors. The eastern routes generally ran closer to heavily populated communities and were longer, resulting in greater impacts across all evaluation criteria.

The purpose of the route selection process is to identify a proposed and two alternative routes that provide the best opportunities for routing across all criterion. Based on the weights provided in Table 3-2, residences have the greatest influence for routing this project followed by total line length. However, because of the weighted analysis, one route may have fewer residences but may be ranked lower than a route with higher residences. The routing process used in this project takes a broader approach than just identifying residences within the area. While the weighting process takes those factors into account on a preliminary level, further evaluation of the lower ranked routes is needed to identify the best routes that are considered acceptable while reaching a balance between human and natural resources.

In reviewing the data for the eight retained routes, it was determined they could be broken into two distinct groups, those with the low residential impacts and those with higher residential impacts. Also, it was generally noted that the routes with lower residential proximity had higher natural resource

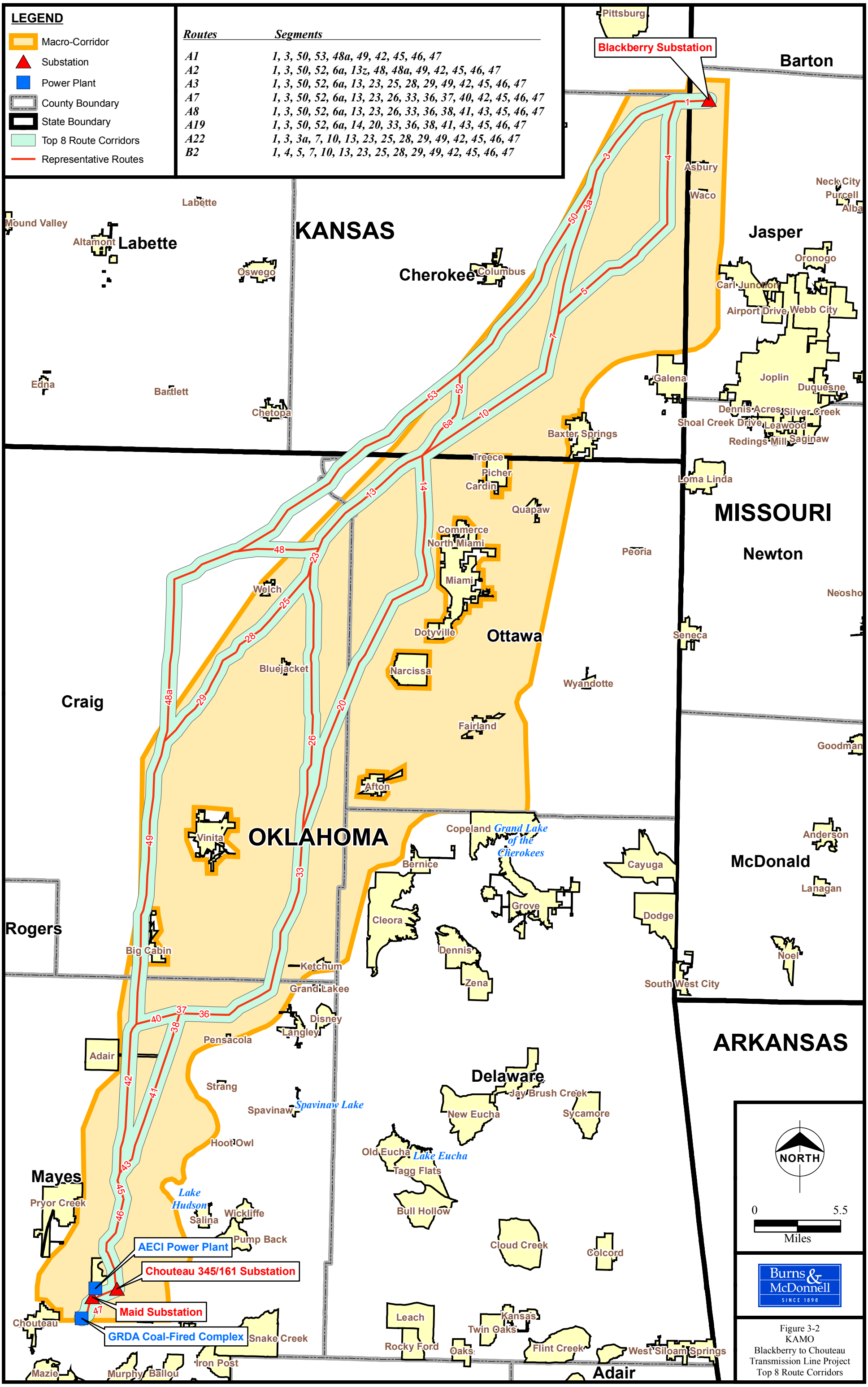

Figure 3-2
KAMO
Blackberry to Chouteau
Transmission Line Project
Top 8 Route Corridors

considerations. The four routes with the fewest residences are routes A1, A2, A3 and A7 (Table 3-3). The number of residences within 500 feet of the line for these four routes varied from 16 to 20. The routes with the lower natural resource considerations are routes A8, A19, A22 and B2. These four routes ranged from 25 to 35 residences within 500 feet of the line. The evaluations of both of these groups of routes are discussed below.

Table 3-3 Top 8 Route Data

Route Criteria	Route							
	A1	A2	A3	A7	A8	A19	A22	B2
Total Length (miles)	97.12	99.20	95.11	98.64	97.12	96.22	96.03	96.69
Length Not Along Existing T-Line (miles)	86.62	88.6	84.6	85	73.71	72.68	85.53	86.19
Angles over 30 Degrees (number)	9	12	12	15	17	16	11	14
Residences Within 0-150 ft. (number)	1	1	1	1	2	2	0	0
Residences Within 151-500 ft. (number)	15	17	17	19	29	33	26	25
Agricultural Cropland Within ROW (acres)	424.01	417.64	424.87	463.64	438.32	442.28	462.22	436.69
Pasture/Grassland Within ROW (acres)	915.28	974.17	924.32	991.26	977.02	946.65	911.14	938.05
Woodland Within ROW (acres)	184.58	172.69	168.05	152.37	147.62	139.9	165.16	176.54
Wetlands within ROW (acres)	13.97	5.40	5.40	5.40	5.40	15.84	3.54	5.83
Streams Crossed (number)	20	21	22	25	25	20	25	25
Road Crossings (number)	104	106	108	101	101	103	110	108
Length Through Superfund Area (miles)	0	0	0	0	0	0	3.35	3.35

The four remaining routes with the lower residential proximity differ by only 4 residences within 150-500 feet of the line (Table 3-3). All four routes have only one residence within 150 feet. The differences between these routes occur in other categories such as total length, agricultural land, woodland, and wetlands within the ROW. Route A3, the shortest of all routes considered, is the shortest of the four by 2.1 miles (95.11 miles), has generally low amounts of agricultural land (1349.19 acres) in the ROW, low amounts of woodlands (168.05 acres), and low amounts of wetlands (5.40 acres). Route A1 (97.21 miles) is longer than route A3, has more woodland (184.58 acres), and well over twice as many wetlands (13.97 acres). Route A1 does provide two fewer residences from 150 to 500 feet of the line, and 9.9 less acres of total agricultural land (1339.29 acres). While the impacts to residences and agricultural land are important, the higher amounts of woodland and wetlands could cause permitting issues and would have a greater impact to sensitive environmental areas by requiring more areas of wetland and woodlands to be

permanently converted to ROW. Therefore, Route A1, at over 2.0 miles more length, provides no real benefits over Route A3. Route A2 (99.20 miles) is also longer than Route A3, has the same number of residences (18) as A1, more agricultural land (1391.81 acres) than A1 or A3, more woodland (172.69) than A3, and the same amount of wetlands as route A1 (5.40 acres). As with Route A1, Route A2 provides no real benefits over route A3. Route A7 (98.64 miles) is longer than Route A3, has two more residences (20), has 105.7 more acres of total agricultural land (1454.9 acres), has 15.7 acres less of woodlands (152.37 acres), and the same amount of wetlands. Route A7 provides no real benefit over route A3. Route A3 provides the best overall routing opportunity while maintaining residences as a primary concern. It is the shortest route and also minimizes impacts to sensitive resources and potential conflicts with agricultural land use. Therefore, Route A3 is selected as the proposed route. The other three routes were eliminated from the alternate selection because benefits were the same or less than those of Route A3.

The four remaining routes (A8, A19, A22, and B2) did not provide any benefits regarding residential proximity to Route A3 and the other low residence routes. However, they did provide natural resource and sensitive area benefits. Route A22 was the shortest (96.03 miles) by 0.82 miles. Route A22 had the lowest number of residences (26) with the exception of Route B2 (25). A22 also had more woodland (165.16 acres) than the remaining four routes, but still had less than the proposed Route A3. A22 had the least amount of wetland (3.54 acres) within the ROW of all 188 routes evaluated. A22 had the least amount of total agricultural land (1373.36 acres) of the remaining four routes, but had 24.17 acres more than the proposed Route A3. Route A22 provides the best routing opportunity of the remaining routes and was selected as the first alternate route. Although providing no benefit from the residential perspective, it would minimize woodland impacts and provide beneficial reductions in potential wetland impacts should those become a key aspect for project construction.

Route B2 (96.69 miles) was shorter than A8 (97.12 miles), but longer than A19 (96.22 miles). B2 had the least amount of residences (25) of the four routes. B2 had higher agricultural land (1375.19 acres) than A22, but less than A19 (1388.93 acres) and A8 (1415.52 acres). Route B2, however, had a very high amount of woodlands in the area (176.54 acres) and more wetlands (5.83 acres) than A8 (5.40 acres). While Route B2 may have a few less residences than A19 and A8, it provides few other benefits. The high amount of woodlands and wetlands within the ROW would result in the disturbance of sensitive environmental habitats and the potential for increased permitting issues. Route B2 was eliminated from the second alternate selection because it provided no real advantage over routes A19 and A22 which have less environmental impacts.

The two remaining routes (A19, A8) are both relatively short. Route A19 (96.22 miles) is only 1.11 miles longer than the proposed Route A3 while Route A8 (97.12 miles) is 2.01 miles longer than the proposed route. However, while A19 is shorter than A8, it has six more residences. Route A19 had less woodlands (139.90 acres) compared to A8 (147.62 acres), but a very high amount of wetlands (15.84 acres). Route A8 has the same amount of wetlands at the proposed route (5.40 acres). In comparing Route A19 to A8, Route A8 was determined to provide the next best opportunity for minimizing impacts to sensitive natural resources, reducing permitting concerns while still minimizing impacts to residents. Therefore, Route A8 was selected as the second alternate route.

Based on the foregoing analysis and route comparisons, one proposed and two alternate routes for the proposed project were selected (Figure 3-3). The proposed route (Route A3 in Table 3-3 and the Route Analysis Data Tables included as Appendix D to this document), minimizes impacts to residents, agriculture, and areas of environmental concern. The first alternate route (Route A22) would minimize impacts to woodland and wetland areas while not having substantially greater residential proximity than Route A3. An additional second alternative to both the proposed and first alternate routes is Route A8. Route A8 would have only slightly greater impact than Route A22. Individual maps showing the proposed and alternate routes are included in Appendix E.

3.4.5 Chouteau to AECI Plant 161-kV

3.4.5.1 Route Screening

The routing process for the 161-kV line connecting the new Chouteau Substation to the GRDA Coal-Fired Complex began with identifying a study area, based on project need and preliminary review of possible routing constraints and opportunities in the area. After establishing the study area, preliminary routes were investigated. The distance from the new Chouteau Substation to the GRDA Coal-Fired Complex is approximately 1.3 miles long, runs directly predominantly east to west and contains existing transmission lines. This short distance allowed for minimal routing options for the new 161-kV transmission line. Any routes extending to the power plant from the substation would have essentially the same human and environmental impacts. However, a variety of natural and human environmental data was obtained to identify potential routing opportunities along with information on potential resource conflicts.

Ultimately, only one potential route was determined reasonable. This route would follow existing 161-kV transmission line from the Chouteau Substation to the AECI Plant, potentially double circuiting the existing line to accommodate the new circuit.

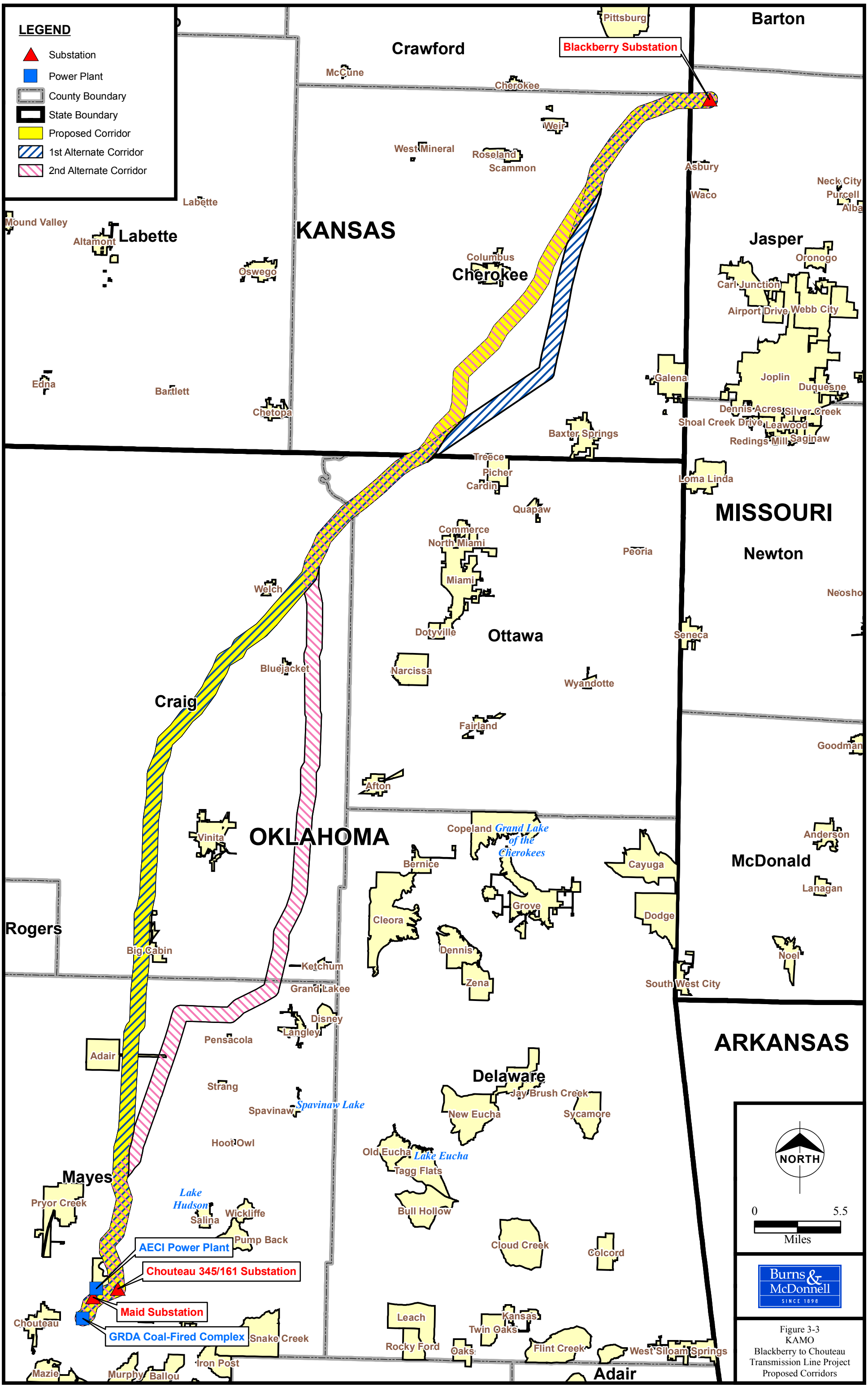

Figure 3-3
KAMO
Blackberry to Chouteau
Transmission Line Project
Proposed Corridors

3.4.5.2 Proposed Route Selection

Selection of the final of the 161-kV route was based on the evaluation of one route. The area near the new Chouteau Substation has numerous transmission lines scattered through the landscape and all crossing near the substation. The selected route for the line follows an existing transmission line south from the new Chouteau Substation to Route EO550. The line then continues to the west along Route EO550 to the AECI Power Plant (Appendix F).

The total length of the segment (101) was 1.42 miles in length. There were zero residences from 0-500 feet of the line. Approximately 9.58 acres of woodland, one perennial waterway and 3 roads were crossed by the line (Appendix D). No wetlands were located within the ROW.

3.4.6 Route Corridor Summary

For the Blackberry to Chouteau 345-kV line, Route A3 was selected as the proposed route corridor and routes A22 and A8 were selected as the first alternate route corridor and second alternate route corridor, respectively.

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4.0 ENVIRONMENTAL CONSEQUENCES

This section of the EA outlines the potential impacts of the proposed project, including discussion for the proposed and two alternative routes, on air quality; water quality; wetlands; floodplains; soils; land use; vegetation; wildlife; threatened endangered or rare species; cultural resources; transportation; health and safety; socioeconomics; and visual character. Both short-term impacts associated with the proposed construction activity and long-term impacts have been considered. These activities include the construction and maintenance of the 345-kV and 161-kV transmission lines, the Blackberry Substation, the 345/161-kV Chouteau Substation, and several optic fiber regeneration sites within the ROW of the 345-kV line. These regeneration sites will be located entirely within the ROW and will generally be located next to streets to allow easy access and limit the need for access roads. A separate discussion of these regeneration sites is not necessary because the impacts are included as part of those with the proposed ROW.

This EA addresses all individual and cumulative impacts associated with the proposed action and alternatives. The Council on Environmental Quality regulations for the implementation of NEPA define cumulative impacts as, “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 action.” Cumulative impacts are identified at the end of each resource section.

The region of influence for the majority of the resources investigated was limited to the immediate vicinity of the proposed action. However, the region of influence, or area of potential effect (APE), for aboveground cultural resources was defined as ¼ mile on either side of the proposed alternate routes where paralleling existing transmission lines, and ½ mile on either side of the center line in new alignment sections. This APE is based accepted practice for transmission lines in the affected states. The region of influence for streams in the project area was downstream and in the immediate vicinity of the proposed action, and the region of influence for socioeconomics was the five counties that the proposed action would directly affect.

4.1 AIR QUALITY

4.1.1 No Action

The No Action alternative would have no impact on air emissions over those currently existing in the study area because no construction would occur. No short-term or long-term impacts to the local or regional ambient air quality are expected.

4.1.2 Construction and Operation Impacts

During construction of the proposed transmission lines, small amounts of air pollutants will be temporarily generated. Temporary increases in fugitive dust from ground disturbing activities and combustive emissions from construction equipment would be generated during the construction of the proposed transmission lines. These emissions would be greatest during the initial site preparation activities and would vary from day to day depending on the construction phase, level of activity, and prevailing weather conditions. All of these emissions would be temporary in nature, fall off rapidly with distance from the proposed construction site, and would not result in any long-term impacts. Once the construction activities are completed, emissions would subside and ambient air quality would return to pre-construction levels.

The herbicides proposed for use on the proposed ROW would not have any effect on the air quality of the study area. The applicators would be trained and licensed for the application and label directions would be strictly followed. Herbicide applications would also be made in accordance with the respective local and/or state requirements. Applicators would monitor weather conditions and would postpone or suspend applications when conditions become unfavorable. No long-term impacts to the local or regional ambient air quality are expected from operation of the transmission lines.

4.1.3 Cumulative Impacts

The proposed transmission line project is not expected to have any significant cumulative effects on air quality. The direct and indirect air quality impact of the transmission line project is expected to be minimal.

4.1.4 Summary of Impacts to Air Quality for Proposed and Alternate Routes

There would be temporary impact to air quality to due to construction vehicles; however, there would be no significant difference in impacts to air quality between the proposed and alternate routes.

4.2 VEGETATION

4.2.1 No Action

The No Action alternative would have no short- or long-term impacts to vegetation because no construction would occur, and no clearing or alteration of vegetation would be required.

4.2.2 Construction and Operation Impacts

Construction and maintenance of the proposed transmission line may result in a change of vegetation type within the transmission line ROW. Approximately 165, 160, and 148 acres of woodland clearing would

be required for the proposed route, first alternate route and second alternate route, respectively. Herbaceous vegetation, including crops, would not be removed but could be damaged by construction equipment and vehicular movement. Following clearing, the ROW in non-agricultural areas, would be allowed to recover as herbaceous or shrub-scrub vegetation.

Portions of the proposed transmission line extending across agricultural land are expected to have minimal impacts on vegetation. Only vegetation at support pole locations would require removal. Some damage to crops could occur depending on when construction occurs. KAMO would compensate landowners for any crop damage or loss.

Herbicides would be used for control of targeted woody-stemmed vegetation within the proposed ROW. Non-target plants could be impacted from over spray, drift or accidental discharge. However, through proper application techniques such impact can be minimized and managed under proper environmental conditions. Applicators would be trained on the effects of wind and other environmental conditions with herbicide use. Herbicide applications would be suspended if temperature, humidity or wind speeds become unfavorable. As a result of the herbicide application, vegetation in the ROW would be limited to low growing plant species including shrubs, ferns, grasses, forbs and low growing tree species. Over time, the taller growing tree species would be eliminated. Through usage of herbicides, low growing plant communities can become better established because the woody-stemmed species would be reduced or eliminated, providing more open areas for these communities to thrive.

The proposed substations would require removal of vegetation at each of the proposed sites to allow for the construction of the new facilities and installation of the electrical equipment. As described in Section 2.2, the Blackberry Substation site is currently composed of pasture and cropland while the Chouteau Substations site is a mix of deciduous forests and herbaceous grassland. The construction associated with any of these proposed new substations would affect a maximum of three acres, converting it from current land use to the substation. All of the plant communities potentially affected are common to the area. No unique or rare plant communities are expected to be affected.

4.2.3 Cumulative Impacts

No other corridor projects causing large-scale vegetation impacts are currently proposed in the area. Therefore, cumulative impacts to vegetation within the study area are expected to be minimal. Herbicide use is expected to reduce tall growing plant species and increase shrub, forb and herbaceous species. An indirect cumulative impact would be the establishment of relatively stable low growing plant community. This plant community would increase diversity of vegetation type and decrease intensity of future

vegetation management. Therefore, no cumulative impacts on vegetation are expected by the proposed transmission line project.

4.2.4 Summary of Impacts to Vegetation for Proposed and Alternate Routes

Given that the proposed, first alternate, and second alternate routes are similar in length, or 95 miles, 96 miles, and 97 miles, respectively, the impact to vegetation in terms of total acreage impacted is similar between the proposed and alternate routes. In terms of the type of vegetation impacted, the three routes differ only slightly. Cropland or grassland that is disturbed would be allowed to recover the following year, and therefore no long-term impacts would result from any of the alternate routes. The amount of woodland that would be cleared from the ROW of the proposed and first alternate routes is similar; 168 acres and 165 acres, respectively. The amount of woodland that would be cleared from the ROW of the second alternate route is slightly lower at 148 acres.

4.3 WILDLIFE

4.3.1 No Action

The No Action alternative would have no short- or long-term impacts to wildlife because no construction would occur.

4.3.2 Construction and Operation Impacts

Construction and maintenance of the transmission line could result in some adverse impacts to wildlife. The removal of approximately 168, 165, and 148 acres of forested vegetation within or adjacent to the proposed ROW for the proposed alternative, first alternate route, and second alternate route, respectively, would reduce the foraging, shelter, or nesting habitat for some species. However, this loss of habitat would be minimal compared to the amount of similar habitat available in the study area. Cleared ROW would also create additional open and edge habitat beneficial to many local species of wildlife.

Portions of the proposed transmission line extending across agricultural land would minimally impact wildlife because very little, if any, wildlife habitat would be lost within those portions. Deer, birds, and other wildlife species moving through agricultural lands would be temporarily impacted by the noise and human activity associated with the construction phase of the project. Construction of the transmission line alongside existing ROW would have a similar effect on fauna species as those portions of the proposed ROW extending across agricultural land because of the human activity and associated construction noise.

Human presence and activity during construction would disturb and displace wildlife in the area of construction. However, impacts to most species would be temporary and short-term in nature, limited to the period during the construction phase and would consist primarily of displacement and disturbance. Some less mobile species occurring in the construction corridor could be directly impacted, and movements between habitat areas could be temporarily impeded due to noise and human presence. Additional temporary disturbances could occur during future maintenance activities along the line.

The Blackberry Substation site is currently used as pastureland and, as such, construction of the facility would not impact high quality wildlife habitat nor have any significant impact on wildlife species. This is also true for the Chouteau Substation site which would largely be located with existing transmission line ROW. The only wildlife in the vicinity of these two sites would be deer and small birds, reptiles, and mammals that could move into outlying vegetation areas. Therefore, other than temporary minor effects to wildlife caused by noise and human activity, no impacts are expected from the construction and maintenance of the proposed transmission line.

4.3.3 Cumulative Impacts

No other corridor projects causing large-scale wildlife habitat disturbance are known to be proposed in the area. Therefore, cumulative impacts to wildlife within the study area are expected to be minimal. As outlined above, the project is not expected to have any adverse impacts on terrestrial wildlife species.

4.3.4 Summary of Impacts to Wildlife for Proposed and Alternate Routes

Impacts to wildlife would be primarily due to disturbance during construction and habitat loss as a result of the clearing of woodland vegetation within the ROW. In comparing the total acreage of woodland for the proposed and alternate routes, the ROW for the second alternate route has slightly less woodland acreage than the other two routes. There are 168 acres of woodland within the ROW of the proposed route, 165 acres within the ROW of the first alternate route, and 148 within the ROW of the second alternate route.

4.4 THREATENED AND ENDANGERED SPECIES

4.4.1 No Action

The No Action alternative would have no short- or long-term impacts to threatened and endangered species because no construction would occur.

4.4.2 Construction and Operation Impacts

As described in Section 2.4, four federally threatened, four federally endangered, and two candidate species are know to occur, or at one time occurred within the study area. These species include the American burying beetle, Arkansas darter, eskimo curlew, gray myotis, interior least tern, Neosho madtom, Neosho mucket, Ozark cavefish, piping plover, and the western prairie fringed orchid. However, species information on habitats, ranges, and accounts listed in Section 2.4 suggests that only the American burying beetle, Arkansas darter, Neosho mucket, and gray myotis could potentially be impacted by the project.

Despite care taken to avoid sensitive species during the routing process, potential habitat for some of these species may occur along the proposed or alternate routes. Additional mitigation to avoid potential impacts is discussed in Section 5.0.

The recent records (since 1992) of the American burying beetle in Craig County and the historic or unconfirmed records in Mayes, and Ottawa counties in Oklahoma suggest that it would be possible for American burying beetles to exist along any of the proposed or alternate routes (USFWS 2007). Of particular concern would be areas of woodland clearing where clearing equipment and earth disturbing activities would occur. RUS will undergo Section 7 consultations with the USFWS to further evaluate the potential impacts to the American burying beetle and develop options for minimizing any impacts. The project would not affect caves and would have no effect on the gray myotis and Ozark cavefish. Because of the lack of suitable habitat and no recent records exist, the project would have no effect on the eskimo curlew, interior least tern, piping plover, or western prairie fringed orchid.

In addition to the federally threatened and endangered species, 21 other state endangered or threatened species are know to occur, or at one time occurred within the study area (Table 2-1). Two of these state listed species, the Arkansas darter and the Neosho mucket are also candidates for federal listing. These species are not expected to be impacted by the project because construction will span the creeks and rivers in the study area. These species are, however, are particularly sensitive to increased sedimentation and water turbidity. Best management practices (BMPs) as discussed in Chapter 5 will be used to prevent soil erosion and sediment run-off throughout the project area. Because of the BMPs to control erosion, the project would have no effect on the Arkansas darter, Neosho madtom, and Neosho mucket.

4.4.3 Cumulative Impacts

No other projects are known to be proposed with the potential to cumulatively affect the American burying beetle or other listed species. As described above, the proposed transmission line project would

have no impacts on the federal threatened and endangered species within the project area, with the exception of the American burying beetle. Section 7 consultation will be initiated for the American burying beetle. No cumulative impacts on other threatened and endangered species are expected by the proposed project.

4.4.4 Summary of Impacts to Threatened and Endangered Species for Proposed and Alternate Routes

American burying beetle, a federally listed species of concern for this project, could be affected by earth disturbing activities during construction. The USFWS would be consulted with to minimize any adverse effects. There would be no significant difference in impacts to threatened and endangered species between the proposed and alternate routes.

4.5 LAND USE

4.5.1 No Action

The No Action alternative would have no short- or long-term impacts to land use because no construction would occur.

4.5.2 Construction and Operation Impacts

The proposed electric transmission project is not expected to have any significant impacts on the existing land use in the study area. Approximately 10.6 miles of the proposed route, 10.5 miles of the first alternate route, and 23.4 miles of the second alternate route would involve construction of the new line along side existing ROWs to minimize utility corridors. The land use along the agricultural portions of the proposed new line section would remain unchanged with the exception of structure locations because KAMO' policy is to allow agricultural practices within the ROWs, as long as such practices do not interfere with, or jeopardize the operation of the lines. Table 4-1 shows the amount of forested areas and agricultural land within each of the alternate routes.

Table 4-1 Land Use

	Proposed Route	First Alternate Route	Second Alternate Route
Forested Acres	168 acres	165 acres	148 acres
Agricultural Acres	424 acres	438 acres	462 acres

Impact on pasture land would be negligible because the line would not interfere with grazing. The impact to cropland was minimized during the development of routes by siting the routes where practicable along fence and property lines so the landowners could continue to farm or irrigate the fields with only minimal intrusion. Some adjustments may also be made during future easement consultations with landowners to minimize impacts. Temporary disturbance from heavy equipment within the ROW may result in the loss of some crops during construction. The only land that would be unavailable for agriculture would be the area occupied by structures. Other cropland within the ROW could continue to be farmed. Some additional agricultural land may be created should forested areas cleared for the new ROW be used for pasture, crops, or other agricultural activities.

The proposed and alternate routes were located in an attempt to avoid concentrated residential development, although the proposed route does pass within the vicinity of some rural residential development (Table 4-2). As a result, the proposed and alternate routes for the proposed new transmission line extend through rural areas and are expected to have minimal impacts on existing residential development in the project area.

Table 4-2 House Proximity to Alternate Routes

Alternate Routes	Proposed	First Alternate	Second Alternate
Houses 0 to 150’ from ROW edge	1	0	2
Houses 151 to 500’ from ROW edge	30	38	31

The siting of a new transmission line requires that necessary land rights be obtained for the project facilities, including access, construction, and operations and maintenance for the life of the project. These land rights would generally take the form of easements where the fee ownership remains with the landowners. The majority of the easements would be obtained from private landowners, with additional easements granted across state and federal land. These easements give KAMO the right to construct and maintain the transmission line. They also restrict the uses of the property within the boundary to protect the line from any construction that may pose a safety or reliability problem. Typically, this includes restrictions on some construction, mobile home placement, well digging, advertising devices, lighting and flag poles, antennas, trash dumpsters and the storage of materials and other objects that reduce code clearances or may be flammable. Permitted or compatible uses within the ROW can be considered as anything not specifically excluded in the easement. In general, land uses that do not conflict with National Electrical Safety Code, local zoning or other code requirements are permitted. Examples include

storm water control basins, park areas, streets, walkways, parking, bike paths, leach beds, yards, landscaping, farming and pasture.

4.5.3 Land Values

Many property owners have concerns when a transmission line ROW is commissioned to run through their property. The potential change to property value that might be experienced has been studied in the past. Generally it has been found that a new transmission line may result in a decline in property value immediately following the construction. However, this effect diminishes after a few years. A property's value is influenced more by location of a school, job, the size of the house, and the neighborhood than the presence of transmission lines. American Transmission Company (2005) found that proximity to a transmission line did not diminish property values because the use of the property was not affected. This may be due to transmission structures or lines being common in our everyday life and a part of the landscape.

When the route for the transmission line is chosen, a landowner whose property is affected by the ROW will go into negotiations with the company concerning an easement. Easements allow the company to locate its wires and poles on the property and enter for maintenance when needed; in return the landowner is compensated and receives payment based on an appraisal of the property. The landowner keeps ownership of the land but they are restricted to certain activities so they do not compromise the safety and efficiency of the lines.

The amount of compensation is negotiated based on several factors. Some factors are the length and width of the ROW, the number of poles that would be located on their property and their height and design, the wires, construction practices, and maintenance done to the area. The landowners would receive different payment amounts depending on these factors.

4.5.4 Cumulative Impacts

As described above, the proposed transmission line project would have minimal impacts on the existing land use within the project area. Therefore, no cumulative impacts on land use are expected by the proposed project.

4.5.5 Summary of Impacts to Land Use for Proposed and Alternate Routes

Impacts to land use would generally be short-term in nature for any of the proposed or alternate routes. The primary short-term impact would be the potential loss of lands within the ROW for a season due to construction disturbances. KAMO would compensate landowners for any crop damage or loss. The total acreage of cropland within the ROW of the proposed and alternate routes differs slightly, with the

proposed route having the lowest acreage. Cropland accounts for 424 acres of the ROW for the proposed route, 438 acres for the alternate route, and 462 acres for the second alternate route. Following completion of construction, no adverse affects to cropland are expected. Following construction cropland and pastureland would convert back to its normal use. The proposed route has 168.05 acres of woodland while the first and second alternative routes have 165.16 and 147.62 acres, respectively. These areas would be permanently converted to open land for the life of the project. The Some minimal restrictions on land use within the ROW, such as no permanent structures, would remain for the life of the project.

4.6 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

In order to identify potential socioeconomic impacts of this project, an assessment of existing conditions and trends associated with the human environment was conducted. Section 2.8 includes an analysis of population growth trends, racial and ethnic characteristics, economic indicators, and employment data for Kansas, Missouri, and Oklahoma as well as six counties included in the study area. The transmission line is not expected to change population trends, economic indicators, or employment and these impacts are not further analyzed. This section includes further analysis of socioeconomic conditions for the population of the areas adjacent to the proposed and alternate transmission line routes. The analysis focuses on identification of minority and low-income populations in the project area in order to identify potential environmental justice concerns.

The need to identify environmental justice issues is stated in Executive Order 12898 (EO), entitled "Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations". The EO states that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." A Presidential Memorandum accompanying the EO directed agencies to incorporate environmental justice concerns in their NEPA processes and practices.

For this project, minority populations are identified by determining the percent minority residents for those census block groups through which the proposed and alternate routes extend. Low-income populations are identified based on poverty rates for the populations of the selected census block groups. Figure 4-1 shows the proposed and alternate 345-kV and 161-kV routes along with the state, county, and Census block groups with greater than fifty percent minority or low-income residents are identified as areas of potential environmental justice concern. In census block groups with less than fifty percent minority or low-income residents, a determination is made as to whether the census block group boundaries.

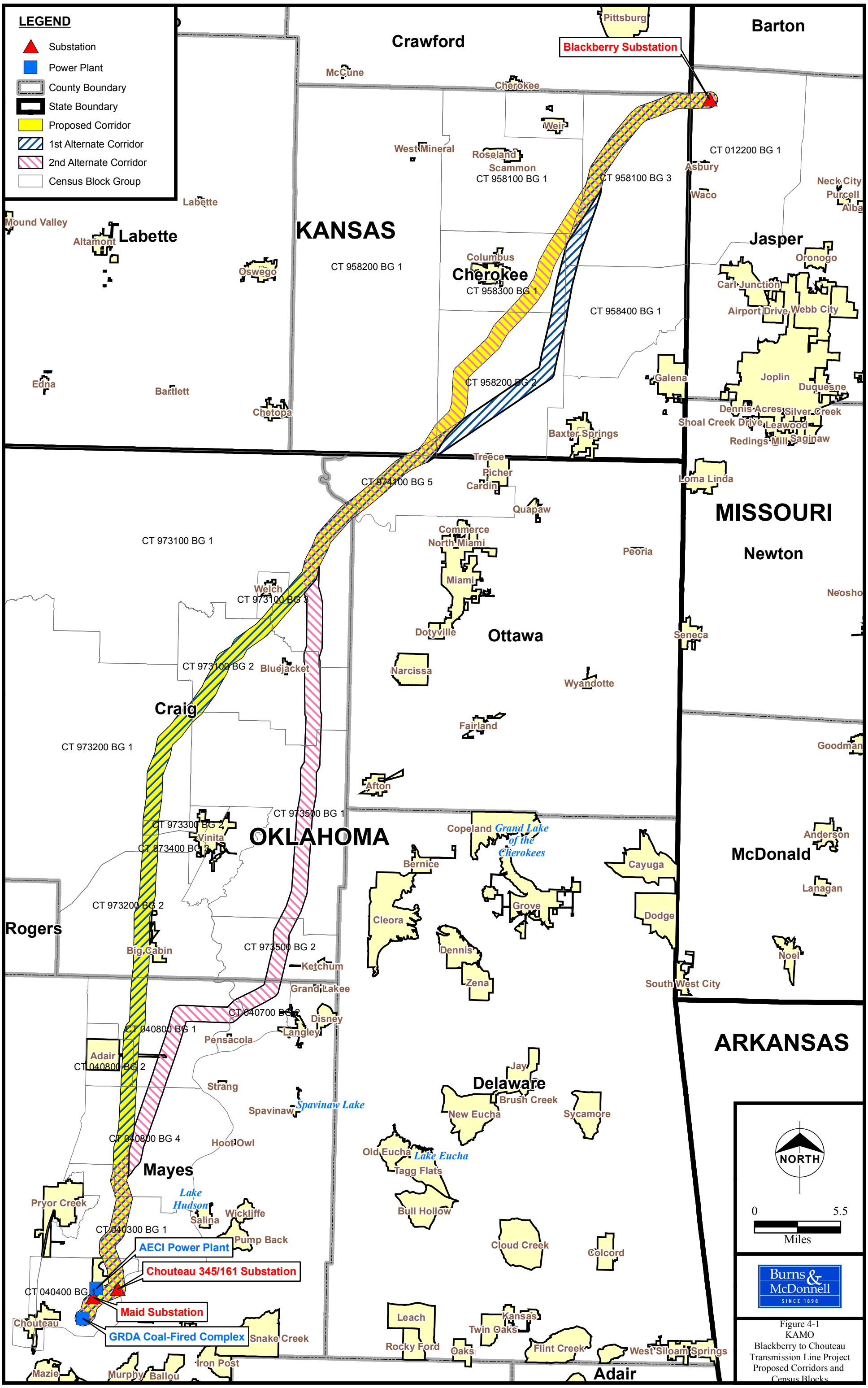


Figure 4-1
KAMO
Blackberry to Chouteau
Transmission Line Project
Proposed Corridors and
Census Blocks

percent minority or low-income population of the census block group is meaningfully greater than the percent minority or low-income of the general population. In this case, the general population is defined as the county within which the census block group lies. As a screening criterion, census block groups with minority or low-income populations that exceed the county levels by more than ten percent are identified as areas of potential environmental justice concern.

Results of the census block group level analysis are presented below beginning with identification of minority populations and followed by identification of low-income populations. This section concludes with a description of potential environmental justice issues and other potential socioeconomic impacts of the project.

4.6.1 Minority Populations

Table 4-3 displays data on race and ethnicity. This data is analyzed in order to identify potential concentrations of minority populations. Data is reported for the 2000 Census at the census block group, county, and state levels. Census block groups are included for the proposed and alternate routes. None of these census block groups has a minority population greater than fifty percent. Therefore, in determining whether any of these census block groups may be an area of environmental justice concern based on minority population, the criteria of ten percent greater than the county level is used.

Table 4-3 Population by Race

	Total Pop.	White	Black or African American	American Indian/ Alaskan	Asian	Hawaiian/ Pacific Islander	Some other race	Two or more races	Hispanic*
Oklahoma	3,450,654	76.2%	7.6%	7.9%	1.4%	0.1%	2.4%	4.5%	5.2%
Mayes County	38,369	72.1%	0.3%	19.1%	0.3%	0.01%	0.6%	7.5%	1.9%
CT 404, BG 1**	1,947	74.0%	0.6%	14.7%	0.7%	0	0.7%	9.2%	2.0%
CT 403, BG 1	1,664	79.1%	0	13.3%	0.2%	0	0.5%	6.9%	1.7%
CT 408, BG 4	1,880	79.0%	0	13.1%	0.2%	0	0.2%	7.6%	1.5%
CT 408, BG 2	763	69.6%	0.1%	23.2%	0	0	0.7%	6.4%	1.2%
CT 408, BG 1	1,134	78.4%	0	11.3%	0	0	0.4%	9.9%	1.9%
CT 407, BG 2	790	82.2%	1.5%	10.6%	0	0	1.0%	4.7%	2.5%
Craig County	14,950	68.5%	3.1%	16.3%	0.2%	0.03%	0.5%	11.4%	1.2%
CT 9732, BG 2	1,537	69.8%	0.4%	18.3%	0.5%	0	0.5%	10.5%	1.2%
CT 9735, BG 2	1,140	71.7%	0.2%	16.1%	0	0.1%	0	12.0%	0.3%
CT 9734, BG 3	1,374	75.0%	2.3%	13.2%	0.3%	0	0.2%	9.1%	0.6%
CT 9733, BG 2	1,831	65.9%	10.9%	12.5%	0	0	0.8%	10.0%	1.6%
CT 9732, BG 1	1,140	61.2%	2.6%	21.4%	0.2%	0.1%	0.3%	14.2%	1.8%
CT 9735, BG 1	1,002	68.2%	0.7%	18.9%	0	0	0.2%	12.1%	0.9%
CT 9731, BG 2	1,037	63.6%	0.4%	18.0%	0	0	0	17.9%	0.2%
CT 9731, BG 3	693	76.0%	0.1%	13.1%	0	0	1.2%	9.5%	1.9%
CT 9731, BG 1	1,242	72.9%	0.2%	17.1%	0	0	0.7%	8.9%	0.7%

	Total Pop.	White	Black or African American	American Indian/ Alaskan	Asian	Hawaiian/ Pacific Islander	Some other race	Two or more races	Hispanic*
Ottawa County	33,194	74.1%	0.6%	16.5%	0.3%	0.1%	1.5%	6.8%	3.2%
CT 9741, BG 5	623	73.4%	0	16.5%	0	0	0	10.1%	1.9%
Kansas	2,688,418	86.1%	5.7%	0.9%	1.7%	0.05%	3.4%	2.1%	7.0%
Cherokee County	22,605	92.3%	0.6%	3.5%	0.2%	0.04%	0.5%	2.9%	1.3%
CT 9582, BG 1	1,443	95.4%	0.1%	2.8%	0	0	0.2%	1.5%	1.0%
CT 9582, BG 2	989	91.0%	1.2%	4.9%	0	0	0.1%	2.8%	0.2%
CT 9583, BG 1	1,214	95.7%	0.6%	1.0%	0.2%	0	0.3%	2.2%	1.2%
CT 9584, BG 1	1,781	92.5%	1.3%	2.9%	0.3%	0	0.4%	2.6%	1.1%
CT 9581, BG 1	1,290	95.0%	0.3%	2.2%	0.2%	0	0.1%	2.1%	0.4%
CT 9581, BG 3	857	96.7%	0.1%	1.1%	0.2%	0	0.1%	1.8%	0.8%
Missouri	5,595,211	84.9%	11.2%	0.4%	1.1%	0.1%	0.8%	1.5%	2.1%
Jasper County	104,686	92.6%	1.5%	1.3%	0.7%	0.1%	1.6%	2.2%	3.5%
CT 122, BG 1	1,598	95.5%	0.3%	1.9%	0.3%	0	0.4%	1.6%	1.3%

*Of any race
**CT (Census Tract), BG (Census Block Group)
Source: US Census Bureau, 2000 Census

Oklahoma

As shown in Table 4-3, there are 16 census block groups through which the proposed and alternate routes pass within the State of Oklahoma. The majority of these block groups have populations with similar patterns of racial composition as their respective county. There are four census block groups that have a slightly higher percentage of minority residents as compared to the level for that county.

One of these includes Census Block Group 2 of Census Tract 408 in Mayes County. The population is 69.6 percent white and 23.2 percent American Indian. This is compared to 72.1 percent white and 19.1 percent American Indian in Mayes County. The combined non-white minority population of this census block group is 30.4 percent, which exceeds the level for Mayes County (27.9 percent) by 2.5 percent. This difference is less than the established 10 percent threshold for determining environmental justice issues. Therefore, Block Group 2 of Census Tract 408 in Mayes County is determined not to be an area of environmental justice concern based on minority population.

In Craig County, there are three census block groups that have a slightly larger minority population than the county. In the county, 68.5 percent of the population is white, 3.1 percent is African American, 16.3 percent is American Indian, and 11.4 percent is of two or more races. The combined non-white minority population of the county is 31.5 percent.

The population in Census Block Group 2 of Census Tract 9733 is slightly different than Craig County, with 65.9 percent white, 10.9 percent African American, 12.5 percent American Indian, and 10.0 percent

of two or more races. The combined non-white minority population of this census block group is 34.1 percent, which exceeds the level for Craig County by 2.6 percent.

The population in Census Block Group 1 of Census Tract 9732 is 61.2 percent white, 2.6 percent African American, 21.4 percent American Indian, and 14.2 percent of two or more races. The combined non-white minority population of this census block group is 38.8 percent, which exceeds the level for Craig County by 7.3 percent.

The population in Census Block Group 2 of Census Tract 9731 is 63.6 percent white, 0.4 percent African American, 18.0 percent American Indian, and 17.9 percent of two or more races. The combined non-white minority population of this census block group is 36.4 percent, which exceeds the level for Craig County by 4.9 percent.

Of these three census block groups in Craig County that have higher percentages of minority residents as compared to the county, none exceed the ten percent threshold. Therefore, none of these census block groups is determined to be an area of environmental justice concern based on minority population.

Kansas

Of the six census block groups through which the proposed and alternate transmission line routes pass in Cherokee County, Kansas, only one has a non-white minority population that is higher than the county. The population in Census Block Group 2 of Census Tract 9582 is 91 percent white, 1.2 percent African American, and 4.9 percent American Indian. This is compared to 92.3 percent white, 0.6 percent African American, and 3.5 percent American Indian for Cherokee County. The combined non-white minority population of this census block group is 9.0 percent, which exceeds the level for Cherokee County (7.7 percent) by 1.3 percent. This difference is less than the established 10 percent threshold for determining environmental justice issues. Therefore, Census Block Group 2 of Census Tract 9582 in Cherokee County is determined not to be an area of environmental justice concern based on minority population.

Missouri

Block Group 1 of Census Tract 122 in Jasper County is the only census block group in Missouri that is analyzed for this project. This block group has a population that is 95.5 percent white, 0.3 percent African American, and 1.9 percent American Indian. The combined non-minority population of this census block group is 4.5 percent. The population of Jasper County is 92.6 percent white, 1.5 percent African American, and 1.3 percent American Indian. The combined non-white minority population of Jasper County is 7.4 percent. Because the census block group minority population is 2.5 percent less than

the county level, Census Block Group 1 of Census Tract 122 is determined not to be an area of environmental justice concern based on minority population.

4.6.2 Comparison of Minority Populations for Proposed and Alternate Routes

Table 4-4 compares the distribution by race of the population in the combined five county area with the areas around the proposed and two alternate routes. Percentages reported include all of the census block groups located along each of the routes. As shown in the table, the patterns of distribution are very similar for the three routes. The percentage of the population that is white accounts for 78.9 percent of the population along the proposed route, 79.8 percent along the first alternate route, and 82.2 percent along the second alternate route. The largest minority group is American Indian along all three routes, accounting for 11.7 percent of the population along the proposed route, 11.1 percent of the population along the first alternate route, and 10.1 percent along the second alternate route.

Table 4-4 Comparison of Population by Race

	White	Black or African American	American Indian/ Alaskan	Asian	Hawaiian/ Pacific Islander	Some other race	Two or more races	Hispanic*
Study Area[1]	84.3%	1.2%	8.2%	0.5%	0.1%	1.2%	4.6%	2.7%
Proposed Route[2]	78.9%	1.3%	11.7%	0.2%	0.004%	0.4%	7.6%	1.2%
First Alternative[3]	79.8%	1.3%	11.1%	0.2%	0.004%	0.4%	7.3%	1.2%
Second Alternative[4]	82.2%	0.4%	10.1%	0.2%	0.01%	0.3%	6.8%	1.2%

*Of any race
[1]Total of counties: Mayes County, Ok; Craig County, Ok; Ottawa County, OK; Cherokee County, KS; Jasper County, MO
[2]Total of Census block groups: Mayes County, OK (CT403, BG1; CT404, BG1; CT408, BG1,2,4); Craig County, OK (CT9731, BG1,2,3; CT9732, BG1,2; CT9733, BG2; CT9734, BG3; CT9735, BG1); Ottawa County, OK (CT9741, BG5); Cherokee County, KS (CT9581, BG1,3; CT9582, BG1,2; CT9583, BG1); Jasper County, MO (CT 122, BG1)
[3]Total of Census block groups: Mayes County, OK (CT403, BG1; CT404, BG1; CT408, BG1,2,4); Craig County, OK (CT9731, BG1,2,3; CT9732, BG1,2; CT9733, BG2; CT9734, BG3; CT9735, BG1); Ottawa County, OK (CT9741, BG5); Cherokee County, KS (CT9581, BG1,3; CT9582, BG1,2; CT9583, BG1; CT9584, BG1); Jasper County, MO (CT 122, BG1)
[4]Total of Census block groups: Mayes County, OK (CT403, BG1; CT404, BG1; CT407, BG2; CT408, BG1,4); Craig County, OK (CT9731, BG1,2; CT9735, BG1,2); Ottawa County, OK (CT9741, BG5); Cherokee County, KS (CT9581, BG1,3; CT9582, BG1,2; CT9583, BG1); Jasper County, MO (CT 122, BG1)
Source: US Census Bureau, 2000 Census

As detailed above, none of the census block groups through which the proposed and alternate routes extend are areas of environmental justice concern based on minority population. Of those census block groups that have a combined non-white minority population that is greater than the county level, none exceed county levels by greater than ten percent. Furthermore, the total minority population for all of those census block groups along each route is compared to the total minority population for the five county study area to determine if environmental justice concerns related to minority population may be associated with a specific route. The minority population is 15.7 percent for the study area, 21.1 percent for the proposed route, 20.2 percent for the first alternative, and 17.8 percent for the second alternative.

None of the routes has a combined minority population that exceeds the minority population of the study area by more than ten percent. As a result, neither the proposed route nor two alternatives would disproportionately affect minority populations.

4.6.3 Low-Income Populations

Table 4-5 is a comparison of select economic indicators from the 2000 Census. These indicators are analyzed in order to identify potential low-income populations. Data is analyzed at the census block group level as well as the county and state level. Census block groups are included for the proposed and alternate routes. The 2000 Census reports income and poverty levels for the year 1999. For the purpose of identifying environmental justice issues, low-income populations are determined based on the percent of the population below poverty. None of the census block groups has a low-income population greater than 50 percent. Therefore, in determining whether any of these census block groups may be an area of environmental justice concern based on low-income population, the criteria of 10 percent greater than the county level is used.

Oklahoma

Of the 16 census block groups through which the proposed and alternate routes pass in Oklahoma, four have lower median household incomes and higher poverty and unemployment rates as compared to the respective county (Table 4-5).

Table 4-5 Economic Indicators

	Total Population	Median Household Income, 1999	% Population Below Poverty in 1999	Civilian Labor Force	Unemployment Rate
Oklahoma	3,450,654	$33,400	14.7%	1,632,128	5.3%
Mayes County	38,369	$31,125	14.3%	17,458	5.4%
CT 404, BG 1**	1,947	$30,833	24.5%	895	7.6%
CT 403, BG 1	1,664	$42,379	5.8%	878	6.8%
CT 408, BG 4	1,880	$37,105	3.2%	944	2.9%
CT 408, BG 2	763	$33,750	16.1%	378	4.2%
CT 408, BG 1	1,134	$36,083	8.2%	601	1.7%
CT 407, BG 2	790	$26,563	22.5%	296	8.8%
Craig County	14,950	$30,997	13.7%	6,626	3.9%
CT 9732, BG 2	1,537	$30,743	10.9%	752	2.9%
CT 9735, BG 2	1,140	$35,809	10.9%	519	2.7%
CT 9734, BG 3	1,374	$33,194	11.1%	515	4.9%
CT 9733, BG 2	1,831	$22,112	22.3%	520	7.1%
CT 9732, BG 1	1,140	$41,406	11.4%	632	2.1%
CT 9735, BG 1	1,002	$40,270	4.9%	526	0
CT 9731, BG 2	1,037	$31,607	11.3%	468	4.5%

	Total Population	Median Household Income, 1999	% Population Below Poverty in 1999	Civilian Labor Force	Unemployment Rate
CT 9731, BG 3	693	$30,000	13.5%	300	4.3%
CT 9731, BG 1	1,242	$32,121	11.9%	585	3.4%
Ottawa County	33,194	$27,507	16.6%	15,077	6.0%
CT 9741, BG 5	623	$26,250	26.6%	364	7.1%
Kansas	2,688,418	$40,624	9.9%	1,374,698	4.2%
Cherokee County	22,605	$30,505	14.3%	10,846	5.5%
CT 9582, BG 1	1,443	$34,735	12.0%	731	3.1%
CT 9582, BG 2	989	$24,773	15.7%	443	3.2%
CT 9583, BG 1	1,214	$26,542	15.8%	615	4.2%
CT 9584, BG 1	1,781	$41,293	11.1%	1,009	3.1%
CT 9581, BG 1	1,290	$28,261	21.1%	570	8.2%
CT 9581, BG 3	857	$40,568	7.2%	461	2.2%
Missouri	5,595,211	$37,934	11.7%	2,806,718	5.3%
Jasper County	104,686	$31,323	14.5%	52,511	6.6%
CT 122, BG 1	1,598	$40,488	6.6%	859	4.0%

**CT (Census Tract), BG (Census Block Group)
Source: US Census Bureau, 2000 Census

The population in Census Block Group 1 of Census Tract 404 in Mayes County had median household income of $30,833, a poverty rate of 24.5 percent, and an unemployment rate of 7.6 percent. This is compared to Mayes County, with a median household income of $31,125, a poverty rate of 14.3 percent, and an unemployment rate of 5.4 percent. The poverty rate for this census block group is 10.2 percent greater than the poverty rate for Mayes County. Because this difference exceeds the 10 percent threshold, Census Block Group 1 of Census Tract 404 is an area of potential environmental justice concern based on low-income population.

The population in Census Block Group 2 of Census Tract 407 in Mayes County had a median household income of $26,563, a poverty rate of 22.5 percent, and an unemployment rate of 8.8 percent. These figures are compared to those of Mayes County, with a median household income of $31,125, a poverty rate of 14.3 percent, and an unemployment rate of 5.4 percent. The poverty rate for this census block group is 8.2 percent greater than the county level, which is less than the 10 percent threshold. Therefore, Census Block Group 2 of Census Tract 407 is determined not to be an area of environmental justice concern based on low-income population.

The population in Census Block Group 2 of Census Tract 9733 in Craig County had a median household income of $22,112, a poverty rate of 22.3 percent, and an unemployment rate of 7.1 percent. This is compared to Craig County, with a median household income of $30,997, a poverty rate of 13.7 percent, and an unemployment rate of 3.9 percent. The poverty rate for this census block group is 8.6 percent

greater than the county level. Because this difference is less than the 10 percent threshold, Census Block Group 2 of Census Tract 9733 is determined not to be an area of environmental justice concern based on low-income population.

The population in Census Block Group 5 of Census Tract 9741 in Ottawa County had a median household income of $26,250, a poverty rate of 26.6 percent, and an unemployment rate of 7.1 percent. This is compared to Ottawa County, with a median household income of $27,507, a poverty rate of 16.6 percent, and an unemployment rate of 6.0 percent. The poverty rate for this census block group is 10 percent greater than the county level, which equals the environmental justice threshold but does not exceed it. Therefore, Census Block Group 5 of Census Tract 9741 is determined not to be an area of environmental justice concern based on low-income population.

Kansas

Of the six census block groups through which the proposed and alternate routes pass in Kansas, one has a lower median household income combined with higher poverty and unemployment rates as compared to Cherokee County (Table 4-5). The population in Census Block Group 1 of Census Tract 9581 in Cherokee County had a median household income of $28,261, a poverty rate of 7.2 percent, and an unemployment rate of 8.2 percent. This is compared to Cherokee County, with a median household income of $30,505, a poverty rate of 14.3 percent, and an unemployment rate of 5.5 percent. The poverty rate for this census block group is 6.8 percent greater than the county level, which is less than the 10 percent threshold. Therefore, Census Block Group 1 of Census Tract 9581 is determined not to be an area of environmental justice concern based on low-income population.

Missouri

The one census block group that is included for Jasper County, Census Block group 1 of Census Tract 122, had a higher median household income and lower poverty and unemployment rates than the county levels (Table 4-5). Therefore, this block group is not an area of environmental justice concern based on low-income population.

4.6.4 Summary of Low-Income Population for Proposed and Alternate Routes

An analysis of poverty rates aggregated along the proposed and alternate routes as compared to the five county study area indicates that concentrations of low-income residents are similar. The poverty rate for the five county study area is 14.7 percent. By comparison, the poverty rate is 12.6 percent along the proposed route, 12.5 percent along the first alternate route, and 12.4 percent along the second alternate route. None of the routes has a poverty rate that exceeds the 14.7 percent rate of the five county area.

As detailed above, there is one census block group through which the proposed and alternate routes extend that is an area of environmental justice concern based on low-income population. Census Block Group 1 of Census Tract 404 in Mayes County, Oklahoma, has a poverty rate that exceeds the county level by 10.2 percent. This block group is located at the terminus of the new 345-kV line, and all proposed and alternate routes extend through this block group. This area includes the GRDA Coal-Fired Complex, the AECI Chouteau Gas Plant, and the proposed 345/161-kV Chouteau Substation.

Because this block group has been identified as an area of environmental justice concern, a determination must be made as to whether the project impacts are disproportionately high and adverse to the low-income population in this area. Further evaluation of this environmental justice issue and a discussion of the potential socioeconomic impacts of this project are included in the following sections.

4.6.5 No Action

The No Action alternative would have no short- or long-term impacts to socioeconomics and environmental justice because no construction would occur. As the electrical load within KAMO's system grows, shortages of electric power, potentially leading to electrical brownouts and outages could result from the No Action alternative. This interrupted electrical service could have adverse effects on the use and enjoyment of the land by property owners in the project area.

4.6.6 Construction and Operation Impacts

The construction and operation activities associated with the proposed project would minimally impact socioeconomics in the project area. Construction of the transmission line and switching stations would provide minimal economic activity from the increase of construction workers in the area during the construction period. Most of the construction labor would be drawn from neighboring communities in the project area. Existing personnel will provide the operational and maintenance support for the new facilities. Increases in expenditures for local goods and services are expected to be minor and could provide some degree of short-term economic support to the local and regional economy. The proposed electric transmission line project may have a minor impact on the value of the property the new line would cross. Property owners will be compensated by KAMO for the encumbrance of the easement across their property.

Census Block Group 1 of Census Tract 404 in Mayes County, Oklahoma has been identified as an area of environmental justice concern based on the higher percentage of low-income residents that reside in this area. The corridor was not preferentially routed through this community because of the presence of low

income residents. Because the construction and operation impacts of this project are minimal, no disproportionately high or adverse environmental impacts to this low-income population would result.

4.6.7 Cumulative Impacts

As described above, the construction and operation activity associated with the proposed project would minimally impact socioeconomics in the immediate project area. In addition, the proposed and alternate routes are not disproportionately located in, or through, areas with a large minority population. One area, Census Block Group 1 of Census Tract 404 in Mayes County, Oklahoma, has a higher percentage of low-income residents as compared to the surrounding county and has been identified as an area of environmental justice concern. Existing electric facilities are currently located in this area. The project would not significantly change the character of this area nor would it result in any significant socioeconomic impacts to the low-income population in this area. Therefore, it can be concluded that the cumulative impacts of this project would not result in disproportionately high or adverse environmental effects on this low-income population.

4.7 RECREATION

4.7.1 No Action

The No Action alternative would have no short- or long-term impacts to recreation because no construction would occur.

4.7.2 Construction and Operation Impacts

As described in Section 2.6, several developed recreational facilities, such as, campgrounds or picnic areas, exist within the study area. However these facilities are not located within the proposed or alternate route corridors and, as result, these types of areas would not be affected by the construction or maintenance of the proposed project. Incidental hiking, and deer and small game hunting activities could occur within the study area and could be affected by the proposed project. However, such activities would take place on a case-by-case basis and any impact to these types of activities by the project transmission line would be temporary and minimal.

4.7.3 Cumulative Impacts

As described above, the proposed transmission line project would have minimal effects on incidental recreational activities that may occur within the study area. As a result, no significant cumulative impacts on recreational activities are expected by the proposed project.

4.7.4 Summary of Impacts to Recreation for Proposed and Alternate Routes

No developed recreational facilities are anticipated to be affected by the project. There would be no significant difference in impacts to recreation between the proposed and alternate routes.

4.8 WATER QUALITY

4.8.1 No Action

The No Action alternative would have no short-term or long-term impacts to water quality since no new construction would occur.

4.8.2 Construction and Operation Impacts

The proposed and alternate routes investigated for the proposed 345-kV and 161-kV transmission lines cross numerous streams in the study area. Table 4-6 identifies the creeks and streams traversed by each of these routes.

Table 4-6 Stream Crossings

Creeks	Alternate routes			Creeks	Alternate routes		
	Proposed	Alt. 1	Alt. 2		Proposed	Alt. 1	Alt. 2
Missouri				**Oklahoma cont.**			
Jasper County				*Mayes County Cont.*			
Pond Creek	X	X	X	Pryor creek	X	X	X
Kansas				Armstrong Branch			X
Cherokee County				Benge Branch			X
Taylor Branch	X	X	X	Wolf Creek			X
Cow Creek	X	X	X	Granny Creek			X
Brush creek	X	X	X	Elm Creek			X
Long Branch	X	X	X	*Craig County*			
Little Shawnee Creek	X	X	X	Mustang Creek			X
Shawnee Creek	X	X	X	Locust Creek			X
Bitter Creek		X		Coal Creek			X
Willow Creek		X		Cow Creek			X
Tar Creek		X		Mud Creek	X	X	X
Fly Creek	X		X	Little Cabin Creek	X	X	
Oklahoma				Whiskey Branch Creek	X	X	
Ottawa County				Shawnee Creek			X
Fourmile Creek	X	X	X	Big Cabin Creek	X	X	
Squaw Creek	X	X	X	West Fork Big Cabin Creek	X	X	
Elm Creek			X	Pawpaw Creek	X	X	
Mayes County				Pecan Creek	X	X	
Rock Creek	X	X	X	White Oak Creek	X	X	
Sulphur Creek	X	X	X				

The proposed project could potentially impact water quality within the study area from the use of herbicides during maintenance operations associated with the proposed transmission line ROW. Herbicide application would be accomplished according to label directions by a licensed professional to guard against contamination of water resources within the proposed study area. The weather would be monitored to ensure conditions were favorable for application. In addition, contractors would perform the following to reduce impacts to water resources within the study area:

- Apply herbicides a minimum of 30 feet from lakes, ponds, wetlands, perennial or intermittent springs, seeps, or streams
- Apply herbicides a minimum of 100 feet from any public or domestic water source
- Mix, load, or clean herbicides approximately 200 feet from any open water, or public or domestic water source

These measures would reduce or eliminate the potential for adverse impacts due to the use of herbicides.

Construction and operation of the project would minimally impact surface water features along the transmission line route. All streams crossed by the proposed and alternate routes are narrow enough that they could easily be spanned with normal spacing of the structures. Short-term, minor water quality impacts may occur during the construction of the proposed project. These impacts would be associated with the soils from disturbed areas being washed by storm water into adjacent waters during rainstorm events. Increased turbidity and localized sedimentation of the stream bottom may occur from the runoff. However, these impacts would be temporary and would not significantly alter water quality conditions. Additionally, mitigation measures proposed in Section 5.0 would prevent or minimize these water quality impacts. The construction and maintenance of the transmission line would not disturb any subsurface waters.

4.8.3 Cumulative Impacts

The sediment load caused by the proposed project on the surface water is expected to be negligible, given the mitigation measures described in Section 5.0. Herbicides used on the proposed transmission line ROW are not expected to leach into the groundwater or run off into surrounding surface water in significant amount. Additionally, infrequent herbicide application in small quantities for managing vegetation within the ROW is not expected to incrementally impact water resources in the study area. Therefore, cumulative impacts on the water resources of the study area are not expected from the construction and operation of the proposed transmission line.

4.8.4 Summary of Impacts to Water Quality for Proposed and Alternate Routes

Impacts to water quality for any of the proposed or alternate routes would be short-term, relating to construction activities and the potential for sedimentation in local streams. During operation, run-off from herbicide application could occur. However, measures would be taken to minimize these impacts so as not to significantly affect water quality. In comparing the extent of these short-term impacts to water quality between the proposed and alternate routes, the number of stream crossings can be used as a basis for comparison. The total number of stream crossings would be the lowest for the proposed route, or twenty-two crossings. There would be twenty-five stream crossings for both the first alternate and second alternate routes.

4.9 WETLANDS

4.9.1 No Action

The No Action alternative would have no short- or long-term impacts to wetlands since no new construction would occur.

4.9.2 Construction and Operation Impacts

As described in Section 2.10, the proposed and alternate routes for the proposed transmission line traverse wetland areas associated with the numerous creeks and streams as well as a few small isolated ponds and wetlands. Wetland communities occurring within the study area are primarily associated with lakes, drainage ways, and small ponds providing water for livestock. According to NLCD maps for the study the proposed, first alternate, and second alternate routes would have 5.40 acres, 3.54 acres, and 5.40 acres of wetlands respectively within their ROWs. The types of wetlands found in the study area include emergent wetlands, forested/shrub wetlands, and riverine systems.

The proposed project would not result in the placement of support structures in wetlands. The wetlands within the ROW will be spanned and the poles will be located outside of the wetlands. KAMO would implement BMPs to protect the wetlands from sedimentation, combined with other mitigation measures to prevent the herbicides from leaching into the wetlands. Additionally, no construction equipment or vehicles would be permitted within the wetland areas. The clearing of forested wetlands may occur, however KAMO will comply with the COE and will obtain necessary permitting including a 404 permit required for this activity.

No wetlands depicted on the NLCD maps are located at either of the proposed substation sites and none of the soils located at these sites are recognized as being hydric. Therefore, no impacts to wetlands from the construction and operation of the proposed transmission line or the substations are expected.

4.9.3 Cumulative Impacts

Cumulative impacts on the identified wetland areas caused by the proposed transmission line and substations are not expected. No other reasonably foreseeable actions are planned that would affect wetlands in the corridor. The wetlands will be spanned and poles will be located outside of the wetland boundaries. Clearing of forested wetlands may occur, but is expected to be minimal and will be addressed as part of the 404 permit.

4.9.4 Summary of Impacts to Wetlands for Proposed and Alternate Routes

There are 5.40 acres of wetlands in the proposed route ROW, 3.54 acres within the first alternate ROW, and 5.40 acres within the second alternate ROW. Support structures would not be placed in wetland areas for any of the proposed or alternate routes. Forested wetlands could potentially be cleared from the ROW given that required approvals and permits are obtained.

4.10 FLOODPLAINS

4.10.1 No Action

The No Action alternative would have no short- or long-term impacts to floodplains since no new construction would occur.

4.10.2 Construction and Operation Impacts

All of the proposed and alternate routes for the new transmission line traverse floodplain areas associated with numerous creeks and streams, including the Neosho River. All of the alternate routes investigated are located generally perpendicular to the waterways identified in Sections 2.9 and the floodplain areas extend all along the river and creeks. As a result, it would not be practicable to avoid crossing the floodplain areas by routing around them, which would add unreasonably to the length and construction costs of the line.

The proposed transmission line would not have any adverse impacts on the identified floodplain areas. The narrow width of the floodplains at the proposed crossings for each of the alternate routes would allow the transmission line to generally span the majority of the floodplain areas, avoiding the placement of support structures within these areas. However, a few of the identified floodplain areas may not be able to be spanned because of engineering design constraints; and the placement of structures within the floodplains may be unavoidable. The proposed support structures would be pole type structures that would have essentially no impact on flood flows or levels.

4.10.3 Cumulative Impacts

Because of the narrow width of the floodplains crossed, most streams will be spanned by the transmission line, and the pole type structures proposed are not expected to have any impacts on the floodplain. Cumulative effects from the placement of the proposed project within the floodplain areas are not expected.

4.10.4 Summary of Impacts to Floodplains for Proposed and Alternate Routes

There are not expected to be any impacts to floodplains as a result of the project. There would be no significant difference in impacts to floodplains between the proposed and alternate routes.

4.11 SOILS

4.11.1 No Action

The No Action alternative would have no short- or long-term impacts to soils because no construction would occur.

4.11.2 Construction and Operation Impacts

The proposed and alternate routes cross several different soil associations in the project area. Construction and operation activities associated with the project could adversely affect these soils. Potential impacts include soil erosion, loss of soil productivity, and the establishment of noxious weeds on the soil surface. Construction activities, such as vegetation clearing, trenching, grading, topsoil segregation, and back filling, may also increase erosion potential by destabilizing the soil surface. Soil compaction can result from the movement of heavy construction vehicles along the routes. The degree of compaction would depend on the moisture content and texture of the soil. These impacts would be short-term in nature and minimized as much as possible. Furthermore, the majority of soils throughout the proposed and alternate routes have been previously disturbed by agricultural activities such as tilling, so no additional impacts are anticipated in these areas.

As presented in Section 2.12, prime or otherwise important farmland soils are found throughout large percentages of the counties in the study area. Prime soils account for 48 percent of the acreage in Mayes County, 63 percent of Craig County, 54 percent of Ottawa County, 42 percent of Delaware County, 85 percent of Cherokee County, and 81 percent of Jasper County. Given this, the proposed and alternate routes investigated for the proposed project likely traverse some of these prime or important soils.

The construction activities associated with the proposed project could have short-term effects on prime and important farmland soils depending upon the time of year that construction takes place. Some of

these types of soils could be temporarily lost to production for one growing season due to the nature of the construction activity and the ingress and egress of construction equipment and vehicles. However, after construction is complete, the majority of these types of soils would be returned to production because KAMO has a policy of allowing agricultural practices within its ROWs as long as they do not interfere with, or jeopardize, the operation of its lines. The long-term impact to prime and important farmland soils would be minimal. Approximately 10.6 miles of the proposed route, 10.5 miles of the first alternate route and 23.4 miles of second alternate route would involve the building of a transmission line alongside existing ROWs. Additionally, prime and important farmland soils would only be permanently lost to agricultural practices in the immediate vicinity of the transmission line support pole locations within the proposed ROW; this represents a very small amount of the total ROW. As a result of this project a minimal amount of prime farmland would be taken out of production.

The soils at the proposed sites for the Blackberry and Chouteau Substations are not considered prime or statewide important farmland soils. Therefore, no impact to prime or important farmland soils is expected.

4.11.3 Cumulative Impacts

The proposed transmission project is not expected to have any cumulative effects on prime and important farmland soils because of the relatively small amount that would be taken out of production.

4.11.4 Summary of Impacts to Soils for Proposed and Alternate Routes

Disturbance during construction may occur with erosion, sedimentation, and soil compaction by heavy construction impact. There would be no significant difference in impacts to soils between the proposed and alternate routes.

4.12 TRANSPORTATION

4.12.1 No Action

The No Action alternative would have no short- or long-term impacts to transportation because no construction would occur.

4.12.2 Construction and Operation Impacts

The construction of the proposed new transmission line and substations are not expected to impact transportation taking place within the project area. The proposed alternative would cross approximately 11 primary roads, which include both state highways and U.S. highways, as well as crossing numerous (98) local roads. The first alternate route would cross approximately 11 primary roads, and 90 local roads

and the second alternate route would cross approximately 12 primary roads and 99 local roads. The construction of the transmission line could minimally increase traffic within the project area through the movement of construction vehicles along the proposed route. However, this increase in traffic would be temporary and normal conditions would return upon completion of the construction activities. Maintenance of the proposed project is not expected to impact traffic flows or patterns within the project area. However, line maintenance at crossing locations could cause temporary delays if maintenance vehicles are present.

The construction of the proposed project could have a temporary impact on transportation in the project area through temporary road or lane closures. During the construction of the proposed line, the electrical conductors would be strung on the support structures using a pulley system, or with a tensioner mounted on the back of a digger/derrick truck. At the proposed transmission line crossings some of the roads or lanes may be temporarily closed for safety purposes during the stringing of the electrical conductor onto the support structures. These closures could range in duration from a few minutes to hours based on the width of the road and the complexity of the crossing. These temporary closings are not expected to have any significant impacts on the transportation in the area because of the generally low level of traffic on most area roads and once the aerial crossing is completed the road would be reopened, the traffic flows and patterns would return to normal. KAMO would coordinate the proposed transmission line construction with each state Department of Transportation and secure all the required permits for the road and highway crossings prior to construction. Appropriate traffic controls will be implemented for motorist and construction crew safety and to maintain safe traffic flow.

The construction of the proposed Blackberry and Chouteau Substations could slightly increase traffic along State Route H in Missouri and Highway 412B in Oklahoma, respectively, through the ingress and egress of construction vehicles and personnel at the proposed Substation sites. This increase in traffic would be temporary and minimal, traffic flows would return to normal once construction of the substation is complete. Maintenance inspections of the substations would involve the ingress and egress of a small truck carrying one to two persons once every one to two months and are not expected to impact transportation in the area.

4.12.3 Cumulative Impacts

As described above, the proposed transmission line and substations included with this project are expected to have minimal temporary effects on transportation within the study area. As a result, the project would not have any cumulative effects on transportation.

4.12.4 Summary of Impacts to Transportation for Proposed and Alternate Routes

Impacts to transportation would primarily consist of temporary traffic delays or road closures during construction. Delays or closures would be short-term in nature, and all applicable permits would be obtained prior to such activities. In comparing the extent of these short-term impacts between the proposed and alternate routes, the number of road crossings can be used as a basis for comparison. The total number of road crossings would be the lowest for the second alternate route, or 101 crossings. There would be 108 road crossings for the proposed route and 110 for the first alternate route.

4.13 HEALTH & SAFETY

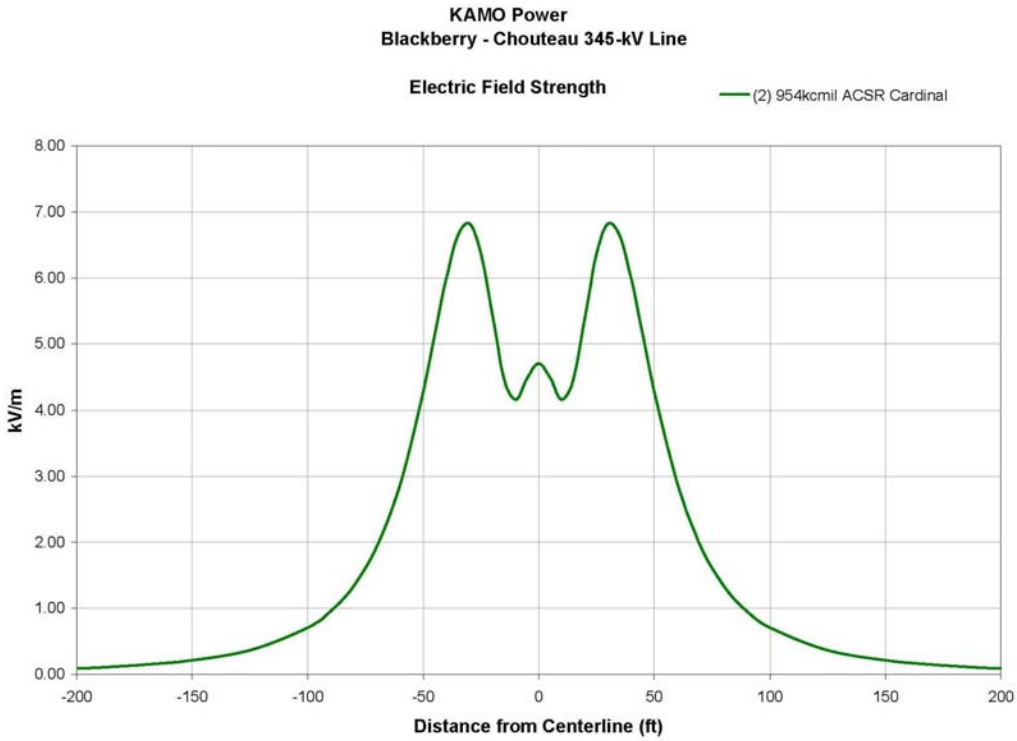
4.13.1 No Action

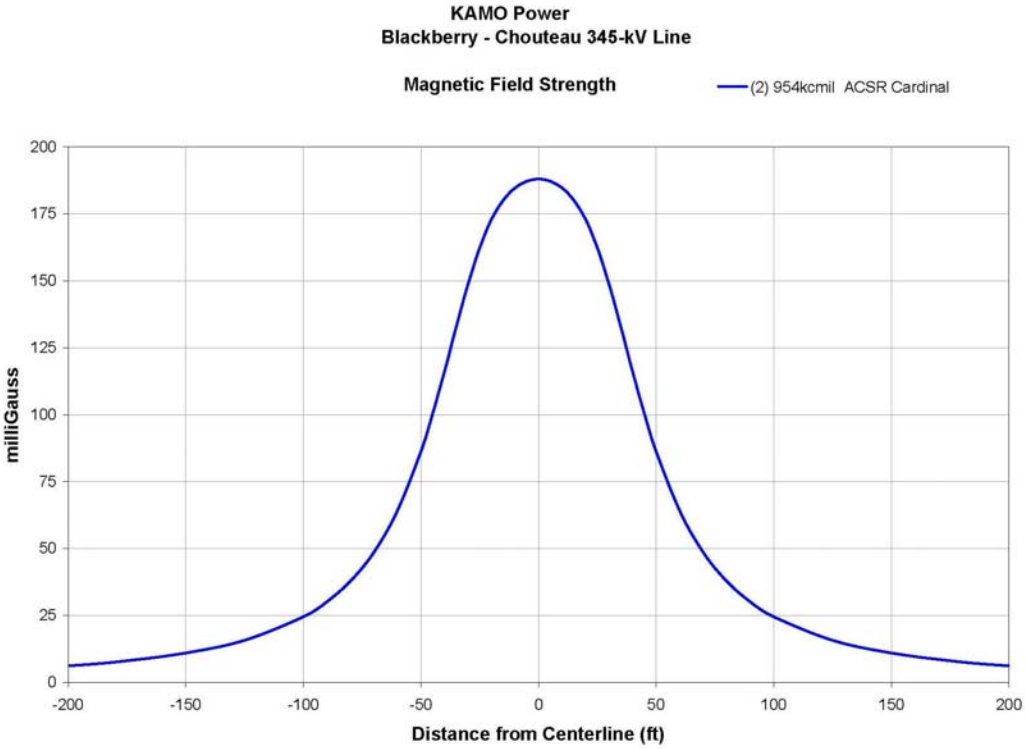
The No Action alternative would have no impacts on the health and safety of construction workers because no construction would occur. However, the No Action alternative could have an impact on the health and safety of the public by contributing to potential interruption in electrical service for consumers living within KAMO's service area. Interruptions in electric service caused by power outages could interrupt the operation of traffic signals, elevators, emergency lighting, medical life support equipment and healthcare operations, possibly resulting in injury or death. Potential electrical brownouts could cause ill effects, such as pneumonia, to individuals living in the project area, or potentially death in the event of an extended power outage during periods of freezing weather. The public could also be affected in times of severe heat during episodes of electric power brownouts and outages. Very small children, the elderly, and those individuals sensitive to heat could suffer from the effects of heatstroke or even death should outages occur during periods of extreme heat.

4.13.2 Electric and Magnetic Fields (EMF)

Any energized conductor (power lines, all electrical equipment, and wiring) will produce EMFs which consists of invisible fields of force which arise due to the flow of electricity and voltage on a line. As stated in the EA by the City of Marshall, Minnesota (2007) and the EIS for Tucson Electric Power Company (Department of Energy 2005) the amount of exposure a person experiences varies throughout a day due to fields from common household appliances. According to the American Transmission Company (2005) and the Gilpin Group (2007) an important characteristic of both electric and magnetic fields is that their strength diminishes as one moves away from the source (Figure 4-2). The electric fields are produced by voltage and increase as voltage increases. Electric fields can be easily blocked by objects like trees, walls and skin. When current flows through a wire it produces magnetic fields. Unlike electric fields, magnetic fields cannot be blocked.

Figure 4-2 Electric and Magnetic Fields





The studies done in regards to EMF research fall into the categories of epidemiology, laboratory animals, and cellular research. The laboratory studies done on animals and cells have not substantiated the relationship between EMF and health issues (Hawkins 1999). The epidemiological research that has been done has mix results. Some epidemiological experiments have concluded that there is a correlation between health effects and EMF, however epidemiological studies alone are considered insufficient for concluding that a cause and effect relationship exists. "No single study or type of study is able to address all questions about what may affect our health. A number of epidemiological, laboratory, and cell/tissue studies must be considered together because the strengths of one type of study tend to balance the limitations of the other types of studies" (National Grid 2003).

Several EMF Scientific review committees have been convened by the US Congress and by federal and international health agencies to review and evaluate the extensive historical body of scientific literature on EMF effects and to draw conclusions (Minnesota Environmental Quality Board 2005). In 1999 a press release the National Institute of Environmental Health Sciences stated that after six years of congressional sponsored research "The overall scientific evidence for human health risk from EMF exposure is weak" (NIEHS 2002). According to the book Possible Exposure to Residential Electric and Magnetic Fields quoted in EA for XCEL Energy in the same year the National Academy of Science report from its National Research Council found after examining 500 studies that there was "No clear, convincing evidence exists to show that residential exposures to electric and magnetic fields (EMF) are a threat to human health" and "there is no conclusive evidence that electromagnetic fields play a role in the development of cancer, reproductive and developmental abnormalities, or learning and behavioral problems" (Minnesota Environmental Quality Board 2005). Given the distance of the transmission line from most residences and the lack of scientific evidence for any impacts, this project would have no effect on public health and safety.

Cell Phone, Radio and TV Interference

For high-voltage and extra-high-voltage transmission lines, the electric field attains its maximum strength at the surface of the conductors. The electric field in a line is concentrated wherever surface irregularities occur. These irregularities include dirt, insects, bird droppings, water droplets, loose hardware, scrapes and nicks. At these concentrated locations, the field strength may be great enough that the air becomes ionized and a partial spark discharge between the conductor and the surrounding air takes place. This phenomenon is called corona. The greatest corona activity occurs during rain when each clinging raindrop acts as an individual corona source

Radio Interference and Television Interference (TVI) occur usually during periods of rainy weather. Usually the residences that are affected by interference are those that are in very close proximity to the transmission line. The AM broadcast broadband on the radio is affected more by corona-generated electromagnetic interference than the FM broadband or TV reception. The FM broadband and television systems are rarely a problem especially when there is a good signal quality in the area before the transmission line is built. "Corona-caused TVI occurs during foul weather and is generally of concern for transmission lines with voltages of 345-kV or above, and only for conventional receivers within about 600 ft. (183 m) of a line" (T. Dan Bracken, Inc). Television systems that operate at higher frequencies such as satellite receivers are not affected by interference. Similarly cable television systems are unaffected.

Livestock

To test for adverse affects on livestock scientists study animals which are continuously exposed to EMF fields from transmission lines in relatively controlled conditions. Studies have focused on grazing animals such as sheep and cows, which have been exposed to high-voltage transmission lines. According to Bonneville Power Administration 2006 Project studies of animal reproductive performance, behavior, melatonin production, immune function, and navigation have found minimal or no effects of EMF. Occasionally utility companies receive reports that livestock illness and death were related to nearby transmission lines. Typically no evidence is found to substantiate the report when investigated and the owners questioned (Bonneville 1989).

4.13.3 Summary of Impacts to Health and Safety for Proposed and Alternate Routes

No potential impacts are expected as a result of the project to humans or livestock. There would be no significant difference in impacts to health and safety between the proposed and alternate routes.

4.14 CULTURAL RESOURCES

During the routing process all known historical and archaeological resources were avoided to the extent possible. Data provided by the GLO maps and SHPOs were used to locate these resources. Impacts to these resources would be minimal because transmission lines and other development already occur in proximity to the majority of these sites.

Additional cultural resource issues may arise when further consultation with the SHPOs is initiated upon approval of a route by the RUS. If any cultural resources are discovered during construction, KAMO

would stop construction at that location and immediately notify the SHPO. KAMO would coordinate with the corresponding SHPOs to implement appropriate measures to protect any discovered resources.

Kansas

No historic or cultural sites are located within 500 feet of the proposed and alternate routes.

Missouri

No historic or cultural sites are located within 500 feet of the proposed and alternate routes.

Oklahoma

Several cultural resources sites are located within the study area and four are eligible for or listed on the NRHP. However, none of the NRHP sites and only two unevaluated sites occur within 500 feet of the proposed and alternate routes. These sites are located along segments 46 and 47 of all the proposed and alternate routes. Both of these unevaluated sites are located near an existing transmission line that the proposed route would parallel. Preliminary site investigations did not reveal any structures in the area of the proposed and alternate routes. Based on comments received at the public meetings, another site may be located along segment 7 of the first alternate route. However, this site is not currently listed on the State or Federal Register of Historic Places and did not show up during background research at the SHPO.

4.14.1 No Action

The No Action alternative would have no short- or long-term impacts to cultural resources because no construction would occur.

4.14.2 Construction and Operation Impacts

Recorded archaeological sites can assist the researcher in evaluating the probability of sites in a given topographic study area. Much of the proposed construction corridor in Oklahoma has not been extensively studied. Stream crossings are generally considered to be high probability areas for archaeological sites, terraces and bluffs above water often provide shelter for campsites or more extensive villages. Other functional archaeological sites, such as cemeteries, hunting locales, and quarries may be located as appropriate given the topography in the area.

During the routing process, all known historical and archeological resources were avoided to the extent possible. Based on research in Kansas, Missouri, and Oklahoma, as presented above in Section 2.12, two sites that are listed as unevaluated occurred within 500 feet of the proposed or alternate routes. A survey of the Oklahoma SHPO database showed one of these sites within 500 feet of segment 46, and one within

500 feet of segment 47 on the Chouteau quadrangle. However, impacts to cultural resources are not expected. Site investigations did not reveal any structures in the area of the proposed route or Substation site. According to the Chouteau Quadrangle map, the locations of the sites are near existing transmission ROW. None of the known cultural resources will be directly affected by the new transmission line.

Additional cultural resource issues may arise prior to or during construction. If any resources are discovered during construction KAMO would stop construction at that location and immediately notify the appropriate SHPO. KAMO would coordinate with the SHPO to implement appropriate measures to protect any discovered resources.

4.14.3 Cumulative Impacts

As described above, the proposed project is expected to have no impacts on cultural resources within the study area. As a result, the project would not have any cumulative effects on cultural resources.

4.14.4 Summary of Impacts to Cultural Resources for Proposed and Alternate Routes

The project would not impact cultural resources because any sites that may occur can generally be avoided or spanned. There would be no significant difference in impacts to cultural resources between the proposed and second alternate route. However, based on information collected at the public meetings, one not recorded historic site may be located within the corridor of the first alternate route.

4.15 VISUAL CHARACTER

Transmission lines and substations alter the visual landscape. Visual impacts, to a certain extent, differ according to an individual's values.

4.15.1 No Action

The No Action alternative would have no short- or long-term impacts to the visual character of the study area because no construction would occur.

4.15.2 Construction and Operation Impacts

The construction of the proposed transmission line is not expected to impact the visual character of the project area. The proposed and alternate routes would be supported by weathering steel structures that would aid in blending the line into the surrounding background. In addition, approximately 10.5 miles of the proposed route would be located next to existing electric transmission line ROW but would not involve rebuilding and replacement of the existing electric transmission line. The potential visual impact of the sections of the proposed line that would parallel existing electric transmission lines would also be

somewhat mitigated by the visual impact which the existing lines currently have on the area. Additionally, the proposed line would extend through rural areas and would not be located in the immediate vicinity of any concentrated residential development. As a result, the proposed line would not be readily visible from such development. The proposed line would be visible in areas, but would not have any impact of the visual quality of the area due to the number of existing transmission lines in the area around the AECI and GRDA plants. Elsewhere, there are no sensitive viewsheds affected by the proposed or alternate corridors.

The proposed Blackberry Substation is removed from the roads in the area and would not be readily visible from any roads. The proposed site for the substation is located in a rural area and would not be visible from any concentrated residential development. This is also true for the Chouteau Substation. The Chouteau Substation will be located in a rural area and would not be visible from any concentrated residential development. Additionally, the proposed Chouteau Substation site is located in the intersection of several existing electric transmission lines. The two new substations would not have an impact on the visual quality of the area. Transmission lines are already a common component of the existing landscape.

4.15.3 Cumulative Impacts

As described above, the construction and operation activity associated with the proposed project would have a very minor impact on the visual character in the immediate project impact area. Therefore, no cumulative effects to visual resources would be expected as a result of the proposed action.

4.15.4 Summary of Impacts to visual character for Proposed and Alternate Routes

The construction of the proposed transmission line is not expected to impact the visual character of the project area. There would be no significant difference in impacts to visual character between the proposed and alternate routes.

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5.0 MITIGATION MEASURES

As described in the previous section (Section 4.0), KAMO would be implementing numerous mitigation measures to aid in minimizing the potential environmental impacts arising from the construction and operation of the proposed electric transmission project. The following list provides a summary of the mitigation measures that KAMO would implement:

- Revegetate disturbed areas with native grasses and other flowering plants to minimize the grassland habitat disturbance
- Use proper erosion control measures for all areas with soil disturbance; accomplish construction in compliance with the National Pollutant Discharge Elimination System (NPDES) Permit for Storm water Discharges from Construction Activities issued by each state; develop, implement, and maintain BMPs included in the Stormwater Pollution Prevention Plan (SWPPP)
- Use silt fences or berms to prevent siltation of water bodies near waterways and wetlands
- Promptly stabilize disturbed areas after construction has been completed with grasses or mulch
- Use topsoil removed during construction as fill or spread over the non-paved areas after construction is completed
- Obtain all necessary construction permits from the appropriate federal, state, and local governments prior to construction
- Schedule construction mainly between the hours of 7:00 a.m. and 10 p.m. to minimize noise impacts to nearby residences unless it becomes necessary to meet scheduling constraints
- Design project to retain the natural drainage patterns on the site to the greatest extent possible; when this is not possible, reroute drainage to maintain the existing drainage patterns of the surrounding areas; facilitate infiltration, reduce the potential for erosion, and increase storm water runoff volumes using drainage systems that feature flat, shallow swales and ditches
- Apply herbicides a minimum of 30 feet from lakes, ponds, wetlands, perennial or intermittent springs, seeps, or streams
- Apply herbicides a minimum of 100 feet from any public or domestic water source
- Mix, load, or clean herbicides approximately 200 feet from any open water, or public or domestic water source
- Should any previously unknown historic/prehistoric sites or artifacts be encountered during construction, all land altering activities at that location will be suspended until such time that KAMO is notified and appropriate measures taken to assure compliance with the NHPA and enabling legislation

- Class III surveys shall be conducted along applicable access routes identified for the project prior to the initiation of project construction. These survey results will be submitted to the applicable SHPO and RUS for review and concurrence prior to the start of construction
- If consultation with the USFWS creates additional concerns for threatened or endangered species such as the American burying beetle, appropriate mitigation efforts such as surveying, trapping or baiting away will be implemented to address USFWS concerns
- If any problems are reported concerning radio or television interference during operation of the line, KAMO will investigate and implement appropriate corrective actions if interference is due to the line

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APPENDIX A – Prime Farmland Soils

Soil Types in Jasper County, Missouri

Soil Series	Acres	Farmland Classification
Barden silt loam, 1 to 3 percent slopes	20,604	All areas are prime farmland
Parsons silt loam, 0 to 1 percent slopes	8	All areas are prime farmland
Sylvania loam, 3 to 8 percent slopes	4,290	Farmland of statewide importance
Barco loam, 1 to 3 percent slopes	2,152	All areas are prime farmland
Eldorado silt loam, 1 to 3 percent slopes, very stony	7,178	Not prime farmland
Eldorado very gravelly silt loam, 3 to 8% slopes, very stony	29,091	Not prime farmland
Maplegrove silt loam, 1 to 3 percent slopes	80,849	All areas are prime farmland
Medoc silt loam, 0 to 1 percent slopes	5,730	All areas are prime farmland
Newtonia-Eldorado silt loams, 1 to 3 percent slopes	53,192	All areas are prime farmland
Newtonia-Eldorado silt loams, 1 to 3 percent slopes, moderately eroded	640	All areas are prime farmland
Opolis silt loam, 0 to 1 percent slopes	8,021	All areas are prime farmland
Opolis silt loam, 1 to 3 percent slopes	11,225	All areas are prime farmland
Opolis loam, 1 to 3 percent slopes, moderately eroded	1,058	All areas are prime farmland
Sylvania gravelly silt loam, 1 to 3 percent slopes	1,070	Farmland of statewide importance
Sylvania very gravelly silt loam, 3 to 8 percent slopes	2,078	Farmland of statewide importance
Sylvania loam, 8 to 15 percent slopes	2,454	Not prime farmland
Hepler silt loam, 0 to 3 percent slopes, frequently flooded	1,824	Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
Cherokee silt loam, 0 to 1 percent slopes	14,024	All areas are prime farmland
Carl silty clay loam, 0 to 1 percent slopes, rarely flooded	7,430	Prime farmland if drained
McCune silt loam, 0 to 1 percent slopes	2,826	All areas are prime farmland
Verdigris silt loam, 0 to 1 percent slopes, frequently flooded	8,633	Prime farmland if protected from flooding or not frequently flooded during the growing season
Hepler silt loam, 0 to 1 percent slopes, occasionally flooded	6,379	All areas are prime farmland
Osage silty clay loam, 0 to 2% slopes, occasionally flooded	720	Prime farmland if drained
Verdigris silt loam, 0 to 1% slopes, occasionally flooded	14,839	All areas are prime farmland
Creldon silt loam, 1 to 3 percent slopes	572	All areas are prime farmland
Hoberg silt loam, 2 to 5 percent slopes	429	Farmland of statewide importance
Tonti silt loam, 3 to 8 percent slopes	990	Farmland of statewide importance
Keeno gravelly silt loam, 3 to 8 percent slopes	641	Farmland of statewide importance
Crackerneck extremely gravelly silt loam, 8 to 15% slopes	267	Not prime farmland
Crackerneck extremely gravelly silt loam, 15 to 35% slopes	1,847	Not prime farmland
Crackerneck very gravelly silt loam, 3 to 8 percent slopes	1,199	Farmland of statewide importance
Goss extremely gravelly silt loam, 15 to 35% slopes, rocky	3,403	Not prime farmland
Hoberg-Eldorado-Pomme silt loams, 1 to 3 percent slopes	4,311	Farmland of statewide importance
Pomme silt loam, karst, 1 to 3 percent slopes	3,589	All areas are prime farmland
Pomme-Rueter complex, 1 to 3 percent slopes	16,819	Farmland of statewide importance
Rueter extremely gravelly silt loam, 8 to 15 percent slopes, very stony	27,027	Not prime farmland
Rueter very gravelly silt loam, 1 to 3 percent slopes	6,329	Farmland of statewide importance
Rueter very gravelly silt loam, 3 to 8 percent slopes	15,021	Farmland of statewide importance
Winnipeg silt loam, 1 to 3 percent slopes	5,352	All areas are prime farmland

Newtonia silt loam, 1 to 3 percent slopes	260	All areas are prime farmland
Bearthicket silt loam, 0 to 1% slopes, occasionally flooded	9,510	All areas are prime farmland
Gerald silt loam, 0 to 2 percent slopes	3,237	All areas are prime farmland
Pomme silt loam, 1 to 3 percent slopes	19	All areas are prime farmland
Captina silt loam, 1 to 3 percent slopes	163	All areas are prime farmland
Cedargap gravelly silt loam, 0 to 3 percent slopes, frequently flooded	14,628	Farmland of statewide importance
Pits-Quarries complex	687	Not prime farmland
Water	950	Not prime farmland
Borrow Pits	212	Not prime farmland
Miscellaneous Water	350	Not prime farmland
Landfill Pits	225	Not prime farmland
Pits & Dumps complex	5,869	Not prime farmland
Kanima very channery loam, 3 to 50 percent slopes	172	Not prime farmland
Total Acres	**410,393**	
Total Acres Prime Farmland	**330,661**	

Soil Types in Cherokee County, Kansas		
Soil Series	**Acres**	**Farmland Classification**
Hepler silt loam, frequently flooded	20,913	Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
Hepler silt loam, occasionally flooded	32,596	Prime farmland if drained
Lanton silt loam, occasionally flooded	6,110	Prime farmland if drained
Osage silty clay, occasionally flooded	9,802	Prime farmland if drained
Verdigris silt loam, occasionally flooded	3,039	All areas are prime farmland
Cherokee silt loam, 0 to 1 percent slopes	17,409	All areas are prime farmland
Bates loam, 1 to 3 percent slopes	19,849	All areas are prime farmland
Bates loam, 3 to 7 percent slopes	3,648	All areas are prime farmland
Bates-Collinsville complex, 3 to 15 percent slopes	4,463	Not prime farmland
Brazilton silty clay loam, 1 to 3 percent slopes	64	All areas are prime farmland
Catoosa silt loam, 0 to 1 percent slopes	2,621	All areas are prime farmland
Dennis silt loam, 1 to 3 percent slopes	93,529	All areas are prime farmland
Eram silty clay loam, 3 to 7 percent slopes	2,112	Farmland of statewide importance
Eram-Shidler silty clay loams, 4 to 15 percent slopes	1,352	Not prime farmland
Kanima silty clay loam, 2 to 15 percent slopes	6,629	Not prime farmland
Kanima silty clay loam, 15 to 50 percent slopes	13,586	Not prime farmland
Parsons silt loam, 0 to 1 percent slopes	85,557	All areas are prime farmland
Taloka silt loam, 0 to 1 percent slopes	18,380	All areas are prime farmland
Zaar silty clay, 0 to 1 percent slopes	5,395	All areas are prime farmland
Secesh silt loam, channeled	526	Not prime farmland
Secesh silt loam, rarely flooded	925	All areas are prime farmland
Bolivar-Hector complex, 5 to 15 percent slopes	3,415	Not prime farmland
Clarksville very cherty silt loam, 10 to 30 percent slopes	7,554	Not prime farmland
Gerald silt loam, 0 to 2 percent slopes	862	Farmland of statewide importance
Nixa cherty silt loam, 2 to 9 percent slopes	6,567	Not prime farmland

Tonti silt loam, 2 to 5 percent slopes	2,750	Farmland of statewide importance
Waben cherty silt loam, 2 to 5 percent slopes	1,680	Not prime farmland
Dumps, mine	3,199	Not prime farmland
Gravel pits and quarries	76	Not prime farmland
Miscellaneous water	295	Not prime farmland
Water	3,772	Not prime farmland
Total Acres	**378,675**	
Total Acres Prime Farmland	**325,561**	

Soil Types in Mayes County, Oklahoma

Soil Series	Acres	Farmland Classification
Bates loam, 1 to 3 percent slopes	3,209	All areas are prime farmland
Bates loam, 3 to 5 percent slopes	3,312	All areas are prime farmland
Bates-Collinsville complex, 1 to 5 percent slopes	17,941	All areas are prime farmland
Razort gravelly loam, 0 to 1 percent slopes, occasionally flooded	3,522	All areas are prime farmland
Captina silt loam, 1 to 3 percent slopes	1,440	All areas are prime farmland
Choteau silt loam, 0 to 1 percent slopes	7,901	All areas are prime farmland
Choteau silt loam, 1 to 3 percent slopes	5,217	All areas are prime farmland
Clarksville gravelly silt loam, 1 to 8 percent slopes	42,910	Not prime farmland
Clarksville stony silt loam, 5 to 20 percent slopes	6,893	Not prime farmland
Clarksville stony silt loam, 20 to 50 percent slopes	35,048	Not prime farmland
Collinsville loam, 5 to 30 percent slopes, extremely stony	16,419	Not prime farmland
Craig silt loam, 1 to 3 percent slopes	6,113	All areas are prime farmland
Craig silt loam, 3 to 5 percent slopes	2,512	All areas are prime farmland
Large dam	45	Not prime farmland
Dennis silt loam, 1 to 3 percent slopes	39,495	All areas are prime farmland
Dennis silt loam, 3 to 5 percent slopes	5,775	All areas are prime farmland
Dennis silt loam, 3 to 5 percent slopes, eroded	8,437	Not prime farmland
Eram-Verdigris complex, 0 to 15 percent slopes	15,495	Not prime farmland
Eldorado gravelly silt loam, 1 to 8 percent slopes	5,999	Not prime farmland
Elsah gravelly loam, 0 to 1 percent slopes, frequently flooded	4,651	Not prime farmland
Hector-Enders-Linker complex, 1 to 5 percent slopes	6,123	Not prime farmland
Hector-Enders complex, 5 to 20 percent slopes	17,725	Not prime farmland
Hector-Steprock-Rock outcrop complex, 20 to 50 percent slopes	6,363	Not prime farmland
Kanima gravelly silty clay loam, 1 to 30 percent slopes	320	Not prime farmland
Lenapah silty clay loam, 0 to 3 percent slopes	4,900	Not prime farmland
Lenapah-Rock outcrop complex, 1 to 8 percent slopes	8,093	Not prime farmland
Lula silt loam, 1 to 3 percent slopes	4,542	All areas are prime farmland
Miscellaneous water	512	Not prime farmland
Mayes silty clay loam, 0 to 1 percent slopes	6,457	Not prime farmland
Nixa gravelly silt loam, 0 to 3 percent slopes	13,175	All areas are prime farmland
Okemah silt loam, 0 to 1 percent slopes	836	All areas are prime farmland
Osage silty clay loam, 0 to 1 percent slopes, occasionally flooded	608	Not prime farmland
Parsons silt loam, 0 to 1 percent slopes	34,958	All areas are prime farmland
Pits	1,495	Not prime farmland
Quarles silt loam, 0 to 1 percent slopes, occasionally flooded	10,878	Not prime farmland

Riverton loam, 1 to 3 percent slopes	3,277	All areas are prime farmland
Riverton gravelly loam, 1 to 5 percent slopes	5,137	All areas are prime farmland
Britwater silt loam, 1 to 3 percent slopes	8,371	All areas are prime farmland
Summit silty clay loam, 0 to 1 percent slopes	3,495	All areas are prime farmland
Summit silty clay loam, 1 to 3 percent slopes	9,933	All areas are prime farmland
Summit silty clay loam, 3 to 5 percent slopes	3,418	All areas are prime farmland
Taloka silt loam, 0 to 1 percent slopes	23,076	All areas are prime farmland
Urban land	650	Not prime farmland
Verdigris silty clay loam, 0 to 1% slopes, occasionally flooded	6,559	All areas are prime farmland
Verdigris silty clay loam, 0 to 1 percent slopes, frequently flooded	5,089	Not prime farmland
Water	18,963	Not prime farmland
Total Acres	**437,287**	
Total Acres Prime Farmland	**213,214**	

Soil Types in Ottawa County, Oklahoma

Soil Series	Acres	Farmland Classification
Osage-Verdigris complex, 0 to 1 percent slopes, frequently flooded	2,886	Not prime farmland
Bates loam, 1 to 3 percent slopes	1,775	All areas are prime farmland
Bates loam, 3 to 5 percent slopes	3,756	All areas are prime farmland
Bates loam, 3 to 5 percent slopes, eroded	1,149	Not prime farmland
Coweta-Bates complex, 1 to 5 percent slopes	1,933	Not prime farmland
Macedonia silt loam, 1 to 3 percent slopes	2,509	All areas are prime farmland
Macedonia silt loam, 3 to 5 percent slopes	437	All areas are prime farmland
Clarksville gravelly silt loam, 0 to 3 percent slopes	5,288	Not prime farmland
Clarksville very gravelly silt loam, 1 to 8 percent slopes	33,726	Not prime farmland
Clarksville stony silt loam, 12 to 50 percent slopes	38,862	Not prime farmland
Eram-Verdigris complex, 0 to 20 percent slopes	6,280	Not prime farmland
Choteau silt loam, 0 to 1 percent slopes	1,995	All areas are prime farmland
Choteau silt loam, 1 to 3 percent slopes	4,252	All areas are prime farmland
Collinsville stony loam, 3 to 20 percent slopes	2,633	Not prime farmland
Craig silt loam, 1 to 3 percent slopes	6,216	All areas are prime farmland
Craig silt loam, 3 to 5 percent slopes	2,020	All areas are prime farmland
Dennis silt loam, 0 to 1 percent slopes	970	All areas are prime farmland
Dennis silt loam, 1 to 3 percent slopes	40,459	All areas are prime farmland
Dennis silt loam, 3 to 5 percent slopes	635	All areas are prime farmland
Dennis silt loam, 3 to 5 percent slopes, eroded	1,274	Not prime farmland
Dumps	5	Not prime farmland
Eldorado gravelly silt loam, 1 to 8 percent slopes	5,167	Not prime farmland
Waben gravelly silt loam, 3 to 8 percent slopes	2,721	Not prime farmland
Britwater silt loam, 0 to 3 percent slopes	5,668	All areas are prime farmland
Razort gravelly silt loam, 0 to 1 percent slopes, frequently flooded	2,150	Not prime farmland
Healing silt loam, 0 to 1 percent slopes, occasionally flooded	7,139	All areas are prime farmland
Wynona silty clay loam, 0 to 1 percent slopes, frequently flooded	1,030	Not prime farmland
Captina silt loam, 0 to 1 percent slopes	1,503	All areas are prime farmland
Lightning silt loam, 0 to 1 percent slopes, occasionally flooded	1,497	All areas are prime farmland
Miscellaneous water	91	Not prime farmland

Kanima gravelly clay loam, 1 to 30 percent slopes	5,224	Not prime farmland
Newtonia silt loam, 1 to 3 percent slopes	3,809	All areas are prime farmland
Newtonia silt loam, 3 to 5 percent slopes	594	All areas are prime farmland
Newtonia silt loam, 3 to 5 percent slopes, eroded	809	Not prime farmland
Newtonia-Shidler complex, 1 to 8 percent slopes	776	Not prime farmland
Osage silty clay, 0 to 1 percent slopes, occasionally flooded	11,659	Not prime farmland
Parsons silt loam, 0 to 1 percent slopes	20,342	All areas are prime farmland
Parsons silt loam, 1 to 3 percent slopes	9,965	All areas are prime farmland
Parsons silt loam, 1 to 3 percent slopes, eroded	1,092	Not prime farmland
Pits	138	Not prime farmland
Riverton gravelly loam, 3 to 5 percent slopes	1,076	All areas are prime farmland
Apperson silty clay loam, 1 to 3 percent slopes	1,393	All areas are prime farmland
Taloka silt loam, 0 to 1 percent slopes	41,972	All areas are prime farmland
Verdigris silt loam, 0 to 1 percent slopes, occasionally flooded	7,598	All areas are prime farmland
Water	9,375	Not prime farmland
Mayes silty clay loam, 0 to 1 percent slopes	6,035	Not prime farmland
Mayes silty clay loam, 1 to 3 percent slopes	1,717	Not prime farmland
Total Acres	**309,600**	
Total Acres Prime Farmland	**167,580**	

Soil Types in Craig County, Oklahoma

Soil Series	Acres	Farmland Classification
Bates loam, 1 to 3 percent slopes	1,047	All areas are prime farmland
Bates loam, 3 to 5 percent slopes	15,194	All areas are prime farmland
Bates loam, 3 to 5 percent slopes, eroded	3,743	Not prime farmland
Bates-Collinsville complex, 1 to 5 percent slopes	8,785	All areas are prime farmland
Apperson silty clay loam, 1 to 3 percent slopes	22,853	All areas are prime farmland
Pharoah silt loam, 0 to 1 percent slopes	886	Not prime farmland
Cherokee silt loam, 0 to 1 percent slopes	2,128	All areas are prime farmland
Choteau silt loam, 0 to 1 percent slopes	4,494	All areas are prime farmland
Choteau silt loam, 1 to 3 percent slopes	4,936	All areas are prime farmland
Catoosa silt loam, 1 to 5 percent slopes	5,191	All areas are prime farmland
Clarksville stony silt loam, 5 to 12 percent slopes	2,992	Not prime farmland
Clarksville very gravelly silt loam, 1 to 8 percent slopes	3,134	Not prime farmland
Collinsville-Vinita complex, 2 to 30 percent slopes	39,892	Not prime farmland
Craig silt loam, 1 to 3 percent slopes	7,065	All areas are prime farmland
Dennis silt loam, 1 to 3 percent slopes	98,041	All areas are prime farmland
Dennis silt loam, 3 to 5 percent slopes	5,075	All areas are prime farmland
Dennis silt loam, 3 to 5 percent slopes, eroded	11,800	Not prime farmland
Dennis silty clay loam, 3 to 5 percent slopes, severely eroded	1,078	Not prime farmland
Eldorado stony silt loam, 1 to 8 percent slopes	3,897	Not prime farmland
Eldorado silt loam, 3 to 5 percent slopes	2,990	All areas are prime farmland
Hector-Bolivar complex, 1 to 5 percent slopes	7,727	Not prime farmland
Hector-Bolivar complex, 5 to 20 percent slopes	10,435	Not prime farmland
Lenapah silty clay loam, 0 to 3 percent slopes	4,644	Not prime farmland
Lightning-Healdton complex, 0 to 1% slopes, occasionally flooded	6,008	All areas are prime farmland

Bolivar fine sandy loam, 1 to 3 percent slopes	1,277	All areas are prime farmland
Bolivar fine sandy loam, 3 to 5 percent slopes	1,104	All areas are prime farmland
Bolivar fine sandy loam, 3 to 5 percent slopes, eroded	392	Not prime farmland
Lula silt loam, 1 to 3 percent slopes	8,818	All areas are prime farmland
Lula silt loam, 3 to 5 percent slopes	415	All areas are prime farmland
Miscellaneous water	47	Not prime farmland
Kanima gravelly clay loam, 1 to 30 percent slopes	5,630	Not prime farmland
Nixa gravelly silt loam, 0 to 3 percent slopes	483	All areas are prime farmland
Apperson silty clay loam, 0 to 1 percent slopes	1,911	All areas are prime farmland
Osage silty clay loam, 0 to 1 percent slopes, occasionally flooded	2,837	Not prime farmland
Mayes silty clay loam, 0 to 1 percent slopes	8,136	Not prime farmland
Parsons silt loam, 0 to 1 percent slopes	35,529	All areas are prime farmland
Radley silt loam, 0 to 1 percent slopes, occasionally flooded	9,895	All areas are prime farmland
Britwater silt loam, 0 to 3 percent slopes	867	All areas are prime farmland
Britwater silt loam, 3 to 8 percent slopes	362	Not prime farmland
Razort silt loam, 0 to 1 percent slopes, occasionally flooded	836	All areas are prime farmland
Apperson silty clay loam, 0 to 1 percent slopes	2,904	All areas are prime farmland
Apperson silty clay loam, 1 to 3 percent slopes	26,118	All areas are prime farmland
Apperson silty clay loam, 3 to 5 percent slopes	1,905	All areas are prime farmland
Apperson silty clay loam, 3 to 5 percent slopes, eroded	1,477	Not prime farmland
Taloka silt loam, 0 to 1 percent slopes	17,997	All areas are prime farmland
Shidler silty clay loam, 0 to 3 percent slopes	9,959	Not prime farmland
Shidler-Catoosa complex, 1 to 8 percent slopes	27,261	Not prime farmland
Verdigris silty clay loam, 0 to 1% slopes, occasionally flooded	14,878	All areas are prime farmland
Verdigris silt loam, 0 to 1 percent slopes, frequently flooded	4,871	Not prime farmland
Verdigris-Eram complex, 0 to 20 percent slopes	26,577	Not prime farmland
Water	1,761	Not prime farmland
Total Acres	**488,282**	
Total Acres Prime Farmland	**308,744**	

Soil Types in Delaware County, Oklahoma

Soil Series	Acres	Farmland Classification
Bates loam, 1 to 3 percent slopes	2,672	All areas are prime farmland
Macedonia silt loam, 1 to 3 percent slopes	15,301	All areas are prime farmland
Doniphan gravelly silt loam, 1 to 3 percent slopes	25,647	All areas are prime farmland
Doniphan-Tonti complex, 3 to 5 percent slopes	16,617	All areas are prime farmland
Captina silt loam, 1 to 3 percent slopes	14,675	All areas are prime farmland
Choteau silt loam, 0 to 1 percent slopes	627	All areas are prime farmland
Choteau silt loam, 1 to 3 percent slopes	1,003	All areas are prime farmland
Clarksville very gravelly silt loam, 1 to 8 percent slopes	62,884	Not prime farmland
Clarksville stony silt loam, 5 to 20 percent slopes	54,480	Not prime farmland
Clarksville stony silt loam, 20 to 50 percent slopes	114,760	Not prime farmland
Coweta fine sandy loam, 3 to 5 percent slopes	1,173	Not prime farmland
Large dam	9	Not prime farmland
Dennis silt loam, 1 to 3 percent slopes	9,315	All areas are prime farmland
Eldorado silt loam, 1 to 3 percent slopes	13,326	All areas are prime farmland

Eldorado silt loam, 3 to 5 percent slopes	6,930	All areas are prime farmland
Eldorado stony silt loam, 3 to 12 percent slopes	9,432	Not prime farmland
Elsah very gravelly loam, 0 to 3 percent slopes, frequently flooded	2,212	Not prime farmland
Hector fine sandy loam, 3 to 5 percent slopes	21	Not prime farmland
Hector-Linker association, 8 to 30 percent slopes	50	Not prime farmland
Jay silt loam, 1 to 3 percent slopes	5,093	All areas are prime farmland
Linker fine sandy loam, 3 to 5 percent slopes	37	All areas are prime farmland
Tonti gravelly silt loam, 1 to 3 percent slopes	9,321	All areas are prime farmland
Miscellaneous water	7	Not prime farmland
Newtonia silt loam, 0 to 1 percent slopes	3,095	All areas are prime farmland
Newtonia silt loam, 1 to 3 percent slopes	3,795	All areas are prime farmland
Newtonia silt loam, 3 to 5 percent slopes	95	All areas are prime farmland
Okemah silt loam, 0 to 1 percent slopes	2,010	All areas are prime farmland
Okemah silty clay loam, 0 to 1 percent slopes	209	All areas are prime farmland
Okemah silty clay loam, 1 to 3 percent slopes	1,104	All areas are prime farmland
Parsons silt loam, 0 to 1 percent slopes	2,763	All areas are prime farmland
Pits	15	Not prime farmland
Britwater silt loam, 0 to 1 percent slopes	502	All areas are prime farmland
Britwater silt loam, 1 to 3 percent slopes	7,092	All areas are prime farmland
Britwater gravelly silt loam, 1 to 3 percent slopes	4,236	All areas are prime farmland
Britwater gravelly silt loam, 3 to 8 percent slopes	16,900	All areas are prime farmland
Healing silt loam, 0 to 1 percent slopes, occasionally flooded	2,993	All areas are prime farmland
Razort gravelly loam, 0 to 3 percent slopes, occasionally flooded	38,590	All areas are prime farmland
Stigler silt loam, 0 to 1 percent slopes	6,253	Not prime farmland
Taloka silt loam, 0 to 1 percent slopes	6,356	All areas are prime farmland
Shidler-Rock outcrop complex, 2 to 8 percent slopes	806	Not prime farmland
Verdigris silt loam, 0 to 1 percent slopes, occasionally flooded	2,366	All areas are prime farmland
Verdigris silt loam, 0 to 1 percent slopes, frequently flooded	1,372	Not prime farmland
Water	36,091	Not prime farmland
Mayes silt loam, 0 to 1 percent slopes	4,645	Not prime farmland
Total Acres	**506,880**	
Total Acres Prime Farmland	**212,670**	

APPENDIX B – PUBLIC AND AGENCY COMMENTS

PUBLIC WRITTEN COMMENTS RECEIVED

The following people submitted comments concerning the KAMO Blackberry-Chouteau Transmission Line Project:

1. Allen Sanders
2. Ben Means
3. Bill Fairsfreats
4. Bill Jackson
5. Bill W. & Shirley Turner
6. Bob Guilliams
7. C. O. Stanley
8. Charles & Eileen Neer
9. Charles L. Carlett
10. Dale Estep
11. David & Melanie Kalar
12. Debbie Gaines
13. Floyd & Leneva Rhoe
14. Gary & Rhonda Cooley
15. Gary & Rhonda Cooley; Petition of 88 signatures
16. Gregory H. Grigg
17. Harvey Clark
18. Jack Brumback
19. Jay & Debbie Evans
20. Jeri Estep
21. Jess & Marla Larison
22. Jim Bushyhead
23. Jim Dungan
24. Katie Gaines; 52 Letters
25. Larry Sanda
26. Leon Walker
27. Mr. & Mrs. James L. Evans
28. Pat Gwin
29. Pete Schofield
30. Polly C. Burcham
31. Robert J. Fleming
32. Robert Russell
33. Ronald Mercer
34. Rosalie Duffin Lopp
35. Royan J. & Christian C. Meyer
36. Ruth Schumaker
37. Steve Stanley
38. Todd Chlanda
39. Tom Andris
40. Tom Thomas
41. Wendell L. Wilkinson

The following 52 comment letters were received together as a collective group from Senator Tom Coburn:

1. Katie Gaines
2. Heath Gaines
3. Kevin Seaton
4. Stephanie Seaton
5. A. Droper
6. James Baker
7. Kristi Baker
8. Bill Harper
9. Jo Harper
10. Jame Brede
11. Shawna Brede
12. Frank Leonard
13. James Williams
14. Leroy Malone
15. Ladonna Malone
16. Jake Malone
17. Vernon Minson, Jr.
18. Larry Powell, Jr.
19. Krista Powell
20. Larry Powell
21. Carol Powell
22. Chris Lundy
23. Donna Lundy
24. John Mattews
25. Steven Poe
26. Tiffany Poe
27. Richard Ayres
28. Charlene Ayres
29. Betty Abbott
30. Steve Bryan
31. Judy Bryan
32. Jake McCoin
33. Leon McCoin
34. Angie Wall
35. Dan Peetoom
36. Howard Berry
37. Arnold Speer
38. Carol Speer
39. Danny Jameson
40. Doug Wells
41. Barb Wells
42. Frank Weicht
43. Lisa Weicht
44. Roger Smith
45. Deloris Smith
46. Troy King
47. Tonya King
48. Phillip Shamblin
49. Reta Shamblin
50. Helen Mount
51. James Chandler
52. Ronda Chandler

The following 43 comment letters were received together as a collective group from Representative Dan Boren:

1. Katie Gaines
2. Debbie Gaines
3. Kevin Seaton
4. Stephanie Seaton
5. A. Droper
6. Bill Harper
7. Jo Harper
8. James Williams
9. Leroy Malone
10. Ladonna Malone
11. Jake Malone
12. Vernon Minson, Jr.
13. Larry Powell, Jr.
14. Krista Powell
15. Larry Powell
16. Carol Powell
17. Chris Lundy
18. Donna Lundy
19. John Matthews
20. Steven Poe
21. Tiffany Poe
22. Richard Ayres
23. Charlene Ayres
24. Betty Abbott
25. Steve Bryan
26. Judy Bryan
27. Jake McCoin
28. Leon McCoin
29. Angie Wall
30. Arnold Speer
31. Carol Speer
32. Danny Jameson
33. Doug Wells
34. Barb Wells
35. Frank Weicht
36. Lisa Weicht
37. Roger Smith
38. Deloris Smith
39. Troy King
40. Tonya King
41. Helen Mount
42. James Chandler
43. Ronda Chandler

Public Comment Summary: Vinita, OK

Category	#	Comments
Aesthetics		
Total: 7	4	Visual disturbance
	3	Noise disturbance
	7	
Construction, Operation & Maintenance		
Total: 7	3	Oppose herbicide spraying that could wash into creeks
	2	ROW maintenance is damaging and a nuisance
	1	Construction & operation disrupts farming operations
	1	Will create unwanted traffic across property
	7	
Cultural Resources		
Total: 1	1	Rural character of area will be disturbed
	1	
Data & Maps		
Total: 3	2	Request for more project information, maps, comment forms
	1	Maps did not show new Vinita Sports Complex and all existing houses
	3	
Economics		
Total: 11	4	Property will decrease in value
	3	Corridors hinder existing/future projects on property
	1	Refuse to sell ROW unless by court order
	1	Currently receive 97% of power from GRDA; KAMO line brings no benefit
	1	Costs of farming operations would increase
	1	Compensation payments not sufficient for all impacts
	11	
EIS Process		
Total: 9	3	Request for full environmental impact study to assess potential damage, not fast track construction
	2	Concern that many landowners unaware of project proposal
	1	Request for final environmental documents when completed (EA or EIS)
	1	KAMO crossing Northeastern Oklahoma Electric Cooperative (NEOEC) territory but didn't consult them
	1	Object to decision-making process that resulted in narrow study area and illogical corridors
	1	KAMO should be more willing to interact with community and resolve issues
	9	
Environment & Wildlife		
Total: 177	55	Construction and ROW clearing lead to soil compaction, streambank erosion, sediment loading in creeks, removal of trees, increase in water and ground temperature, and prevent mitigation and regrowth
	54	Route between 4460 and 4470 Roads contains important sensitive habitat, native prairies, bottomland hardwood forests, streams (ex: Little Cabin Creek, Arkansas darter, grassland bird habitat, white fringed prairie orchid, hawkmoth)
	54	KAMO replaces native trees with non-native Kentucky 31 fescue that supports little wildlife
	4	Environment and wildlife will be disrupted
	2	Environment and wildlife should be protected

	2	Disruption of continuous tracts of farmland and pasture
	1	Concern for Oklahoma National Wildlife Refuge
	1	Concern for wetlands
	1	Concern for wildlife habitat for nesting and feeding birds
	1	Contact Oklahoma Department of Environmental Quality to study wildlife and plant impacts
	1	Concerns over effects on waterways (ex: waterfowl migration, fish kills, algae growth, invasive plant growth)
	1	Stray voltage felt by animals causes hesitation to approach water troughs and feeders
	177	
Growth		
Total: 4	2	Routes placed west of Vinita will negatively impact future development since creeks and turnpike limit other directional growth
	1	Commercial Route 2 or railroad east of Vinita don't encroach on property intended for future development
	1	Areas north of Vinita are only potential growth areas due to creeks and floodplain restrictions elsewhere
	4	
Health & Safety		
Total: 16	4	Danger to human health (ex: EMF-cancer link)
	3	Structures will be in close proximity to homes and family farms
	3	Poles, wires, and fences hazardous to farm machinery, livestock, and children
	1	At what distance will EMF not affect humans?
	1	What is total area of EMF?
	1	Danger to livestock health
	1	ROWs make sites more accessible for litter, vandalism and trespassers
	1	Safety issues surrounding electrical contact or arc flashes
	1	Safety issues from storms and storm damage
	16	
Opposition		
Total: 62	58	Object to project going through area
	3	Object to project going through personal property
	1	KAMO proposing a buyout?
	62	
Route Preference		
Total: 71	54	Object to route east of Bluejacket between 4460 and 4470 Roads
	5	Preference for routes west of Vinita since less populated
	6	Preference for routes following railroads, existing lines, highways, gas pipelines, industrial/commercial property, or state/federal recreation land
	2	Plan corridors in areas more likely to benefit; not area already served by NEOEC
	1	Segment #27 will negatively affect northern growth of Vinita
	1	Preference for routes east of Vinita
	1	KAMO seeking a more westerly route?
	1	Current transmission path will affect many small farms
	71	
Total Comments: 368		

Public Comment Summary: Baxter Springs, KS

Category	#	Comments
Aesthetics		
Total: 5	5	Lost aesthetic value
	5	
Construction, Operation & Maintenance		
Total: 2	1	Inconvenience for farming operations
	1	Possible damage during maintenance
	2	
Cultural Resources		
Total: 3	3	Historical site disruption: Agricultural & Industrial Institute
	3	
Economics		
Total: 20	8	Property will decrease in value
	8	No local benefits; profits go elsewhere (such as MO and OK)
	3	Property originally purchased by landowner because free of existing lines
	1	Will landowners be compensated?
	20	
EIS Process		
Total: 9	3	Request more project information, maps
	2	Request information on final route decision
	2	Many landowners unaware of project proposal
	1	Inaccurate environmental assessment process
	1	Request notification of future public meetings
	9	
Environment		
Total: 2	1	Concern for sensitive environment
	1	Important habitat will be negatively effected (ex: wetlands, deciduous forests)
	2	
Growth		
Total: 2	1	Oppose growth of future utilities
	1	Corridors prevent future growth/building on affected properties
	2	
Health & Safety		
Total: 16	7	Danger to human health (ex: EMF-cancer link)
	3	Danger to livestock health
	3	Human safety risk
	2	Homes dangerously close to power lines
	1	Inability of landowner to adjust due to declining health
	16	
Opposition		
Total: 105	94	Object to project (Petition)
	11	Object to project
	105	
Recreation		
Total: 2	1	Currently constructing hunting lodge on affected property
	1	Hunting on property would be prevented
	2	
Route Preference		

Total: 5	1	Preference for routes west of Baxter Superfund site
	1	KAMO seeking easy route at expense of landowner
	1	Possible to use abandoned railroads?
	1	Continue eastern route farther south into Newton County, MO
	1	Preference for using other utilities' high transmission lines
	5	
Storm Damage		
Total: 3	3	Risk of storm damage
	3	
Wildlife		
Total: 3	2	Wildlife and nature setting will be disrupted
	1	Threatened or endangered species may be present
	3	
Other		
Total: 2	1	Proposal planned at time when landowners occupied with farming operations
	1	Cell phone reception could be disrupted
	2	
Total Comments: 179		

AGENCY WRITTEN COMMENTS RECEIVED

The following agencies submitted 34 comment letters concerning the KAMO Blackberry-Chouteau Transmission Line Project:

	Agency	Representative	Date
1	Bureau of Land Management, Tulsa Field Office	Mark Spencer	8/16/07
2	Cherokee Nation	Linda Taylor	4/29/07
3	Army Corps of Engineers, Tulsa District	David A. Manning	5/23/07
4	Army Corps of Engineers, Little Rock District	Kyle Clark	8/17/07, 11/27/07*
5	Environmental Protection Agency	Mike McAteer	5/4/07
6	Environmental Protection Agency	David Drake	8/15/07
7	Federal Aviation Administration, Central Region	Todd M. Madison, P.E.	4/24/07
8	Federal Aviation Administration, Southwest Region	Lana Page Logan, P.E.	5/23/07
9	Kansas Biological Survey, University of Kansas	Jennifer M. Delisle	5/9/07
10	Kansas Corporation Commission	Larry W. Holloway	4/18/07
11	Kansas Department of Health and Environment	Joseph Dom	5/16/07
12	Kansas Department of Wildlife & Parks	Nate Davis	5/9/07
13	Kansas State Historical Society	Jennie Chinn	5/7/07
14	Missouri Department of Conservation	Michael S. Smith	5/15/07
15	Missouri Department of Natural Resources	Mark A. Miles	4/18/07
16	Missouri Department of Natural Resources	H. Floyd Gilzow	5/18/07
17	Missouri Public Service Commission	Mike Taylor	8/9/07
18	Natural Resources Conservation Service, Miami Field Office	Michael Ramming	8/8/07
19	Natural Resources Conservation Service, Vinita Field Office	Erik N. Friend	4/27/07
20	Oklahoma Archeological Survey, University of Oklahoma	Robert L. Brooks	4/18/07
21	Oklahoma Biological Survey, Oklahoma Natural Heritage Inventory	Ian Butler	4/19/07
22	Oklahoma Department of Environmental Quality	Ray Roberts	8/28/07
23	Oklahoma Department of Transportation	Dawn R. Sullivan	6/18/07
24	Oklahoma Department of Wildlife Conservation	William Ray	6/18/07
25	Oklahoma Department of Wildlife Conservation	Kelly Roberson	10/12/07*
26	Oklahoma Historical Society, State Historic Preservation Office	Melvena Heisch	5/15/07
27	Peoria Tribe of Indians of Oklahoma	John P. Froman	4/27/06
28	US Fish & Wildlife Service, Kansas Field Office	Michael J. LeValley	4/30/07, 8/2/07
29	US Fish & Wildlife Service, Missouri Field Office	Charles M. Scott	5/8/07

30	US Fish & Wildlife Service, Oklahoma Field Office	Jerry J. Brabander	5/23/07, 9/12/07
31	Wyandotte Nation	Kathleen A. Welch	8/20/07

***** indicates written comment was received after the conclusion of the comment period. These and all comments were considered in the routing process.

APPENDIX C – ROUTE AMENDMENTS

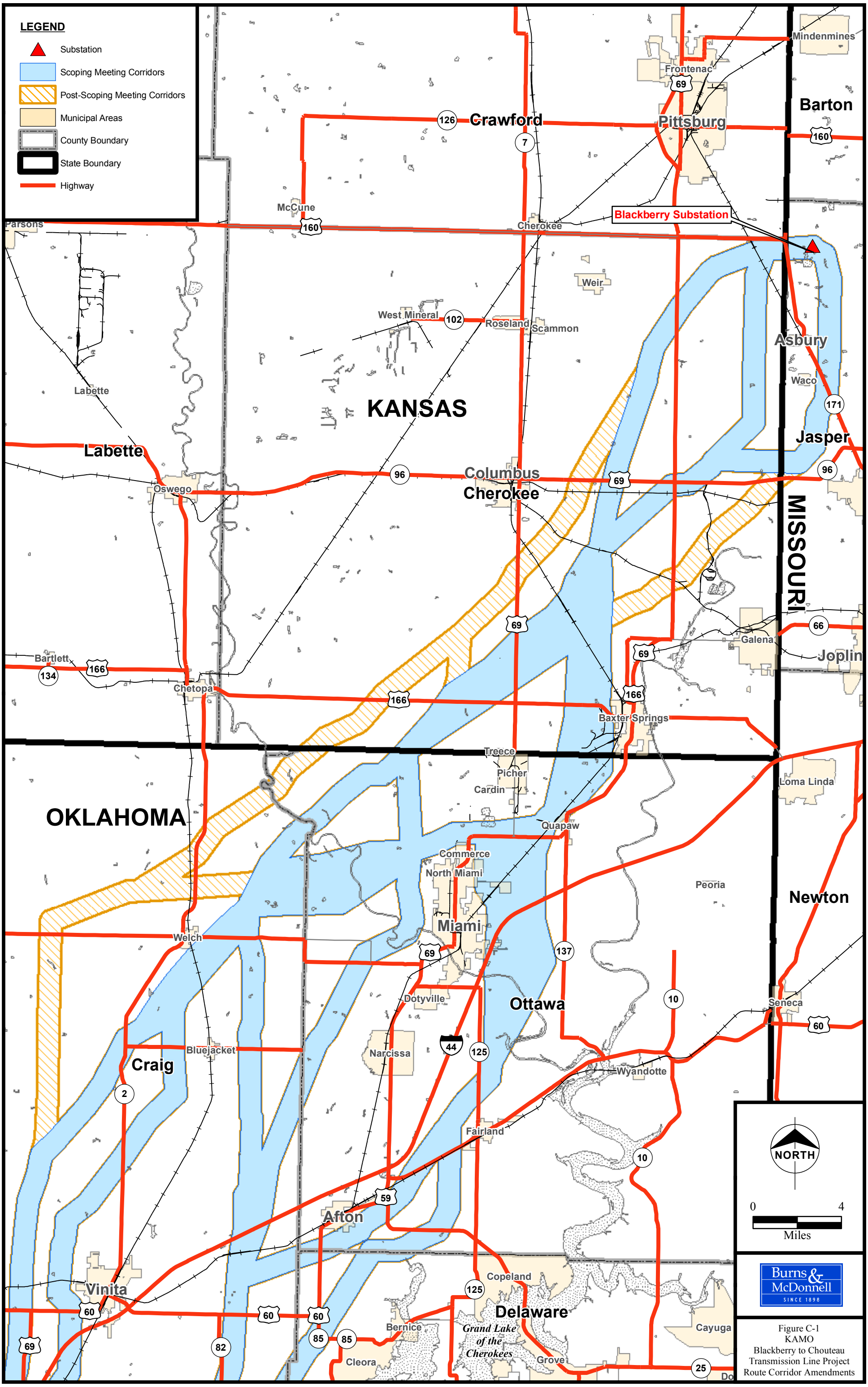

Figure C-1
KAMO
Blackberry to Chouteau
Transmission Line Project
Route Corridor Amendments

APPENDIX D – ROUTE EVALUATION DATA

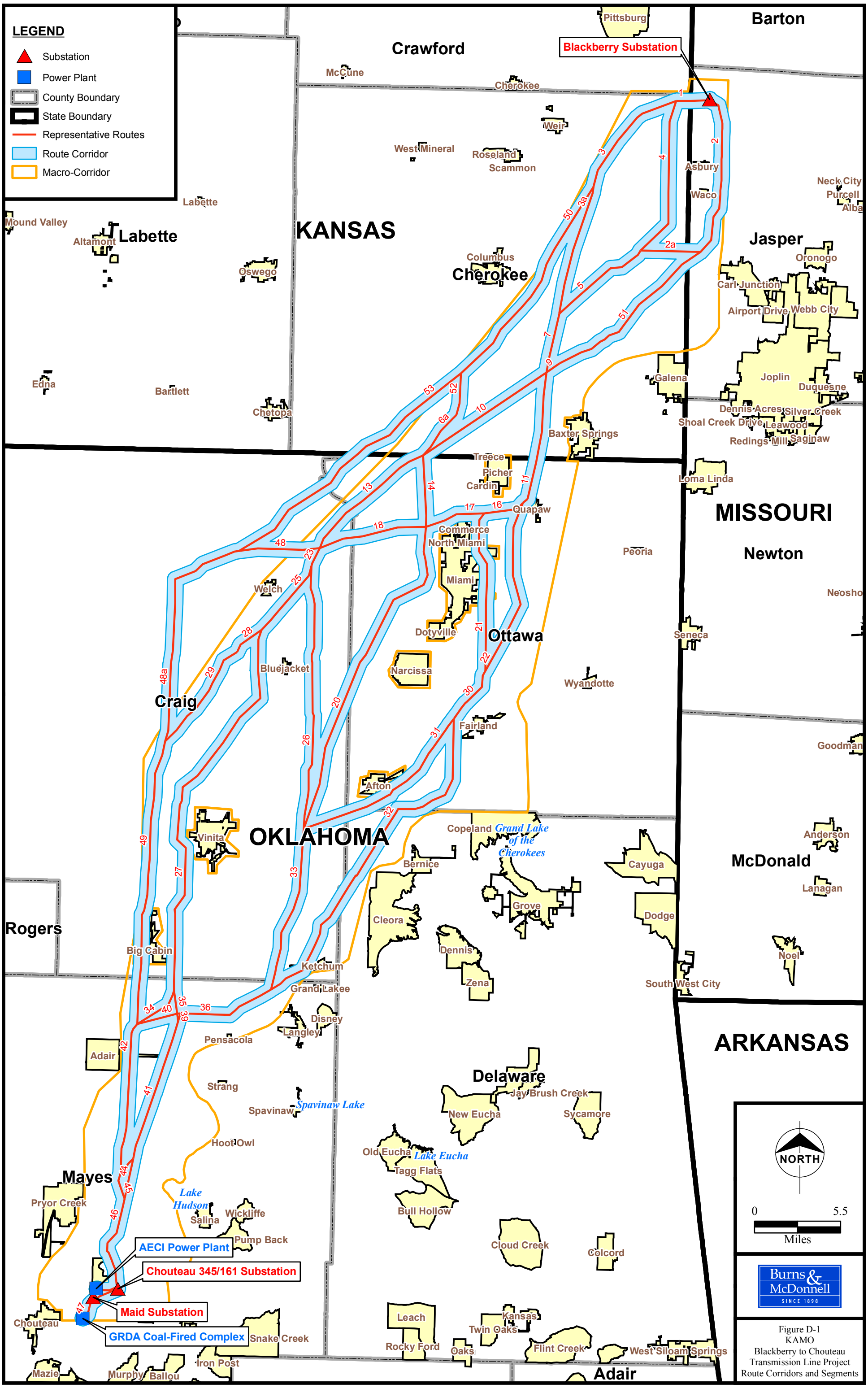

Figure D-1
KAMO
Blackberry to Chouteau
Transmission Line Project
Route Corridors and Segments

KAMO Power Blackberry - Chouteau 345-kV and 161-kV
Segment Data

Segment	Total Length (miles)	Not Parallel Existing T-Line (miles)	Heavy Angles (>30 degrees)	Residences 150ft (number)	residences 150-500 ft (number)	0-500 ft Public Facilities (number)	Agricultual cropland Within ROW (acres)	Pasture/ Grassland Within ROW (acres)	Historic/Achaelogical Sites (Number)	Woodland Within ROW (acres)	NLCD Wetland/ Riparian Areas (acres)	Perennial Waterways (number)	Road Crossings (number)	Length Through Superfund Area (miles)	Segment
1	2.17	0.00	0	0	0	0	8.8	26.6	0	1.0	0.9	0	2	0	1
2	10.48	8.60	4	0	1	0	113.6	57.7	0	9.8	4.4	1	11	0	2
2z	10.48	8.60	5	0	1	0	113.6	57.7	0	9.8	4.4	1	11	0	2z
2a	3.83	3.83	2	0	0	1	37.1	13.8	1	7.9	8.1	1	4	0	2a
3	8.03	8.03	1	0	5	0	89.3	40.2	0	9.3	0.0	3	10	0	3
3a	8.40	8.40	0	0	3	0	113.1	21.2	0	11.0	0.0	3	11	0	3a
4	10.37	10.37	2	0	3	0	118.1	48.1	0	16.2	2.2	3	9	0	4
5	6.71	6.71	2	0	4	0	58.8	40.2	0	15.5	0.1	3	10	0	5
6	9.41	9.41	0	0	6	0	54.3	86.1	0	18.2	3.0	2	13	0	6
6a	3.36	3.35	0	0	0	0	36.3	12.0	0	7.6	0.2	0	4	0	6a
7	3.85	3.85	0	0	7	0	29.9	25.9	0	9.1	0.0	2	4	0.57	7
8	3.19	3.19	0	0	4	0	12.6	31.2	0	11.7	0.0	1	3	0.08	8
9	1.03	1.03	0	0	2	0	3.4	14.0	0	0.9	0.0	1	1	1.03	9
9z	1.03	1.03	1	0	2	0	3.4	14.0	0	0.9	0.0	1	1	1.03	9z
10	9.50	9.50	0	0	4	0	87.3	63.5	0	9.1	0.8	3	12	2.78	10
11	8.20	8.20	0	0	3	0	71.7	65.2	0	2.8	0.4	1	9	8.15	11
12	9.62	9.62	0	0	6	0	90.1	65.8	0	5.0	0.0	2	13	9.57	12
13	9.01	9.14	2	0	0	0	65.1	74.8	0	13.1	1.9	4	10	0	13
13z	9.14	9.14	2	0	3	0	65.1	74.8	0	13.1	1.9	4	10	0	13z
14	4.56	4.56	0	0	7	0	65.1	14.4	0	2.0	0.0	0	5	0	14
15	0.38	0.38	0	0	2	0	0.0	5.8	0	0.7	0.0	0	1	0.38	15
16	2.68	2.68	1	0	0	0	17.0	26.6	0	0.4	1.8	0	2	2.68	16
17	3.89	3.89	0	0	3	0	39.6	21.3	1	0.1	3.8	2	3	2.08	17
17z	3.89	3.89	1	0	3	0	39.6	21.3	1	0.1	3.8	2	3	2.08	17z
18	6.98	6.98	0	0	2	0	24.7	73.4	0	7.5	16.6	2	10	0	18
18z	6.98	6.98	1	0	2	0	24.7	73.4	0	7.5	16.6	2	10	0	18z
19	8.13	8.13	0	0	3	0	36.0	90.2	0	3.4	12.1	2	7	0	19
20	21.76	21.76	3	0	2	0	50.3	296.1	0	12.1	12.3	4	20	0	20
21	10.32	10.32	5	0	4	0	56.2	98.7	0	5.1	14.7	4	11	2.52	21
22	11.48	6.67	2	2	11	0	61.9	117.1	0	8.9	6.9	2	13	1.03	22
23	1.26	1.26	0	0	0	0	3.7	18.7	0	0.2	0.0	0	1	0	23
25	5.24	5.24	1	0	1	0	6.3	78.5	0	1.3	0.0	1	8	0	25
26	16.95	16.95	2	0	3	0	42.6	247.4	0	8.5	0.0	5	12	0	26
27	25.50	25.50	6	1	11	0	27.2	294.7	0	48.6	0.0	5	22	0	27
28	2.17	2.16	0	0	0	0	8.9	20.4	0	4.6	0.0	0	3	0	28
29	7.47	7.44	0	0	2	1	1.6	106.0	0	18.9	0.0	2	7	0	29
30	3.81	2.04	1	0	3	0	4.1	62.2	0	0.1	0.0	0	5	0	30
31	12.36	1.47	3	0	2	0	45.0	163.0	0	1.1	0.0	1	16	0	31
32	22.69	12.54	4	0	18	0	35.9	282.8	0	51.7	0.3	3	32	0	32
Minimum	**0.20**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**Minimum**
Maximum	**25.50**	**25.50**	**6.00**	**2.00**	**18.00**	**1.00**	**139.87**	**296.06**	**1.00**	**51.71**	**16.59**	**6.00**	**32.00**	**9.57**	**Maximum**

KAMO Power Blackberry - Chouteau 345-kV and 161-kV
Segment Data

Segment	Total Length (miles)	Not Parallel Existing T-Line (miles)	Heavy Angles (>30 degrees)	Residences 150ft (number)	residences 150-500 ft (number)	0-500 ft Public Facilities (number)	Agricultual cropland Within ROW (acres)	Pasture/ Grassland Within ROW (acres)	Historic/Achaelogical Sites (Number)	Woodland Within ROW (acres)	NLCD Wetland/ Riparian Areas (acres)	Perennial Waterways (number)	Road Crossings (number)	Length Through Superfund Area (miles)	Segment
33	10.61	10.61	1	0	1	0	24.7	126.7	0	18.3	0.0	4	11	0	33
34	3.31	3.31	1	0	1	0	0.0	41.6	0	2.6	0.0	0	4	0	34
35	1.48	1.48	0	0	1	0	0.0	20.7	0	3.6	0.0	0	2	0	35
36	6.27	3.09	1	0	2	1	0.0	91.2	0	9.7	0.0	1	7	0	36
37	0.20	0.20	0	0	0	0	0.0	0.6	0	0.0	0.0	0	0	0	37
38	0.49	0.00	1	0	0	0	0.0	8.7	0	0.0	0.0	0	0	0	38
39	0.46	0.46	1	0	0	0	0.0	7.0	0	0.0	0.0	0	0	0	39
40	2.64	2.64	0	0	0	0	0.0	36.0	0	0.5	0.0	1	1	0	40
41	9.27	0.00	0	1	9	0	4.4	116.0	0	2.8	0.0	2	9	0	41
42	9.68	9.68	0	0	1	0	29.8	123.6	0	7.1	0.0	1	10	0	42
43	1.22	1.22	1	0	0	0	0.0	21.2	0	0	0.0	0	2	0	43
44	2.62	0.00	0	2	4	0	0.0	43.9	0	0.0	0.0	0	3	0	44
45	1.72	1.72	2	0	0	0	6.8	22.6	0	0	0.0	0	2	0	45
46	6.20	0.87	3	0	2	1	0.0	57.4	1	24.07	0.0	0	5	0	46
47	3.09	0.00	2	0	0	0	0.0	1.7	0	28.67	0.0	1	5	0	47
48	5.20	5.20	0	0	0	0	1.5	81.4	0	1.94	0.0	0	4	0	48
48a	14.88	14.88	1	0	0	0	11.7	192.1	0	27.61	0.0	2	13	0	48a
49	18.26	18.25	0	0	1	0	11.7	230.1	0	27.93	0.0	5	20	0	49
50	14.78	14.78	0	1	5	0	125.9	97.0	0	22.76	1.6	5	18	0	50
51	11.69	11.69	2	1	15	0	84.0	73.3	0	31.79	3.7	6	15	2.75	51
52	2.69	2.69	1	0	0	0	30.7	14.8	0	1.61	0.9	0	3	0	52
53	18.41	18.41	0	0	1	0	140	124	0	36	12	3	19	0	53
101	1.42	0.80	0	0	0	0	0.0	0.0	0	9.58	0.0	1	3	0	101
Minimum	**0.20**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**Minimum**
Maximum	**25.50**	**25.50**	**6.00**	**2.00**	**18.00**	**1.00**	**139.87**	**296.06**	**1.00**	**51.71**	**16.59**	**6.00**	**32.00**	**9.57**	**Maximum**

KAMO Power Blackberry - Chouteau 345-kV
Route Data

Route	Total Length (miles)	Not Parallel Existing T-Line (miles)	Heavy Angles (>30 degrees)	Residences 0-150 ft (number)	Residences 150-500 ft (number)	0-500 ft Public Facilities (number)	Agricultual cropland Within ROW (acres)	Pasture/ Grassland Within ROW (acres)	Historic/ Archaelogical Sites (Number)	Woodland Within ROW (acres)	NLCD Wetland/ Riparian Areas Within ROW (acres)	Perennial Waterways (number)	Road Crossings (number)	Length Through Superfund Area (miles)	Segment
A1	97.21	86.62	9	1	15	1	424.01	915.28	1	184.58	13.97	20	104	0.00	A1
A2	99.20	88.60	12	1	17	1	417.64	974.17	1	172.69	5.40	21	106	0.00	A2
A3	95.11	84.60	12	1	17	2	424.87	924.32	1	168.05	5.40	22	108	0.00	A3
A4	96.02	85.56	19	2	26	1	429.87	904.19	1	167.89	5.40	20	104	0.00	A4
A5	95.46	75.73	20	3	34	1	404.55	903.94	1	164.65	5.40	21	103	0.00	A5
A6	95.14	72.79	17	5	38	1	397.73	903.98	1	164.65	5.40	21	102	0.00	A6
A7	98.64	85.00	15	1	19	2	463.64	991.26	1	152.37	5.40	25	101	0.00	A7
A8	97.12	73.71	17	2	27	2	438.32	977.02	1	147.62	5.40	25	101	0.00	A8
A9	96.79	70.77	14	4	31	2	431.50	977.06	1	147.62	5.40	25	100	0.00	A9
A10	101.59	90.99	11	1	23	1	442.28	987.18	1	169.04	20.14	19	111	0.00	A10
A11	97.64	87.00	11	1	26	2	449.51	937.33	1	164.40	20.14	20	113	0.00	A11
A12	98.54	87.95	18	2	35	1	454.51	917.20	1	164.24	20.14	18	109	0.00	A12
A13	97.99	78.13	19	3	43	1	429.19	916.95	1	161.00	20.14	19	108	0.00	A13
A14	97.66	75.19	16	5	47	1	422.37	916.99	1	161.00	20.14	19	107	0.00	A14
A15	101.17	87.40	14	1	28	2	488.28	1004.27	1	148.72	20.14	23	106	0.00	A15
A16	99.64	76.11	16	2	36	2	462.96	990.03	1	143.97	20.14	23	106	0.00	A16
A17	99.32	73.17	13	4	40	2	456.14	990.07	1	143.97	20.14	23	105	0.00	A17
A18	97.74	83.97	14	1	25	2	467.60	960.89	1	144.65	15.84	20	103	0.00	A18
A19	96.22	72.68	16	2	33	2	442.28	946.65	1	139.90	15.84	20	103	0.00	A19
A20	95.89	69.74	13	4	37	2	435.46	946.69	1	139.90	15.84	20	102	0.00	A20
A21	100.12	89.53	11	0	26	1	454.99	960.99	1	169.80	3.54	24	108	3.35	A21
A22	96.03	85.53	11	0	26	2	462.22	911.14	1	165.16	3.54	25	110	3.35	A22
A23	96.94	86.49	18	1	35	1	467.22	891.01	1	165.00	3.54	23	106	3.35	A23
A24	96.39	76.66	19	2	43	1	441.90	890.76	1	161.76	3.54	24	105	3.35	A24
A25	96.06	73.72	16	4	47	1	435.08	890.80	1	161.76	3.54	24	104	3.35	A25
A26	99.56	85.93	14	0	28	2	500.99	978.08	1	149.48	3.54	28	103	3.35	A26
A27	98.04	74.64	16	1	36	2	475.67	963.84	1	144.73	3.54	28	103	3.35	A27
A28	97.71	71.70	13	3	40	2	468.85	963.88	1	144.73	3.54	28	102	3.35	A28
A29	102.52	91.92	10	0	32	1	479.63	974.00	1	166.15	18.28	22	113	3.35	A29
A30	98.56	87.93	10	0	35	2	486.86	924.15	1	161.51	18.28	23	115	3.35	A30
A31	99.47	88.88	17	1	44	1	491.86	904.02	1	161.35	18.28	21	111	3.35	A31
A32	98.91	79.06	18	2	52	1	466.54	903.77	1	158.11	18.28	22	110	3.35	A32
A33	98.59	76.12	15	4	56	1	459.72	903.81	1	158.11	18.28	22	109	3.35	A33
Minimum	**95.11**	**53.61**	**9**	**0**	**15**	**1**	**378.86**	**890.76**	**1.00**	**124.08**	**3.54**	**17**	**100**	**0.00**	**Minimum**
Maximum	**107.88**	**95.73**	**32**	**6**	**72**	**3**	**525.63**	**1063.13**	**3.00**	**184.58**	**35.13**	**28**	**126**	**17.51**	**Maximum**

Route	Total Length (miles)	Not Parallel Existing T-Line (miles)	Heavy Angles (>30 degrees)	Residences 0-150 ft (number)	Residences 150-500 ft (number)	0-500 ft Public Facilities (number)	Agricultual cropland Within ROW (acres)	Pasture/ Grassland Within ROW (acres)	Historic/ Archaelogical Sites (Number)	Woodland Within ROW (acres)	NLCD Wetland/ Riparian Areas Within ROW (acres)	Perennial Waterways (number)	Road Crossings (number)	Length Through Superfund Area (miles)	Segment
A34	102.09	88.33	13	0	37	2	525.63	991.09	1	145.83	18.28	26	108	3.35	A34
A35	100.57	77.04	15	1	45	2	500.31	976.85	1	141.08	18.28	26	108	3.35	A35
A36	100.24	74.10	12	3	49	2	493.49	976.89	1	141.08	18.28	26	107	3.35	A36
A37	98.66	84.90	13	0	34	2	504.95	947.71	1	141.76	13.98	23	105	3.35	A37
A38	97.14	73.61	15	1	42	2	479.63	933.47	1	137.01	13.98	23	105	3.35	A38
A39	96.81	70.67	12	3	46	2	472.81	933.51	1	137.01	13.98	23	104	3.35	A39
A40	103.61	93.02	10	0	29	1	455.64	1014.94	2	159.05	23.42	22	111	13.86	A40
A41	99.65	89.02	11	0	32	2	462.87	965.09	2	154.41	23.42	23	113	13.86	A41
A42	100.56	89.97	18	1	41	1	467.87	944.96	2	154.25	23.42	21	109	13.86	A42
A43	100.01	80.15	19	2	49	1	442.55	944.71	2	151.01	23.42	22	108	13.86	A43
A44	99.68	77.21	16	4	53	1	435.73	944.75	2	151.01	23.42	22	107	13.86	A44
A45	103.18	89.42	14	0	34	2	501.64	1032.03	2	138.73	23.42	26	106	13.86	A45
A46	101.66	78.13	16	1	42	2	476.32	1017.79	2	133.98	23.42	26	106	13.86	A46
A47	101.33	75.19	13	3	46	2	469.50	1017.83	2	133.98	23.42	26	105	13.86	A47
A48	99.75	85.99	15	0	31	2	480.96	988.65	2	134.66	19.12	23	103	13.86	A48
A49	98.23	74.70	17	1	39	2	455.64	974.41	2	129.91	19.12	23	103	13.86	A49
A50	97.91	71.76	14	3	43	2	448.82	974.45	2	129.91	19.12	23	102	13.86	A50
A51	100.58	74.17	20	0	35	2	496.33	995.18	1	128.83	17.75	22	112	14.30	A51
A52	99.06	62.88	22	1	43	2	471.01	980.94	1	124.08	17.75	22	112	14.30	A52
A53	98.74	59.94	19	3	47	2	464.19	980.98	1	124.08	17.75	22	111	14.30	A53
A54	100.32	74.63	20	0	50	2	462.53	988.34	1	161.14	18.06	20	117	14.30	A54
A55	98.79	63.34	22	1	58	2	437.21	974.10	1	156.39	18.06	20	117	14.30	A55
A56	98.47	60.40	19	3	62	2	430.39	974.14	1	156.39	18.06	20	116	14.30	A56
A57	99.07	67.84	16	2	42	2	484.98	986.93	1	132.25	8.12	20	112	10.13	A57
A58	97.54	56.55	18	3	50	2	459.66	972.69	1	127.50	8.12	20	112	10.13	A58
A59	97.22	53.61	15	5	54	2	452.84	972.73	1	127.50	8.12	20	111	10.13	A59
A60	100.52	70.02	18	2	57	2	458.00	1002.73	1	164.56	8.43	18	119	10.13	A60
A61	97.28	57.02	18	3	65	2	425.86	965.85	1	159.81	8.43	18	117	10.13	A61
A62	96.95	54.08	15	5	69	2	419.04	965.89	1	159.81	8.43	18	116	10.13	A62
B1	100.78	90.18	14	0	25	1	429.46	987.90	1	181.18	5.83	24	106	3.35	B1
B2	96.69	86.19	14	0	25	2	436.69	938.05	1	176.54	5.83	25	108	3.35	B2
B3	97.59	87.14	21	1	34	1	441.69	917.92	1	176.38	5.83	23	104	3.35	B3
B4	97.04	77.32	22	2	42	1	416.37	917.67	1	173.14	5.83	24	103	3.35	B4
Minimum	**95.11**	**53.61**	**9**	**0**	**15**	**1**	**378.86**	**890.76**	**1.00**	**124.08**	**3.54**	**17**	**100**	**0.00**	**Minimum**
Maximum	**107.88**	**95.73**	**32**	**6**	**72**	**3**	**525.63**	**1063.13**	**3.00**	**184.58**	**35.13**	**28**	**126**	**17.51**	**Maximum**

Route	Total Length (miles)	Not Parallel Existing T-Line (miles)	Heavy Angles (>30 degrees)	Residences 0-150 ft (number)	Residences 150-500 ft (number)	0-500 ft Public Facilities (number)	Agricultual cropland Within ROW (acres)	Pasture/ Grassland Within ROW (acres)	Historic/ Archaelogical Sites (Number)	Woodland Within ROW (acres)	NLCD Wetland/ Riparian Areas Within ROW (acres)	Perennial Waterways (number)	Road Crossings (number)	Length Through Superfund Area (miles)	Segment
B5	96.46	74.12	18	4	46	1	409.55	911.32	1	173.14	5.83	24	102	3.35	B5
B6	100.22	86.59	17	0	27	2	475.46	1004.99	1	160.86	5.83	28	101	3.35	B6
B7	98.69	75.30	19	1	35	2	450.14	990.75	1	156.11	5.83	28	101	3.35	B7
B8	98.37	72.36	16	3	39	2	443.32	990.79	1	156.11	5.83	28	100	3.35	B8
B9	103.17	92.58	13	0	31	1	454.10	1000.91	1	177.53	20.57	22	111	3.35	B9
B10	99.22	88.58	13	0	34	2	461.33	951.06	1	172.89	20.57	23	113	3.35	B10
B11	100.12	89.54	20	1	43	1	466.33	930.93	1	172.73	20.57	21	109	3.35	B11
B12	99.57	79.71	21	2	51	1	441.01	930.68	1	169.49	20.57	22	108	3.35	B12
B13	98.98	76.51	17	4	55	1	434.19	924.33	1	169.49	20.57	22	107	3.35	B13
B14	102.74	88.98	16	0	36	2	500.10	1018.00	1	157.21	20.57	26	106	3.35	B14
B15	101.22	77.69	18	1	44	2	474.78	1003.76	1	152.46	20.57	26	106	3.35	B15
B16	100.90	74.75	15	3	48	2	467.96	1003.80	1	152.46	20.57	26	105	3.35	B16
B17	99.32	85.55	16	0	33	2	479.42	974.62	1	153.14	16.27	23	103	3.35	B17
B18	97.79	74.26	18	1	41	2	454.10	960.38	1	148.39	16.27	23	103	3.35	B18
B19	97.47	71.32	15	3	45	2	447.28	960.42	1	148.39	16.27	23	102	3.35	B19
B20	104.26	93.67	13	0	28	1	430.11	1041.85	2	170.43	25.71	22	109	13.86	B20
B21	100.31	89.67	14	0	31	2	437.34	992.00	2	165.79	25.71	23	111	13.86	B21
B22	97.23	86.65	20	1	39	1	439.70	912.06	2	164.52	25.71	20	100	13.86	B22
B23	100.66	80.80	22	2	48	1	417.02	971.62	2	162.39	25.71	22	106	13.86	B23
B24	100.33	77.86	19	4	52	1	410.20	971.66	2	162.39	25.71	22	105	13.86	B24
B25	103.84	90.07	17	0	33	2	476.11	1058.94	2	150.11	25.71	26	104	13.86	B25
B26	102.31	78.78	19	1	41	2	450.79	1044.70	2	145.36	25.71	26	104	13.86	B26
B27	101.99	75.84	16	3	45	2	443.97	1044.74	2	145.36	25.71	26	103	13.86	B27
B28	100.41	86.64	18	0	30	2	455.43	1015.56	2	146.04	21.41	23	101	13.86	B28
B29	98.89	75.35	20	1	38	2	430.11	1001.32	2	141.29	21.41	23	101	13.86	B29
B30	98.56	72.41	17	3	42	2	423.29	1001.36	2	141.29	21.41	23	100	13.86	B30
B31	101.24	74.82	23	0	34	2	470.80	1022.09	1	140.21	20.04	22	110	14.30	B31
B32	99.72	63.53	25	1	42	2	445.48	1007.85	1	135.46	20.04	22	110	14.30	B32
B33	99.39	60.59	22	3	46	2	438.66	1007.89	1	135.46	20.04	22	109	14.30	B33
B34	100.97	75.29	23	0	49	2	437.00	1015.25	1	172.52	20.35	20	115	14.30	B34
B35	99.45	64.00	25	1	57	2	411.68	1001.01	1	167.77	20.35	20	115	14.30	B35
B36	99.12	61.06	22	3	61	2	404.86	1001.05	1	167.77	20.35	20	114	14.30	B36
B37	99.72	68.50	19	2	41	2	459.45	1013.84	1	143.63	10.41	20	110	10.13	B37
Minimum	**95.11**	**53.61**	**9**	**0**	**15**	**1**	**378.86**	**890.76**	**1.00**	**124.08**	**3.54**	**17**	**100**	**0.00**	**Minimum**
Maximum	**107.88**	**95.73**	**32**	**6**	**72**	**3**	**525.63**	**1063.13**	**3.00**	**184.58**	**35.13**	**28**	**126**	**17.51**	**Maximum**

Route	Total Length (miles)	Not Parallel Existing T-Line (miles)	Heavy Angles (>30 degrees)	Residences 0-150 ft (number)	Residences 150-500 ft (number)	0-500 ft Public Facilities (number)	Agricultual cropland Within ROW (acres)	Pasture/ Grassland Within ROW (acres)	Historic/ Archaelogical Sites (Number)	Woodland Within ROW (acres)	NLCD Wetland/ Riparian Areas Within ROW (acres)	Perennial Waterways (number)	Road Crossings (number)	Length Through Superfund Area (miles)	Segment
B38	98.20	57.21	21	3	49	2	434.13	999.60	1	138.88	10.41	20	110	10.13	B38
B39	97.87	54.27	18	5	53	2	427.31	999.64	1	138.88	10.41	20	109	10.13	B39
B40	99.45	68.96	19	2	56	2	425.65	1007.00	1	175.94	10.72	18	115	10.13	B40
B41	97.93	57.67	21	3	64	2	400.33	992.76	1	171.19	10.72	18	115	10.13	B41
B42	97.61	54.73	18	5	68	2	393.51	992.80	1	171.19	10.72	18	114	10.13	B42
C1	102.56	92.25	19	0	23	2	453.25	984.65	2	181.64	15.25	23	110	3.35	C1
C2	98.47	88.25	19	0	23	3	460.48	934.80	2	177.00	15.25	24	112	3.35	C2
C3	99.37	89.21	26	1	32	2	465.48	914.67	2	176.84	15.25	22	108	3.35	C3
C4	98.82	79.38	27	2	40	2	440.16	914.42	2	173.60	15.25	23	107	3.35	C4
C5	98.24	76.18	23	4	44	2	433.34	908.07	2	173.60	15.25	23	106	3.35	C5
C6	102.00	88.65	22	0	25	3	499.25	1001.74	2	161.32	15.25	27	105	3.35	C6
C7	100.47	77.36	24	1	33	3	473.93	987.50	2	156.57	15.25	27	105	3.35	C7
C8	100.15	74.42	21	3	37	3	467.11	987.54	2	156.57	15.25	27	104	3.35	C8
C9	104.95	94.64	18	0	29	2	477.89	997.66	2	177.99	29.99	21	115	3.35	C9
C10	101.00	90.64	18	0	32	3	485.12	947.81	2	173.35	29.99	22	117	3.35	C10
C11	101.90	91.60	25	1	41	2	490.12	927.68	2	173.19	29.99	20	113	3.35	C11
C12	101.35	81.77	26	2	49	2	464.80	927.43	2	169.95	29.99	21	112	3.35	C12
C13	100.76	78.58	22	4	53	2	457.98	921.08	2	169.95	29.99	21	111	3.35	C13
C14	104.52	91.04	21	0	34	3	523.89	1014.75	2	157.67	29.99	25	110	3.35	C14
C15	103.00	79.75	23	1	42	3	498.57	1000.51	2	152.92	29.99	25	110	3.35	C15
C16	102.67	76.81	20	3	46	3	491.75	1000.55	2	152.92	29.99	25	109	3.35	C16
C17	101.10	87.62	21	0	31	3	503.21	971.37	2	153.60	25.69	22	107	3.35	C17
C18	99.57	76.33	23	1	39	3	477.89	957.13	2	148.85	25.69	22	107	3.35	C18
C19	99.25	73.39	20	3	43	3	471.07	957.17	2	148.85	25.69	22	106	3.35	C19
C20	106.04	95.73	18	0	26	2	453.90	1038.60	3	170.89	35.13	21	113	13.86	C20
C21	102.09	91.74	19	0	29	3	461.13	988.75	3	166.25	35.13	22	115	13.86	C21
C22	99.01	88.71	25	1	37	2	463.49	908.81	3	164.98	35.13	19	104	13.86	C22
C23	102.44	82.87	27	2	46	2	440.81	968.37	3	162.85	35.13	21	110	13.86	C23
C24	102.11	79.93	24	4	50	2	433.99	968.41	3	162.85	35.13	21	109	13.86	C24
C25	105.62	92.14	22	0	31	3	499.90	1055.69	3	150.57	35.13	25	108	13.86	C25
C26	104.09	80.85	24	1	39	3	474.58	1041.45	3	145.82	35.13	25	108	13.86	C26
C27	103.77	77.90	21	3	43	3	467.76	1041.49	3	145.82	35.13	25	107	13.86	C27
C28	102.19	88.71	23	0	28	3	479.22	1012.31	3	146.50	30.83	22	105	13.86	C28
Minimum	**95.11**	**53.61**	**9**	**0**	**15**	**1**	**378.86**	**890.76**	**1.00**	**124.08**	**3.54**	**17**	**100**	**0.00**	**Minimum**
Maximum	**107.88**	**95.73**	**32**	**6**	**72**	**3**	**525.63**	**1063.13**	**3.00**	**184.58**	**35.13**	**28**	**126**	**17.51**	**Maximum**

Route	Total Length (miles)	Not Parallel Existing T-Line (miles)	Heavy Angles (>30 degrees)	Residences 0-150 ft (number)	Residences 150-500 ft (number)	0-500 ft Public Facilities (number)	Agricultual cropland Within ROW (acres)	Pasture/ Grassland Within ROW (acres)	Historic/ Archaelogical Sites (Number)	Woodland Within ROW (acres)	NLCD Wetland/ Riparian Areas Within ROW (acres)	Perennial Waterways (number)	Road Crossings (number)	Length Through Superfund Area (miles)	Segment
C29	100.66	77.42	25	1	36	3	453.90	998.07	3	141.75	30.83	22	105	13.86	C29
C30	100.34	74.48	22	3	40	3	447.08	998.11	3	141.75	30.83	22	104	13.86	C30
C31	103.02	76.89	28	0	32	3	494.59	1018.84	2	140.67	29.46	21	114	14.30	C31
C32	101.49	65.60	30	1	40	3	469.27	1004.60	2	135.92	29.46	21	114	14.30	C32
C33	101.17	62.65	27	3	44	3	462.45	1004.64	2	135.92	29.46	21	113	14.30	C33
C34	102.75	77.35	28	0	47	3	460.79	1012.00	2	172.98	29.77	19	119	14.30	C34
C35	107.88	70.83	32	1	56	2	511.91	1041.62	1	170.09	26.04	19	126	14.30	C35
C36	100.90	63.12	27	3	59	3	428.65	997.80	2	168.23	29.77	19	118	14.30	C36
C37	101.50	70.56	24	2	39	3	483.24	1010.59	2	144.09	19.83	19	114	10.13	C37
C38	99.98	59.27	26	3	47	3	457.92	996.35	2	139.34	19.83	19	114	10.13	C38
C39	99.65	56.33	23	5	51	3	451.10	996.39	2	139.34	19.83	19	113	10.13	C39
C40	101.23	71.02	24	2	54	3	449.44	1003.75	2	176.40	20.14	17	119	10.13	C40
C41	99.71	59.73	26	3	62	3	424.12	989.51	2	171.65	20.14	17	119	10.13	C41
C42	99.38	56.79	23	5	66	3	417.30	989.55	2	171.65	20.14	17	118	10.13	C42
C43	100.88	90.57	16	1	29	1	414.81	992.09	1	181.93	10.76	24	108	6.56	C43
C44	96.79	86.58	16	1	29	2	422.04	942.24	1	177.29	10.76	25	110	6.56	C44
C45	97.70	87.53	23	2	38	1	427.04	922.11	1	177.13	10.76	23	106	6.56	C45
C46	97.15	77.71	24	3	46	1	401.72	921.86	1	173.89	10.76	24	105	6.56	C46
C47	96.56	74.51	20	5	50	1	394.90	915.51	1	173.89	10.76	24	104	6.56	C47
C48	100.32	86.98	19	1	31	2	460.81	1009.18	1	161.61	10.76	28	103	6.56	C48
C49	98.80	75.69	21	2	39	2	435.49	994.94	1	156.86	10.76	28	103	6.56	C49
C50	98.47	72.75	18	4	43	2	428.67	994.98	1	156.86	10.76	28	102	6.56	C50
C51	103.28	92.97	15	1	35	1	439.45	1005.10	1	178.28	25.50	22	113	6.56	C51
C52	99.32	88.97	15	1	38	2	446.68	955.25	1	173.64	25.50	23	115	6.56	C52
C53	100.23	89.93	22	2	47	1	451.68	935.12	1	173.48	25.50	21	111	6.56	C53
C54	99.67	80.10	23	3	55	1	426.36	934.87	1	170.24	25.50	22	110	6.56	C54
C55	99.09	76.90	19	5	59	1	419.54	928.52	1	170.24	25.50	22	109	6.56	C55
C56	102.85	89.37	18	1	40	2	485.45	1022.19	1	157.96	25.50	26	108	6.56	C56
C57	101.33	78.08	20	2	48	2	460.13	1007.95	1	153.21	25.50	26	108	6.56	C57
C58	101.00	75.14	17	4	52	2	453.31	1007.99	1	153.21	25.50	26	107	6.56	C58
C59	99.42	85.94	18	1	37	2	464.77	978.81	1	153.89	21.20	23	105	6.56	C59
C60	97.90	74.65	20	2	45	2	439.45	964.57	1	149.14	21.20	23	105	6.56	C60
C61	97.57	71.71	17	4	49	2	432.63	964.61	1	149.14	21.20	23	104	6.56	C61
Minimum	**95.11**	**53.61**	**9**	**0**	**15**	**1**	**378.86**	**890.76**	**1.00**	**124.08**	**3.54**	**17**	**100**	**0.00**	**Minimum**
Maximum	**107.88**	**95.73**	**32**	**6**	**72**	**3**	**525.63**	**1063.13**	**3.00**	**184.58**	**35.13**	**28**	**126**	**17.51**	**Maximum**

Route	Total Length (miles)	Not Parallel Existing T-Line (miles)	Heavy Angles (>30 degrees)	Residences 0-150 ft (number)	Residences 150-500 ft (number)	0-500 ft Public Facilities (number)	Agricultual cropland Within ROW (acres)	Pasture/ Grassland Within ROW (acres)	Historic/ Archaelogical Sites (Number)	Woodland Within ROW (acres)	NLCD Wetland/ Riparian Areas Within ROW (acres)	Perennial Waterways (number)	Road Crossings (number)	Length Through Superfund Area (miles)	Segment
C62	104.37	94.06	16	1	32	1	415.46	1046.04	2	171.18	30.64	22	111	17.07	C62
C63	100.41	90.06	17	1	35	2	422.69	996.19	2	166.54	30.64	23	113	17.07	C63
C64	97.34	87.04	23	2	43	1	425.05	916.25	2	165.27	30.64	20	102	17.07	C64
C65	100.77	81.19	25	3	52	1	402.37	975.81	2	163.14	30.64	22	108	17.07	C65
C66	100.44	78.25	22	5	56	1	395.55	975.85	2	163.14	30.64	22	107	17.07	C66
C67	103.94	90.46	20	1	37	2	461.46	1063.13	2	150.86	30.64	26	106	17.07	C67
C68	102.42	79.17	22	2	45	2	436.14	1048.89	2	146.11	30.64	26	106	17.07	C68
C69	102.09	76.23	19	4	49	2	429.32	1048.93	2	146.11	30.64	26	105	17.07	C69
C70	100.51	87.03	21	1	34	2	440.78	1019.75	2	146.79	26.34	23	103	17.07	C70
C71	98.99	75.74	23	2	42	2	415.46	1005.51	2	142.04	26.34	23	103	17.07	C71
C72	98.67	72.80	20	4	46	2	408.64	1005.55	2	142.04	26.34	23	102	17.07	C72
C73	101.34	75.21	26	1	38	2	456.15	1026.28	1	140.96	24.97	22	112	17.51	C73
C74	99.82	63.92	28	2	46	2	430.83	1012.04	1	136.21	24.97	22	112	17.51	C74
C75	99.50	60.98	25	4	50	2	424.01	1012.08	1	136.21	24.97	22	111	17.51	C75
C76	101.08	75.68	26	1	53	2	422.35	1019.44	1	173.27	25.28	20	117	17.51	C76
C77	99.55	64.39	28	2	61	2	397.03	1005.20	1	168.52	25.28	20	117	17.51	C77
C78	99.23	61.45	25	4	65	2	390.21	1005.24	1	168.52	25.28	20	116	17.51	C78
C79	99.83	68.89	22	3	45	2	444.80	1018.03	1	144.38	15.34	20	112	13.34	C79
C80	98.30	57.60	24	4	53	2	419.48	1003.79	1	139.63	15.34	20	112	13.34	C80
C81	97.98	54.66	21	6	57	2	412.66	1003.83	1	139.63	15.34	20	111	13.34	C81
C82	99.56	69.35	22	3	60	2	411.00	1011.19	1	176.69	15.65	18	117	13.34	C82
C83	98.04	58.06	24	4	68	2	385.68	996.95	1	171.94	15.65	18	117	13.34	C83
C84	97.71	55.12	21	6	72	2	378.86	996.99	1	171.94	15.65	18	116	13.34	C84
Minimum	**95.11**	**53.61**	**9**	**0**	**15**	**1**	**378.86**	**890.76**	**1**	**124.08**	**3.54**	**17**	**100**	**0.00**	**Minimum**
Maximum	**107.88**	**95.73**	**32**	**6**	**72**	**3**	**525.63**	**1063.13**	**3**	**184.58**	**35.13**	**28**	**126**	**17.51**	**Maximum**

KAMO Power Blackberry - Chouteau 345-kV
Un-Weighted Route Scores

Route	Total Length (miles)	Not Parallel Existing T-Line (miles)	Heavy Angles (>30 degrees)	Residences 0-150 ft (number)	Residences 150-500 ft (number)	Agricultual cropland Within ROW (acres)	Pasture/ Grassland Within ROW (acres)	Woodland Within ROW (acres)	NLCD Wetland/ Riparian Areas Within ROW (acres)	Perennial Waterways (number)	Road Crossings (number)	Length Through Superfund Area (miles)
Mean	99.8	77.4	19.1	1.9	41.8	449.5	977.5	156.7	19.3	22.4	108.5	8.4
Std. Dev.	2.2	10.6	4.5	1.6	11.2	28.7	40.0	14.3	8.5	2.6	5.0	5.7

Route	Total Length (miles)	Not Parallel Existing T-Line (miles)	Heavy Angles (>30 degrees)	Residences 0-150 ft (number)	Residences 150-500 ft (number)	Agricultual cropland Within ROW (acres)	Pasture/ Grassland Within ROW (acres)	Woodland Within ROW (acres)	NLCD Wetland/ Riparian Areas Within ROW (acres)	Perennial Waterways (number)	Road Crossings (number)	Length Through Superfund Area (miles)	Total Score	Route
A1	-1.2	0.9	-2.2	-0.6	-2.4	-0.9	-1.6	2.0	-0.6	-0.9	-0.9	-1.5	-9.9	A1
A2	-0.3	1.1	-1.6	-0.6	-2.2	-1.1	-0.1	1.1	-1.6	-0.5	-0.5	-1.5	-7.8	A2
A3	-2.1	0.7	-1.6	-0.6	-2.2	-0.9	-1.3	0.8	-1.6	-0.2	-0.1	-1.5	-10.6	A3
A4	-1.7	0.8	0.0	0.0	-1.4	-0.7	-1.8	0.8	-1.6	-0.9	-0.9	-1.5	-9.0	A4
A5	-1.9	-0.2	0.2	0.7	-0.7	-1.6	-1.8	0.6	-1.6	-0.5	-1.1	-1.5	-9.5	A5
A6	-2.1	-0.4	-0.5	2.0	-0.3	-1.8	-1.8	0.6	-1.6	-0.5	-1.3	-1.5	-9.4	A6
A7	-0.5	0.7	-0.9	-0.6	-2.0	0.5	0.3	-0.3	-1.6	1.0	-1.5	-1.5	-6.4	A7
A8	-1.2	-0.4	-0.5	0.0	-1.3	-0.4	0.0	-0.6	-1.6	1.0	-1.5	-1.5	-8.0	A8
A9	-1.3	-0.6	-1.1	1.3	-1.0	-0.6	0.0	-0.6	-1.6	1.0	-1.7	-1.5	-7.8	A9
A10	0.8	1.3	-1.8	-0.6	-1.7	-0.3	0.2	0.9	0.1	-1.3	0.5	-1.5	-3.3	A10
A11	-1.0	0.9	-1.8	-0.6	-1.4	0.0	-1.0	0.5	0.1	-0.9	0.9	-1.5	-5.7	A11
A12	-0.6	1.0	-0.2	0.0	-0.6	0.2	-1.5	0.5	0.1	-1.7	0.1	-1.5	-4.1	A12
A13	-0.8	0.1	0.0	0.7	0.1	-0.7	-1.5	0.3	0.1	-1.3	-0.1	-1.5	-4.7	A13
A14	-1.0	-0.2	-0.7	2.0	0.5	-0.9	-1.5	0.3	0.1	-1.3	-0.3	-1.5	-4.6	A14
A15	0.6	0.9	-1.1	-0.6	-1.2	1.4	0.7	-0.6	0.1	0.2	-0.5	-1.5	-1.6	A15
A16	-0.1	-0.1	-0.7	0.0	-0.5	0.5	0.3	-0.9	0.1	0.2	-0.5	-1.5	-3.1	A16
A17	-0.2	-0.4	-1.3	1.3	-0.2	0.2	0.3	-0.9	0.1	0.2	-0.7	-1.5	-3.0	A17
A18	-0.9	0.6	-1.1	-0.6	-1.5	0.6	-0.4	-0.8	-0.4	-0.9	-1.1	-1.5	-8.1	A18
A19	-1.6	-0.5	-0.7	0.0	-0.8	-0.3	-0.8	-1.2	-0.4	-0.9	-1.1	-1.5	-9.6	A19
A20	-1.7	-0.7	-1.3	1.3	-0.4	-0.5	-0.8	-1.2	-0.4	-0.9	-1.3	-1.5	-9.5	A20
A21	0.1	1.1	-1.8	-1.2	-1.4	0.2	-0.4	0.9	-1.9	0.6	-0.1	-0.9	-4.7	A21
A22	-1.7	0.8	-1.8	-1.2	-1.4	0.4	-1.7	0.6	-1.9	1.0	0.3	-0.9	-7.5	A22
A23	-1.3	0.9	-0.2	-0.6	-0.6	0.6	-2.2	0.6	-1.9	0.2	-0.5	-0.9	-5.9	A23
A24	-1.5	-0.1	0.0	0.0	0.1	-0.3	-2.2	0.4	-1.9	0.6	-0.7	-0.9	-6.4	A24
A25	-1.7	-0.4	-0.7	1.3	0.5	-0.5	-2.2	0.4	-1.9	0.6	-0.9	-0.9	-6.3	A25
A26	-0.1	0.8	-1.1	-1.2	-1.2	1.8	0.0	-0.5	-1.9	2.1	-1.1	-0.9	-3.3	A26
A27	-0.8	-0.3	-0.7	-0.6	-0.5	0.9	-0.3	-0.8	-1.9	2.1	-1.1	-0.9	-4.8	A27
A28	-0.9	-0.5	-1.3	0.7	-0.2	0.7	-0.3	-0.8	-1.9	2.1	-1.3	-0.9	-4.7	A28
A29	1.2	1.4	-2.0	-1.2	-0.9	1.0	-0.1	0.7	-0.1	-0.2	0.9	-0.9	-0.2	A29
A30	-0.6	1.0	-2.0	-1.2	-0.6	1.3	-1.3	0.3	-0.1	0.2	1.3	-0.9	-2.6	A30
A31	-0.1	1.1	-0.5	-0.6	0.2	1.5	-1.8	0.3	-0.1	-0.5	0.5	-0.9	-1.0	A31
A32	-0.4	0.2	-0.2	0.0	0.9	0.6	-1.8	0.1	-0.1	-0.2	0.3	-0.9	-1.6	A32
A33	-0.5	-0.1	-0.9	1.3	1.3	0.4	-1.8	0.1	-0.1	-0.2	0.1	-0.9	-1.4	A33
Minimum	**-2.1**	**-2.3**	**-2.2**	**-1.2**	**-2.4**	**-2.5**	**-2.2**	**-2.3**	**-1.9**	**-2.1**	**-1.7**	**-1.5**	**-10.6**	**Minimum**
Maximum	**3.6**	**1.7**	**2.9**	**2.6**	**2.7**	**2.7**	**2.1**	**2.0**	**1.9**	**2.1**	**3.5**	**1.6**	**15.2**	**Maximum**

KAMO Power Blackberry - Chouteau 345-kV
Un-Weighted Route Scores

Route	Total Length (miles)	Not Parallel Existing T-Line (miles)	Heavy Angles (>30 degrees)	Residences 0-150 ft (number)	Residences 150-500 ft (number)	Agricultual cropland Within ROW (acres)	Pasture/ Grassland Within ROW (acres)	Woodland Within ROW (acres)	NLCD Wetland/ Riparian Areas Within ROW (acres)	Perennial Waterways (number)	Road Crossings (number)	Length Through Superfund Area (miles)	Total Score	Route
A34	1.0	1.0	-1.3	-1.2	-0.4	2.7	0.3	-0.8	-0.1	1.4	-0.1	-0.9	1.5	A34
A35	0.3	0.0	-0.9	-0.6	0.3	1.8	0.0	-1.1	-0.1	1.4	-0.1	-0.9	0.0	A35
A36	0.2	-0.3	-1.6	0.7	0.6	1.5	0.0	-1.1	-0.1	1.4	-0.3	-0.9	0.1	A36
A37	-0.5	0.7	-1.3	-1.2	-0.7	1.9	-0.7	-1.0	-0.6	0.2	-0.7	-0.9	-4.9	A37
A38	-1.2	-0.4	-0.9	-0.6	0.0	1.0	-1.1	-1.4	-0.6	0.2	-0.7	-0.9	-6.5	A38
A39	-1.3	-0.6	-1.6	0.7	0.4	0.8	-1.1	-1.4	-0.6	0.2	-0.9	-0.9	-6.3	A39
A40	1.7	1.5	-2.0	-1.2	-1.1	0.2	0.9	0.2	0.5	-0.2	0.5	1.0	1.9	A40
A41	-0.1	1.1	-1.8	-1.2	-0.9	0.5	-0.3	-0.2	0.5	0.2	0.9	1.0	-0.3	A41
A42	0.3	1.2	-0.2	-0.6	-0.1	0.6	-0.8	-0.2	0.5	-0.5	0.1	1.0	1.3	A42
A43	0.1	0.3	0.0	0.0	0.6	-0.2	-0.8	-0.4	0.5	-0.2	-0.1	1.0	0.7	A43
A44	-0.1	0.0	-0.7	1.3	1.0	-0.5	-0.8	-0.4	0.5	-0.2	-0.3	1.0	0.9	A44
A45	1.5	1.1	-1.1	-1.2	-0.7	1.8	1.4	-1.3	0.5	1.4	-0.5	1.0	3.8	A45
A46	0.8	0.1	-0.7	-0.6	0.0	0.9	1.0	-1.6	0.5	1.4	-0.5	1.0	2.3	A46
A47	0.7	-0.2	-1.3	0.7	0.4	0.7	1.0	-1.6	0.5	1.4	-0.7	1.0	2.4	A47
A48	0.0	0.8	-0.9	-1.2	-1.0	1.1	0.3	-1.5	0.0	0.2	-1.1	1.0	-2.4	A48
A49	-0.7	-0.3	-0.5	-0.6	-0.2	0.2	-0.1	-1.9	0.0	0.2	-1.1	1.0	-3.9	A49
A50	-0.8	-0.5	-1.1	0.7	0.1	0.0	-0.1	-1.9	0.0	0.2	-1.3	1.0	-3.8	A50
A51	0.4	-0.3	0.2	-1.2	-0.6	1.6	0.4	-1.9	-0.2	-0.2	0.7	1.0	-0.1	A51
A52	-0.3	-1.4	0.6	-0.6	0.1	0.7	0.1	-2.3	-0.2	-0.2	0.7	1.0	-1.6	A52
A53	-0.5	-1.7	0.0	0.7	0.5	0.5	0.1	-2.3	-0.2	-0.2	0.5	1.0	-1.5	A53
A54	0.2	-0.3	0.2	-1.2	0.7	0.5	0.3	0.3	-0.1	-0.9	1.7	1.0	2.4	A54
A55	-0.4	-1.3	0.6	-0.6	1.4	-0.4	-0.1	0.0	-0.1	-0.9	1.7	1.0	0.8	A55
A56	-0.6	-1.6	0.0	0.7	1.8	-0.7	-0.1	0.0	-0.1	-0.9	1.5	1.0	1.0	A56
A57	-0.3	-0.9	-0.7	0.0	0.0	1.2	0.2	-1.7	-1.3	-0.9	0.7	0.3	-3.3	A57
A58	-1.0	-2.0	-0.2	0.7	0.7	0.4	-0.1	-2.0	-1.3	-0.9	0.7	0.3	-4.9	A58
A59	-1.2	-2.3	-0.9	2.0	1.1	0.1	-0.1	-2.0	-1.3	-0.9	0.5	0.3	-4.7	A59
A60	0.3	-0.7	-0.2	0.0	1.4	0.3	0.6	0.6	-1.3	-1.7	2.1	0.3	1.7	A60
A61	-1.1	-1.9	-0.2	0.7	2.1	-0.8	-0.3	0.2	-1.3	-1.7	1.7	0.3	-2.4	A61
A62	-1.3	-2.2	-0.9	2.0	2.4	-1.1	-0.3	0.2	-1.3	-1.7	1.5	0.3	-2.3	A62
B1	0.4	1.2	-1.1	-1.2	-1.5	-0.7	0.3	1.7	-1.6	0.6	-0.5	-0.9	-3.3	B1
B2	-1.4	0.8	-1.1	-1.2	-1.5	-0.4	-1.0	1.4	-1.6	1.0	-0.1	-0.9	-6.1	B2
B3	-1.0	0.9	0.4	-0.6	-0.7	-0.3	-1.5	1.4	-1.6	0.2	-0.9	-0.9	-4.5	B3
B4	-1.2	0.0	0.6	0.0	0.0	-1.2	-1.5	1.2	-1.6	0.6	-1.1	-0.9	-5.0	B4
B5	-1.5	-0.3	-0.2	1.3	0.4	-1.4	-1.7	1.2	-1.6	0.6	-1.3	-0.9	-5.4	B5
B6	0.2	0.9	-0.5	-1.2	-1.3	0.9	0.7	0.3	-1.6	2.1	-1.5	-0.9	-1.9	B6
B7	-0.5	-0.2	0.0	-0.6	-0.6	0.0	0.3	0.0	-1.6	2.1	-1.5	-0.9	-3.5	B7
B8	-0.6	-0.5	-0.7	0.7	-0.2	-0.2	0.3	0.0	-1.6	2.1	-1.7	-0.9	-3.3	B8
B9	1.5	1.4	-1.3	-1.2	-1.0	0.2	0.6	1.5	0.2	-0.2	0.5	-0.9	1.2	B9
B10	-0.3	1.1	-1.3	-1.2	-0.7	0.4	-0.7	1.1	0.2	0.2	0.9	-0.9	-1.2	B10
B11	0.1	1.1	0.2	-0.6	0.1	0.6	-1.2	1.1	0.2	-0.5	0.1	-0.9	0.4	B11
Minimum	**-2.1**	**-2.3**	**-2.2**	**-1.2**	**-2.4**	**-2.5**	**-2.2**	**-2.3**	**-1.9**	**-2.1**	**-1.7**	**-1.5**	**-10.6**	**Minimum**
Maximum	**3.6**	**1.7**	**2.9**	**2.6**	**2.7**	**2.7**	**2.1**	**2.0**	**1.9**	**2.1**	**3.5**	**1.6**	**15.2**	**Maximum**

KAMO Power Blackberry - Chouteau 345-kV
Un-Weighted Route Scores

Route	Total Length (miles)	Not Parallel Existing T-Line (miles)	Heavy Angles (>30 degrees)	Residences 0-150 ft (number)	Residences 150-500 ft (number)	Agricultual cropland Within ROW (acres)	Pasture/ Grassland Within ROW (acres)	Woodland Within ROW (acres)	NLCD Wetland/ Riparian Areas Within ROW (acres)	Perennial Waterways (number)	Road Crossings (number)	Length Through Superfund Area (miles)	Total Score	Route
B12	-0.1	0.2	0.4	0.0	0.8	-0.3	-1.2	0.9	0.2	-0.2	-0.1	-0.9	-0.2	B12
B13	-0.4	-0.1	-0.5	1.3	1.2	-0.5	-1.3	0.9	0.2	-0.2	-0.3	-0.9	-0.6	B13
B14	1.3	1.1	-0.7	-1.2	-0.5	1.8	1.0	0.0	0.2	1.4	-0.5	-0.9	2.9	B14
B15	0.6	0.0	-0.2	-0.6	0.2	0.9	0.7	-0.3	0.2	1.4	-0.5	-0.9	1.4	B15
B16	0.5	-0.3	-0.9	0.7	0.6	0.6	0.7	-0.3	0.2	1.4	-0.7	-0.9	1.5	B16
B17	-0.2	0.8	-0.7	-1.2	-0.8	1.0	-0.1	-0.2	-0.4	0.2	-1.1	-0.9	-3.6	B17
B18	-0.9	-0.3	-0.2	-0.6	-0.1	0.2	-0.4	-0.6	-0.4	0.2	-1.1	-0.9	-5.1	B18
B19	-1.0	-0.6	-0.9	0.7	0.3	-0.1	-0.4	-0.6	-0.4	0.2	-1.3	-0.9	-5.0	B19
B20	2.0	1.5	-1.3	-1.2	-1.2	-0.7	1.6	1.0	0.8	-0.2	0.1	1.0	3.3	B20
B21	0.2	1.2	-1.1	-1.2	-1.0	-0.4	0.4	0.6	0.8	0.2	0.5	1.0	1.1	B21
B22	-1.1	0.9	0.2	-0.6	-0.2	-0.3	-1.6	0.5	0.8	-0.9	-1.7	1.0	-3.3	B22
B23	0.4	0.3	0.6	0.0	0.6	-1.1	-0.1	0.4	0.8	-0.2	-0.5	1.0	2.1	B23
B24	0.2	0.0	0.0	1.3	0.9	-1.4	-0.1	0.4	0.8	-0.2	-0.7	1.0	2.2	B24
B25	1.8	1.2	-0.5	-1.2	-0.8	0.9	2.0	-0.5	0.8	1.4	-0.9	1.0	5.2	B25
B26	1.1	0.1	0.0	-0.6	-0.1	0.0	1.7	-0.8	0.8	1.4	-0.9	1.0	3.7	B26
B27	1.0	-0.2	-0.7	0.7	0.3	-0.2	1.7	-0.8	0.8	1.4	-1.1	1.0	3.8	B27
B28	0.3	0.9	-0.2	-1.2	-1.0	0.2	1.0	-0.7	0.3	0.2	-1.5	1.0	-1.0	B28
B29	-0.4	-0.2	0.2	-0.6	-0.3	-0.7	0.6	-1.1	0.3	0.2	-1.5	1.0	-2.6	B29
B30	-0.6	-0.5	-0.5	0.7	0.0	-0.9	0.6	-1.1	0.3	0.2	-1.7	1.0	-2.5	B30
B31	0.6	-0.2	0.9	-1.2	-0.7	0.7	1.1	-1.1	0.1	-0.2	0.3	1.0	1.3	B31
B32	0.0	-1.3	1.3	-0.6	0.0	-0.1	0.8	-1.5	0.1	-0.2	0.3	1.0	-0.2	B32
B33	-0.2	-1.6	0.6	0.7	0.4	-0.4	0.8	-1.5	0.1	-0.2	0.1	1.0	-0.1	B33
B34	0.5	-0.2	0.9	-1.2	0.6	-0.4	0.9	1.1	0.1	-0.9	1.3	1.0	3.7	B34
B35	-0.2	-1.3	1.3	-0.6	1.4	-1.3	0.6	0.8	0.1	-0.9	1.3	1.0	2.2	B35
B36	-0.3	-1.5	0.6	0.7	1.7	-1.6	0.6	0.8	0.1	-0.9	1.1	1.0	2.3	B36
B37	0.0	-0.8	0.0	0.0	-0.1	0.3	0.9	-0.9	-1.0	-0.9	0.3	0.3	-2.0	B37
B38	-0.7	-1.9	0.4	0.7	0.6	-0.5	0.6	-1.2	-1.0	-0.9	0.3	0.3	-3.5	B38
B39	-0.9	-2.2	-0.2	2.0	1.0	-0.8	0.6	-1.2	-1.0	-0.9	0.1	0.3	-3.4	B39
B40	-0.2	-0.8	0.0	0.0	1.3	-0.8	0.7	1.3	-1.0	-1.7	1.3	0.3	0.5	B40
B41	-0.8	-1.9	0.4	0.7	2.0	-1.7	0.4	1.0	-1.0	-1.7	1.3	0.3	-1.0	B41
B42	-1.0	-2.1	-0.2	2.0	2.3	-2.0	0.4	1.0	-1.0	-1.7	1.1	0.3	-0.9	B42
C1	1.2	1.4	0.0	-1.2	-1.7	0.1	0.2	1.7	-0.5	0.2	0.3	-0.9	0.9	C1
C2	-0.6	1.0	0.0	-1.2	-1.7	0.4	-1.1	1.4	-0.5	0.6	0.7	-0.9	-1.8	C2
C3	-0.2	1.1	1.5	-0.6	-0.9	0.6	-1.6	1.4	-0.5	-0.2	-0.1	-0.9	-0.3	C3
C4	-0.4	0.2	1.7	0.0	-0.2	-0.3	-1.6	1.2	-0.5	0.2	-0.3	-0.9	-0.8	C4
C5	-0.7	-0.1	0.9	1.3	0.2	-0.6	-1.7	1.2	-0.5	0.2	-0.5	-0.9	-1.2	C5
C6	1.0	1.1	0.6	-1.2	-1.5	1.7	0.6	0.3	-0.5	1.8	-0.7	-0.9	2.3	C6
C7	0.3	0.0	1.1	-0.6	-0.8	0.9	0.2	0.0	-0.5	1.8	-0.7	-0.9	0.8	C7
C8	0.2	-0.3	0.4	0.7	-0.4	0.6	0.3	0.0	-0.5	1.8	-0.9	-0.9	0.9	C8
C9	2.3	1.6	-0.2	-1.2	-1.1	1.0	0.5	1.5	1.3	-0.5	1.3	-0.9	5.4	C9
Minimum	**-2.1**	**-2.3**	**-2.2**	**-1.2**	**-2.4**	**-2.5**	**-2.2**	**-2.3**	**-1.9**	**-2.1**	**-1.7**	**-1.5**	**-10.6**	**Minimum**
Maximum	**3.6**	**1.7**	**2.9**	**2.6**	**2.7**	**2.7**	**2.1**	**2.0**	**1.9**	**2.1**	**3.5**	**1.6**	**15.2**	**Maximum**

KAMO Power Blackberry - Chouteau 345-kV
Un-Weighted Route Scores

Route	Total Length (miles)	Not Parallel Existing T-Line (miles)	Heavy Angles (>30 degrees)	Residences 0-150 ft (number)	Residences 150-500 ft (number)	Agricultual cropland Within ROW (acres)	Pasture/ Grassland Within ROW (acres)	Woodland Within ROW (acres)	NLCD Wetland/ Riparian Areas Within ROW (acres)	Perennial Waterways (number)	Road Crossings (number)	Length Through Superfund Area (miles)	Total Score	Route
C10	0.5	1.2	-0.2	-1.2	-0.9	1.2	-0.7	1.2	1.3	-0.2	1.7	-0.9	3.0	C10
C11	0.9	1.3	1.3	-0.6	-0.1	1.4	-1.2	1.2	1.3	-0.9	0.9	-0.9	4.6	C11
C12	0.7	0.4	1.5	0.0	0.6	0.5	-1.3	0.9	1.3	-0.5	0.7	-0.9	4.1	C12
C13	0.4	0.1	0.6	1.3	1.0	0.3	-1.4	0.9	1.3	-0.5	0.5	-0.9	3.6	C13
C14	2.1	1.3	0.4	-1.2	-0.7	2.6	0.9	0.1	1.3	1.0	0.3	-0.9	7.1	C14
C15	1.4	0.2	0.9	-0.6	0.0	1.7	0.6	-0.3	1.3	1.0	0.3	-0.9	5.6	C15
C16	1.3	-0.1	0.2	0.7	0.4	1.5	0.6	-0.3	1.3	1.0	0.1	-0.9	5.7	C16
C17	0.6	1.0	0.4	-1.2	-1.0	1.9	-0.2	-0.2	0.8	-0.2	-0.3	-0.9	0.7	C17
C18	-0.1	-0.1	0.9	-0.6	-0.2	1.0	-0.5	-0.5	0.8	-0.2	-0.3	-0.9	-0.9	C18
C19	-0.2	-0.4	0.2	0.7	0.1	0.8	-0.5	-0.5	0.8	-0.2	-0.5	-0.9	-0.7	C19
C20	2.8	1.7	-0.2	-1.2	-1.4	0.2	1.5	1.0	1.9	-0.5	0.9	1.0	7.5	C20
C21	1.0	1.4	0.0	-1.2	-1.1	0.4	0.3	0.7	1.9	-0.2	1.3	1.0	5.3	C21
C22	-0.4	1.1	1.3	-0.6	-0.4	0.5	-1.7	0.6	1.9	-1.3	-0.9	1.0	1.0	C22
C23	1.2	0.5	1.7	0.0	0.4	-0.3	-0.2	0.4	1.9	-0.5	0.3	1.0	6.3	C23
C24	1.0	0.2	1.1	1.3	0.7	-0.5	-0.2	0.4	1.9	-0.5	0.1	1.0	6.5	C24
C25	2.6	1.4	0.6	-1.2	-1.0	1.8	2.0	-0.4	1.9	1.0	-0.1	1.0	9.4	C25
C26	1.9	0.3	1.1	-0.6	-0.2	0.9	1.6	-0.8	1.9	1.0	-0.1	1.0	7.9	C26
C27	1.8	0.0	0.4	0.7	0.1	0.6	1.6	-0.8	1.9	1.0	-0.3	1.0	8.0	C27
C28	1.1	1.1	0.9	-1.2	-1.2	1.0	0.9	-0.7	1.4	-0.2	-0.7	1.0	3.2	C28
C29	0.4	0.0	1.3	-0.6	-0.5	0.2	0.5	-1.0	1.4	-0.2	-0.7	1.0	1.7	C29
C30	0.2	-0.3	0.6	0.7	-0.2	-0.1	0.5	-1.0	1.4	-0.2	-0.9	1.0	1.8	C30
C31	1.4	-0.1	2.0	-1.2	-0.9	1.6	1.0	-1.1	1.2	-0.5	1.1	1.0	5.5	C31
C32	0.8	-1.1	2.4	-0.6	-0.2	0.7	0.7	-1.4	1.2	-0.5	1.1	1.0	4.0	C32
C33	0.6	-1.4	1.7	0.7	0.2	0.5	0.7	-1.4	1.2	-0.5	0.9	1.0	4.1	C33
C34	1.3	0.0	2.0	-1.2	0.5	0.4	0.9	1.1	1.2	-1.3	2.1	1.0	8.0	C34
C35	3.6	-0.6	2.9	-0.6	1.3	2.2	1.6	0.9	0.8	-1.3	3.5	1.0	15.2	C35
C36	0.5	-1.4	1.7	0.7	1.5	-0.7	0.5	0.8	1.2	-1.3	1.9	1.0	6.6	C36
C37	0.8	-0.7	1.1	0.0	-0.2	1.2	0.8	-0.9	0.1	-1.3	1.1	0.3	2.3	C37
C38	0.1	-1.7	1.5	0.7	0.5	0.3	0.5	-1.2	0.1	-1.3	1.1	0.3	0.8	C38
C39	-0.1	-2.0	0.9	2.0	0.8	0.1	0.5	-1.2	0.1	-1.3	0.9	0.3	0.9	C39
C40	0.6	-0.6	1.1	0.0	1.1	0.0	0.7	1.4	0.1	-2.1	2.1	0.3	4.7	C40
C41	0.0	-1.7	1.5	0.7	1.8	-0.9	0.3	1.0	0.1	-2.1	2.1	0.3	3.2	C41
C42	-0.2	-2.0	0.9	2.0	2.2	-1.1	0.3	1.0	0.1	-2.1	1.9	0.3	3.3	C42
C43	0.5	1.2	-0.7	-0.6	-1.1	-1.2	0.4	1.8	-1.0	0.6	-0.1	-0.3	-0.6	C43
C44	-1.3	0.9	-0.7	-0.6	-1.1	-1.0	-0.9	1.4	-1.0	1.0	0.3	-0.3	-3.4	C44
C45	-0.9	1.0	0.9	0.0	-0.3	-0.8	-1.4	1.4	-1.0	0.2	-0.5	-0.3	-1.8	C45
C46	-1.2	0.0	1.1	0.7	0.4	-1.7	-1.4	1.2	-1.0	0.6	-0.7	-0.3	-2.3	C46
C47	-1.4	-0.3	0.2	2.0	0.7	-1.9	-1.6	1.2	-1.0	0.6	-0.9	-0.3	-2.7	C47
C48	0.2	0.9	0.0	-0.6	-1.0	0.4	0.8	0.3	-1.0	2.1	-1.1	-0.3	0.8	C48
C49	-0.4	-0.2	0.4	0.0	-0.2	-0.5	0.4	0.0	-1.0	2.1	-1.1	-0.3	-0.7	C49
Minimum	**-2.1**	**-2.3**	**-2.2**	**-1.2**	**-2.4**	**-2.5**	**-2.2**	**-2.3**	**-1.9**	**-2.1**	**-1.7**	**-1.5**	**-10.6**	**Minimum**
Maximum	**3.6**	**1.7**	**2.9**	**2.6**	**2.7**	**2.7**	**2.1**	**2.0**	**1.9**	**2.1**	**3.5**	**1.6**	**15.2**	**Maximum**

KAMO Power Blackberry - Chouteau 345-kV
Un-Weighted Route Scores

Route	Total Length (miles)	Not Parallel Existing T-Line (miles)	Heavy Angles (>30 degrees)	Residences 0-150 ft (number)	Residences 150-500 ft (number)	Agricultual cropland Within ROW (acres)	Pasture/ Grassland Within ROW (acres)	Woodland Within ROW (acres)	NLCD Wetland/ Riparian Areas Within ROW (acres)	Perennial Waterways (number)	Road Crossings (number)	Length Through Superfund Area (miles)	Total Score	Route
C50	-0.6	-0.4	-0.2	1.3	0.1	-0.7	0.4	0.0	-1.0	2.1	-1.3	-0.3	-0.6	C50
C51	1.6	1.5	-0.9	-0.6	-0.6	-0.4	0.7	1.5	0.7	-0.2	0.9	-0.3	3.9	C51
C52	-0.2	1.1	-0.9	-0.6	-0.3	-0.1	-0.6	1.2	0.7	0.2	1.3	-0.3	1.5	C52
C53	0.2	1.2	0.6	0.0	0.5	0.1	-1.1	1.2	0.7	-0.5	0.5	-0.3	3.1	C53
C54	-0.1	0.3	0.9	0.7	1.2	-0.8	-1.1	0.9	0.7	-0.2	0.3	-0.3	2.5	C54
C55	-0.3	-0.1	0.0	2.0	1.5	-1.0	-1.2	0.9	0.7	-0.2	0.1	-0.3	2.1	C55
C56	1.4	1.1	-0.2	-0.6	-0.2	1.3	1.1	0.1	0.7	1.4	-0.1	-0.3	5.6	C56
C57	0.7	0.1	0.2	0.0	0.6	0.4	0.8	-0.2	0.7	1.4	-0.1	-0.3	4.1	C57
C58	0.5	-0.2	-0.5	1.3	0.9	0.1	0.8	-0.2	0.7	1.4	-0.3	-0.3	4.2	C58
C59	-0.2	0.8	-0.2	-0.6	-0.4	0.5	0.0	-0.2	0.2	0.2	-0.7	-0.3	-0.8	C59
C60	-0.8	-0.3	0.2	0.0	0.3	-0.4	-0.3	-0.5	0.2	0.2	-0.7	-0.3	-2.4	C60
C61	-1.0	-0.5	-0.5	1.3	0.6	-0.6	-0.3	-0.5	0.2	0.2	-0.9	-0.3	-2.2	C61
C62	2.0	1.6	-0.7	-0.6	-0.9	-1.2	1.7	1.0	1.3	-0.2	0.5	1.5	6.2	C62
C63	0.3	1.2	-0.5	-0.6	-0.6	-0.9	0.5	0.7	1.3	0.2	0.9	1.5	4.0	C63
C64	-1.1	0.9	0.9	0.0	0.1	-0.9	-1.5	0.6	1.3	-0.9	-1.3	1.5	-0.3	C64
C65	0.4	0.4	1.3	0.7	0.9	-1.6	0.0	0.5	1.3	-0.2	-0.1	1.5	5.1	C65
C66	0.3	0.1	0.6	2.0	1.3	-1.9	0.0	0.5	1.3	-0.2	-0.3	1.5	5.2	C66
C67	1.9	1.2	0.2	-0.6	-0.4	0.4	2.1	-0.4	1.3	1.4	-0.5	1.5	8.1	C67
C68	1.2	0.2	0.6	0.0	0.3	-0.5	1.8	-0.7	1.3	1.4	-0.5	1.5	6.6	C68
C69	1.0	-0.1	0.0	1.3	0.6	-0.7	1.8	-0.7	1.3	1.4	-0.7	1.5	6.7	C69
C70	0.3	0.9	0.4	-0.6	-0.7	-0.3	1.1	-0.7	0.8	0.2	-1.1	1.5	1.9	C70
C71	-0.4	-0.2	0.9	0.0	0.0	-1.2	0.7	-1.0	0.8	0.2	-1.1	1.5	0.4	C71
C72	-0.5	-0.4	0.2	1.3	0.4	-1.4	0.7	-1.0	0.8	0.2	-1.3	1.5	0.5	C72
C73	0.7	-0.2	1.5	-0.6	-0.3	0.2	1.2	-1.1	0.7	-0.2	0.7	1.6	4.2	C73
C74	0.0	-1.3	2.0	0.0	0.4	-0.7	0.9	-1.4	0.7	-0.2	0.7	1.6	2.7	C74
C75	-0.1	-1.6	1.3	1.3	0.7	-0.9	0.9	-1.4	0.7	-0.2	0.5	1.6	2.8	C75
C76	0.6	-0.2	1.5	-0.6	1.0	-0.9	1.0	1.2	0.7	-0.9	1.7	1.6	6.7	C76
C77	-0.1	-1.2	2.0	0.0	1.7	-1.8	0.7	0.8	0.7	-0.9	1.7	1.6	5.2	C77
C78	-0.3	-1.5	1.3	1.3	2.1	-2.1	0.7	0.8	0.7	-0.9	1.5	1.6	5.3	C78
C79	0.0	-0.8	0.6	0.7	0.3	-0.2	1.0	-0.9	-0.5	-0.9	0.7	0.9	1.0	C79
C80	-0.7	-1.9	1.1	1.3	1.0	-1.0	0.7	-1.2	-0.5	-0.9	0.7	0.9	-0.5	C80
C81	-0.8	-2.2	0.4	2.6	1.4	-1.3	0.7	-1.2	-0.5	-0.9	0.5	0.9	-0.4	C81
C82	-0.1	-0.8	0.6	0.7	1.6	-1.3	0.8	1.4	-0.4	-1.7	1.7	0.9	3.4	C82
C83	-0.8	-1.8	1.1	1.3	2.3	-2.2	0.5	1.1	-0.4	-1.7	1.7	0.9	1.9	C83
C84	-0.9	-2.1	0.4	2.6	2.7	-2.5	0.5	1.1	-0.4	-1.7	1.5	0.9	2.0	C84
Minimum	**-2.1**	**-2.3**	**-2.2**	**-1.2**	**-2.4**	**-2.5**	**-2.2**	**-2.3**	**-1.9**	**-2.1**	**-1.7**	**-1.5**	**-10.6**	**Minimum**
Maximum	**3.6**	**1.7**	**2.9**	**2.6**	**2.7**	**2.7**	**2.1**	**2.0**	**1.9**	**2.1**	**3.5**	**1.6**	**15.2**	**Maximum**

KAMO Power Blackberry - Chouteau 345-kV
Weighted Route Scores

Route	Total Length (miles)	Not Parallel Existing T-Line (miles)	Heavy Angles (>30 degrees)	Residences 0-150 ft (number)	Residences 150-500 ft (number)	Agricultual cropland Within ROW (acres)	Pasture/ Grassland Within ROW (acres)	Woodland Within ROW (acres)	NLCD Wetland/ Riparian Areas Within ROW (acres)	Perennial Waterways (number)	Road Crossings (number)	Length Through Superfund Area (miles)	Total Score	Route
Weights	7.0	8.0	4.0	10.0	9.0	4.0	1.0	5.0	8.0	2.0	3.0	2.0		
A1	-8.1	6.9	-8.9	-6.0	-21.5	-3.6	-1.6	9.8	-5.0	-1.8	-2.7	-3.0	-45.5	A1
A2	-1.9	8.4	-6.3	-6.0	-19.9	-4.4	-0.1	5.6	-13.1	-1.1	-1.5	-3.0	-43.2	A2
A3	-14.7	5.4	-6.3	-6.0	-19.9	-3.4	-1.3	4.0	-13.1	-0.3	-0.3	-3.0	-58.9	A3
A4	-11.8	6.1	-0.1	0.4	-12.6	-2.7	-1.8	3.9	-13.1	-1.8	-2.7	-3.0	-39.3	A4
A5	-13.6	-1.3	0.8	6.8	-6.2	-6.3	-1.8	2.8	-13.1	-1.1	-3.3	-3.0	-39.3	A5
A6	-14.6	-3.5	-1.9	19.6	-3.0	-7.2	-1.8	2.8	-13.1	-1.1	-3.9	-3.0	-30.7	A6
A7	-3.6	5.7	-3.6	-6.0	-18.3	2.0	0.3	-1.5	-13.1	2.0	-4.5	-3.0	-43.6	A7
A8	-8.4	-2.8	-1.9	0.4	-11.8	-1.6	0.0	-3.2	-13.1	2.0	-4.5	-3.0	-47.9	A8
A9	-9.4	-5.0	-4.5	13.2	-8.6	-2.5	0.0	-3.2	-13.1	2.0	-5.1	-3.0	-39.3	A9
A10	5.6	10.2	-7.2	-6.0	-15.1	-1.0	0.2	4.3	0.8	-2.6	1.5	-3.0	-12.1	A10
A11	-6.8	7.2	-7.2	-6.0	-12.6	0.0	-1.0	2.7	0.8	-1.8	2.7	-3.0	-25.0	A11
A12	-3.9	7.9	-1.0	0.4	-5.4	0.7	-1.5	2.6	0.8	-3.4	0.3	-3.0	-5.4	A12
A13	-5.7	0.5	-0.1	6.8	1.0	-2.8	-1.5	1.5	0.8	-2.6	-0.3	-3.0	-5.3	A13
A14	-6.7	-1.7	-2.7	19.6	4.2	-3.8	-1.5	1.5	0.8	-2.6	-0.9	-3.0	3.3	A14
A15	4.3	7.5	-4.5	-6.0	-11.0	5.4	0.7	-2.8	0.8	0.5	-1.5	-3.0	-9.7	A15
A16	-0.5	-1.0	-2.7	0.4	-4.6	1.9	0.3	-4.4	0.8	0.5	-1.5	-3.0	-13.9	A16
A17	-1.5	-3.2	-5.4	13.2	-1.4	0.9	0.3	-4.4	0.8	0.5	-2.1	-3.0	-5.3	A17
A18	-6.4	4.9	-4.5	-6.0	-13.4	2.5	-0.4	-4.2	-3.3	-1.8	-3.3	-3.0	-38.9	A18
A19	-11.2	-3.6	-2.7	0.4	-7.0	-1.0	-0.8	-5.9	-3.3	-1.8	-3.3	-3.0	-43.2	A19
A20	-12.2	-5.8	-5.4	13.2	-3.8	-2.0	-0.8	-5.9	-3.3	-1.8	-3.9	-3.0	-34.6	A20
A21	1.0	9.1	-7.2	-12.4	-12.6	0.8	-0.4	4.6	-14.9	1.2	-0.3	-1.8	-32.9	A21
A22	-11.8	6.1	-7.2	-12.4	-12.6	1.8	-1.7	3.0	-14.9	2.0	0.9	-1.8	-48.6	A22
A23	-8.9	6.8	-1.0	-6.0	-5.4	2.5	-2.2	2.9	-14.9	0.5	-1.5	-1.8	-29.0	A23
A24	-10.7	-0.6	-0.1	0.4	1.0	-1.1	-2.2	1.8	-14.9	1.2	-2.1	-1.8	-29.0	A24
A25	-11.7	-2.8	-2.7	13.2	4.2	-2.0	-2.2	1.8	-14.9	1.2	-2.7	-1.8	-20.4	A25
A26	-0.7	6.4	-4.5	-12.4	-11.0	7.2	0.0	-2.5	-14.9	4.3	-3.3	-1.8	-33.3	A26
A27	-5.5	-2.1	-2.7	-6.0	-4.6	3.6	-0.3	-4.2	-14.9	4.3	-3.3	-1.8	-37.6	A27
A28	-6.5	-4.3	-5.4	6.8	-1.4	2.7	-0.3	-4.2	-14.9	4.3	-3.9	-1.8	-29.0	A28
A29	8.5	10.9	-8.0	-12.4	-7.8	4.2	-0.1	3.3	-1.0	-0.3	2.7	-1.8	-1.8	A29
A30	-3.9	7.9	-8.0	-12.4	-5.4	5.2	-1.3	1.7	-1.0	0.5	3.9	-1.8	-14.7	A30
A31	-1.0	8.6	-1.9	-6.0	1.8	5.9	-1.8	1.6	-1.0	-1.1	1.5	-1.8	4.9	A31
A32	-2.8	1.2	-1.0	0.4	8.2	2.4	-1.8	0.5	-1.0	-0.3	0.9	-1.8	5.0	A32
A33	-3.8	-1.0	-3.6	13.2	11.4	1.4	-1.8	0.5	-1.0	-0.3	0.3	-1.8	13.6	A33
A34	7.2	8.2	-5.4	-12.4	-3.8	10.6	0.3	-3.8	-1.0	2.7	-0.3	-1.8	0.6	A34
A35	2.4	-0.3	-3.6	-6.0	2.6	7.1	0.0	-5.4	-1.0	2.7	-0.3	-1.8	-3.6	A35
A36	1.4	-2.5	-6.3	6.8	5.8	6.1	0.0	-5.4	-1.0	2.7	-0.9	-1.8	5.0	A36
A37	-3.5	5.6	-5.4	-12.4	-6.2	7.7	-0.7	-5.2	-5.0	0.5	-2.1	-1.8	-28.6	A37
A38	-8.3	-2.9	-3.6	-6.0	0.2	4.2	-1.1	-6.9	-5.0	0.5	-2.1	-1.8	-32.9	A38
A39	-9.3	-5.1	-6.3	6.8	3.4	3.2	-1.1	-6.9	-5.0	0.5	-2.7	-1.8	-24.3	A39
A40	11.9	11.8	-8.0	-12.4	-10.2	0.9	0.9	0.8	3.9	-0.3	1.5	1.9	2.6	A40
Minimum	**-14.7**	**-18.0**	**-8.9**	**-12.4**	**-21.5**	**-9.8**	**-2.2**	**-11.4**	**-14.9**	**-4.1**	**-5.1**	**-3.0**	**-58.9**	**Minimum**
Maximum	**25.3**	**13.8**	**11.4**	**26.0**	**24.3**	**10.6**	**2.1**	**9.8**	**15.0**	**4.3**	**10.5**	**3.2**	**68.4**	**Maximum**

KAMO Power Blackberry - Chouteau 345-kV
Weighted Route Scores

Weights	7.0	8.0	4.0	10.0	9.0	4.0	1.0	5.0	8.0	2.0	3.0	2.0		
Route	**Total Length (miles)**	**Not Parallel Existing T-Line (miles)**	**Heavy Angles (>30 degrees)**	**Residences 0-150 ft (number)**	**Residences 150-500 ft (number)**	**Agricultual cropland Within ROW (acres)**	**Pasture/ Grassland Within ROW (acres)**	**Woodland Within ROW (acres)**	**NLCD Wetland/ Riparian Areas Within ROW (acres)**	**Perennial Waterways (number)**	**Road Crossings (number)**	**Length Through Superfund Area (miles)**	**Total Score**	**Route**
A41	-0.4	8.7	-7.2	-12.4	-7.8	1.9	-0.3	-0.8	3.9	0.5	2.7	1.9	-9.4	A41
A42	2.4	9.5	-1.0	-6.0	-0.6	2.6	-0.8	-0.8	3.9	-1.1	0.3	1.9	10.2	A42
A43	0.7	2.0	-0.1	0.4	5.8	-1.0	-0.8	-2.0	3.9	-0.3	-0.3	1.9	10.3	A43
A44	-0.4	-0.2	-2.7	13.2	9.0	-1.9	-0.8	-2.0	3.9	-0.3	-0.9	1.9	18.8	A44
A45	10.6	9.0	-4.5	-12.4	-6.2	7.3	1.4	-6.3	3.9	2.7	-1.5	1.9	5.9	A45
A46	5.8	0.5	-2.7	-6.0	0.2	3.7	1.0	-7.9	3.9	2.7	-1.5	1.9	1.7	A46
A47	4.8	-1.7	-5.4	6.8	3.4	2.8	1.0	-7.9	3.9	2.7	-2.1	1.9	10.2	A47
A48	-0.1	6.5	-3.6	-12.4	-8.6	4.4	0.3	-7.7	-0.2	0.5	-3.3	1.9	-22.5	A48
A49	-4.9	-2.1	-1.9	-6.0	-2.2	0.9	-0.1	-9.3	-0.2	0.5	-3.3	1.9	-26.7	A49
A50	-5.9	-4.3	-4.5	6.8	1.0	-0.1	-0.1	-9.3	-0.2	0.5	-3.9	1.9	-18.1	A50
A51	2.5	-2.5	0.8	-12.4	-5.4	6.5	0.4	-9.7	-1.5	-0.3	2.1	2.1	-17.4	A51
A52	-2.3	-11.0	2.6	-6.0	1.0	3.0	0.1	-11.4	-1.5	-0.3	2.1	2.1	-21.7	A52
A53	-3.3	-13.2	-0.1	6.8	4.2	2.0	0.1	-11.4	-1.5	-0.3	1.5	2.1	-13.1	A53
A54	1.6	-2.1	0.8	-12.4	6.6	1.8	0.3	1.6	-1.2	-1.8	5.1	2.1	2.3	A54
A55	-3.1	-10.7	2.6	-6.0	13.0	-1.7	-0.1	-0.1	-1.2	-1.8	5.1	2.1	-2.0	A55
A56	-4.2	-12.9	-0.1	6.8	16.3	-2.7	-0.1	-0.1	-1.2	-1.8	4.5	2.1	6.6	A56
A57	-2.3	-7.3	-2.7	0.4	0.2	4.9	0.2	-8.5	-10.6	-1.8	2.1	0.6	-24.7	A57
A58	-7.0	-15.8	-1.0	6.8	6.6	1.4	-0.1	-10.2	-10.6	-1.8	2.1	0.6	-29.0	A58
A59	-8.1	-18.0	-3.6	19.6	9.8	0.5	-0.1	-10.2	-10.6	-1.8	1.5	0.6	-20.4	A59
A60	2.3	-5.6	-1.0	0.4	12.2	1.2	0.6	2.8	-10.3	-3.4	6.3	0.6	6.1	A60
A61	-7.9	-15.4	-1.0	6.8	18.7	-3.3	-0.3	1.1	-10.3	-3.4	5.1	0.6	-9.3	A61
A62	-8.9	-17.7	-3.6	19.6	21.9	-4.2	-0.3	1.1	-10.3	-3.4	4.5	0.6	-0.7	A62
B1	3.1	9.6	-4.5	-12.4	-13.4	-2.8	0.3	8.6	-12.7	1.2	-1.5	-1.8	-26.5	B1
B2	-9.7	6.6	-4.5	-12.4	-13.4	-1.8	-1.0	6.9	-12.7	2.0	-0.3	-1.8	-42.2	B2
B3	-6.9	7.3	1.7	-6.0	-6.2	-1.1	-1.5	6.9	-12.7	0.5	-2.7	-1.8	-22.6	B3
B4	-8.6	-0.1	2.6	0.4	0.2	-4.6	-1.5	5.8	-12.7	1.2	-3.3	-1.8	-22.5	B4
B5	-10.5	-2.5	-1.0	13.2	3.4	-5.6	-1.7	5.8	-12.7	1.2	-3.9	-1.8	-16.0	B5
B6	1.3	6.9	-1.9	-12.4	-11.8	3.6	0.7	1.5	-12.7	4.3	-4.5	-1.8	-26.9	B6
B7	-3.5	-1.6	-0.1	-6.0	-5.4	0.1	0.3	-0.2	-12.7	4.3	-4.5	-1.8	-31.1	B7
B8	-4.5	-3.9	-2.7	6.8	-2.2	-0.9	0.3	-0.2	-12.7	4.3	-5.1	-1.8	-22.5	B8
B9	10.6	11.4	-5.4	-12.4	-8.6	0.6	0.6	7.3	1.2	-0.3	1.5	-1.8	4.7	B9
B10	-1.8	8.4	-5.4	-12.4	-6.2	1.6	-0.7	5.7	1.2	0.5	2.7	-1.8	-8.2	B10
B11	1.0	9.1	0.8	-6.0	1.0	2.3	-1.2	5.6	1.2	-1.1	0.3	-1.8	11.4	B11
B12	-0.7	1.7	1.7	0.4	7.4	-1.2	-1.2	4.5	1.2	-0.3	-0.3	-1.8	11.4	B12
B13	-2.5	-0.7	-1.9	13.2	10.6	-2.1	-1.3	4.5	1.2	-0.3	-0.9	-1.8	18.0	B13
B14	9.2	8.7	-2.7	-12.4	-4.6	7.0	1.0	0.2	1.2	2.7	-1.5	-1.8	7.1	B14
B15	4.5	0.2	-1.0	-6.0	1.8	3.5	0.7	-1.5	1.2	2.7	-1.5	-1.8	2.8	B15
B16	3.4	-2.0	-3.6	6.8	5.0	2.6	0.7	-1.5	1.2	2.7	-2.1	-1.8	11.4	B16
B17	-1.5	6.1	-2.7	-12.4	-7.0	4.2	-0.1	-1.2	-2.9	0.5	-3.3	-1.8	-22.2	B17
Minimum	**-14.7**	**-18.0**	**-8.9**	**-12.4**	**-21.5**	**-9.8**	**-2.2**	**-11.4**	**-14.9**	**-4.1**	**-5.1**	**-3.0**	**-58.9**	**Minimum**
Maximum	**25.3**	**13.8**	**11.4**	**26.0**	**24.3**	**10.6**	**2.1**	**9.8**	**15.0**	**4.3**	**10.5**	**3.2**	**68.4**	**Maximum**

KAMO Power Blackberry - Chouteau 345-kV
Weighted Route Scores
September 5, 2007

Weights	7.0	8.0	4.0	10.0	9.0	4.0	1.0	5.0	8.0	2.0	3.0	2.0		
Route	**Total Length (miles)**	**Not Parallel Existing T-Line (miles)**	**Heavy Angles (>30 degrees)**	**Residences 0-150 ft (number)**	**Residences 150-500 ft (number)**	**Agricultual cropland Within ROW (acres)**	**Pasture/ Grassland Within ROW (acres)**	**Woodland Within ROW (acres)**	**NLCD Wetland/ Riparian Areas Within ROW (acres)**	**Perennial Waterways (number)**	**Road Crossings (number)**	**Length Through Superfund Area (miles)**	**Total Score**	**Route**
B18	-6.3	-2.4	-1.0	-6.0	-0.6	0.6	-0.4	-2.9	-2.9	0.5	-3.3	-1.8	-26.4	B18
B19	-7.3	-4.6	-3.6	6.8	2.6	-0.3	-0.4	-2.9	-2.9	0.5	-3.9	-1.8	-17.9	B19
B20	14.0	12.3	-5.4	-12.4	-11.0	-2.7	1.6	4.8	6.1	-0.3	0.3	1.9	9.1	B20
B21	1.6	9.2	-4.5	-12.4	-8.6	-1.7	0.4	3.2	6.1	0.5	1.5	1.9	-2.9	B21
B22	-8.0	7.0	0.8	-6.0	-2.2	-1.4	-1.6	2.7	6.1	-1.8	-5.1	1.9	-7.7	B22
B23	2.7	2.5	2.6	0.4	5.0	-4.5	-0.1	2.0	6.1	-0.3	-1.5	1.9	16.7	B23
B24	1.7	0.3	-0.1	13.2	8.2	-5.5	-0.1	2.0	6.1	-0.3	-2.1	1.9	25.3	B24
B25	12.6	9.5	-1.9	-12.4	-7.0	3.7	2.0	-2.3	6.1	2.7	-2.7	1.9	12.3	B25
B26	7.9	1.0	-0.1	-6.0	-0.6	0.2	1.7	-3.9	6.1	2.7	-2.7	1.9	8.1	B26
B27	6.9	-1.2	-2.7	6.8	2.6	-0.8	1.7	-3.9	6.1	2.7	-3.3	1.9	16.7	B27
B28	1.9	7.0	-1.0	-12.4	-9.4	0.8	1.0	-3.7	2.0	0.5	-4.5	1.9	-16.0	B28
B29	-2.9	-1.6	0.8	-6.0	-3.0	-2.7	0.6	-5.4	2.0	0.5	-4.5	1.9	-20.3	B29
B30	-3.9	-3.8	-1.9	6.8	0.2	-3.7	0.6	-5.4	2.0	0.5	-5.1	1.9	-11.7	B30
B31	4.5	-2.0	3.5	-12.4	-6.2	3.0	1.1	-5.7	0.7	-0.3	0.9	2.1	-11.0	B31
B32	-0.3	-10.5	5.2	-6.0	0.2	-0.6	0.8	-7.4	0.7	-0.3	0.9	2.1	-15.2	B32
B33	-1.3	-12.7	2.6	6.8	3.4	-1.5	0.8	-7.4	0.7	-0.3	0.3	2.1	-6.6	B33
B34	3.7	-1.6	3.5	-12.4	5.8	-1.7	0.9	5.5	1.0	-1.8	3.9	2.1	8.7	B34
B35	-1.1	-10.2	5.2	-6.0	12.2	-5.3	0.6	3.9	1.0	-1.8	3.9	2.1	4.5	B35
B36	-2.1	-12.4	2.6	6.8	15.5	-6.2	0.6	3.9	1.0	-1.8	3.3	2.1	13.1	B36
B37	-0.2	-6.8	-0.1	0.4	-0.6	1.4	0.9	-4.6	-8.4	-1.8	0.9	0.6	-18.3	B37
B38	-5.0	-15.3	1.7	6.8	5.8	-2.1	0.6	-6.2	-8.4	-1.8	0.9	0.6	-22.5	B38
B39	-6.0	-17.5	-1.0	19.6	9.0	-3.1	0.6	-6.2	-8.4	-1.8	0.3	0.6	-14.0	B39
B40	-1.1	-6.4	-0.1	0.4	11.4	-3.3	0.7	6.7	-8.1	-3.4	3.9	0.6	1.4	B40
B41	-5.8	-15.0	1.7	6.8	17.9	-6.9	0.4	5.1	-8.1	-3.4	3.9	0.6	-2.8	B41
B42	-6.9	-17.2	-1.0	19.6	21.1	-7.8	0.4	5.1	-8.1	-3.4	3.3	0.6	5.8	B42
C1	8.6	11.2	-0.1	-12.4	-15.1	0.5	0.2	8.7	-3.8	0.5	0.9	-1.8	-2.6	C1
C2	-4.2	8.2	-0.1	-12.4	-15.1	1.5	-1.1	7.1	-3.8	1.2	2.1	-1.8	-18.3	C2
C3	-1.3	8.9	6.1	-6.0	-7.8	2.2	-1.6	7.0	-3.8	-0.3	-0.3	-1.8	1.3	C3
C4	-3.1	1.5	7.0	0.4	-1.4	-1.3	-1.6	5.9	-3.8	0.5	-0.9	-1.8	1.4	C4
C5	-4.9	-1.0	3.5	13.2	1.8	-2.3	-1.7	5.9	-3.8	0.5	-1.5	-1.8	7.9	C5
C6	6.9	8.5	2.6	-12.4	-13.4	6.9	0.6	1.6	-3.8	3.5	-2.1	-1.8	-3.0	C6
C7	2.1	-0.1	4.3	-6.0	-7.0	3.4	0.2	0.0	-3.8	3.5	-2.1	-1.8	-7.2	C7
C8	1.1	-2.3	1.7	6.8	-3.8	2.5	0.3	0.0	-3.8	3.5	-2.7	-1.8	1.3	C8
C9	16.1	13.0	-1.0	-12.4	-10.2	4.0	0.5	7.5	10.1	-1.1	3.9	-1.8	28.6	C9
C10	3.8	10.0	-1.0	-12.4	-7.8	5.0	-0.7	5.8	10.1	-0.3	5.1	-1.8	15.7	C10
C11	6.6	10.7	5.2	-6.0	-0.6	5.7	-1.2	5.8	10.1	-1.8	2.7	-1.8	35.3	C11
C12	4.9	3.3	6.1	0.4	5.8	2.1	-1.3	4.6	10.1	-1.1	2.1	-1.8	35.3	C12
C13	3.0	0.9	2.6	13.2	9.0	1.2	-1.4	4.6	10.1	-1.1	1.5	-1.8	41.9	C13
C14	14.8	10.3	1.7	-12.4	-6.2	10.4	0.9	0.4	10.1	2.0	0.9	-1.8	31.0	C14
Minimum	**-14.7**	**-18.0**	**-8.9**	**-12.4**	**-21.5**	**-9.8**	**-2.2**	**-11.4**	**-14.9**	**-4.1**	**-5.1**	**-3.0**	**-58.9**	**Minimum**
Maximum	**25.3**	**13.8**	**11.4**	**26.0**	**24.3**	**10.6**	**2.1**	**9.8**	**15.0**	**4.3**	**10.5**	**3.2**	**68.4**	**Maximum**

KAMO Power Blackberry - Chouteau 345-kV
Weighted Route Scores

Weights	7.0	8.0	4.0	10.0	9.0	4.0	1.0	5.0	8.0	2.0	3.0	2.0		
Route	**Total Length (miles)**	**Not Parallel Existing T-Line (miles)**	**Heavy Angles (>30 degrees)**	**Residences 0-150 ft (number)**	**Residences 150-500 ft (number)**	**Agricultual cropland Within ROW (acres)**	**Pasture/ Grassland Within ROW (acres)**	**Woodland Within ROW (acres)**	**NLCD Wetland/ Riparian Areas Within ROW (acres)**	**Perennial Waterways (number)**	**Road Crossings (number)**	**Length Through Superfund Area (miles)**	**Total Score**	**Route**
C15	10.0	1.7	3.5	-6.0	0.2	6.8	0.6	-1.3	10.1	2.0	0.9	-1.8	26.7	C15
C16	9.0	-0.5	0.8	6.8	3.4	5.9	0.6	-1.3	10.1	2.0	0.3	-1.8	35.3	C16
C17	4.1	7.7	1.7	-12.4	-8.6	7.5	-0.2	-1.1	6.1	-0.3	-0.9	-1.8	1.7	C17
C18	-0.7	-0.8	3.5	-6.0	-2.2	4.0	-0.5	-2.7	6.1	-0.3	-0.9	-1.8	-2.6	C18
C19	-1.7	-3.1	0.8	6.8	1.0	3.0	-0.5	-2.7	6.1	-0.3	-1.5	-1.8	6.0	C19
C20	19.5	13.8	-1.0	-12.4	-12.6	0.6	1.5	5.0	15.0	-1.1	2.7	1.9	32.9	C20
C21	7.2	10.8	-0.1	-12.4	-10.2	1.6	0.3	3.3	15.0	-0.3	3.9	1.9	20.9	C21
C22	-2.5	8.5	5.2	-6.0	-3.8	1.9	-1.7	2.9	15.0	-2.6	-2.7	1.9	16.2	C22
C23	8.3	4.1	7.0	0.4	3.4	-1.2	-0.2	2.2	15.0	-1.1	0.9	1.9	40.6	C23
C24	7.3	1.9	4.3	13.2	6.6	-2.2	-0.2	2.2	15.0	-1.1	0.3	1.9	49.2	C24
C25	18.2	11.1	2.6	-12.4	-8.6	7.0	2.0	-2.1	15.0	2.0	-0.3	1.9	36.2	C25
C26	13.4	2.6	4.3	-6.0	-2.2	3.5	1.6	-3.8	15.0	2.0	-0.3	1.9	32.0	C26
C27	12.4	0.3	1.7	6.8	1.0	2.5	1.6	-3.8	15.0	2.0	-0.9	1.9	40.6	C27
C28	7.5	8.5	3.5	-12.4	-11.0	4.1	0.9	-3.6	10.9	-0.3	-2.1	1.9	7.9	C28
C29	2.7	0.0	5.2	-6.0	-4.6	0.6	0.5	-5.2	10.9	-0.3	-2.1	1.9	3.6	C29
C30	1.7	-2.2	2.6	6.8	-1.4	-0.3	0.5	-5.2	10.9	-0.3	-2.7	1.9	12.2	C30
C31	10.1	-0.4	7.9	-12.4	-7.8	6.3	1.0	-5.6	9.6	-1.1	3.3	2.1	12.9	C31
C32	5.3	-9.0	9.7	-6.0	-1.4	2.8	0.7	-7.2	9.6	-1.1	3.3	2.1	8.7	C32
C33	4.3	-11.2	7.0	6.8	1.8	1.8	0.7	-7.2	9.6	-1.1	2.7	2.1	17.2	C33
C34	9.2	-0.1	7.9	-12.4	4.2	1.6	0.9	5.7	9.9	-2.6	6.3	2.1	32.6	C34
C35	25.3	-5.0	11.4	-6.0	11.4	8.7	1.6	4.7	6.4	-2.6	10.5	2.1	68.4	C35
C36	3.5	-10.8	7.0	6.8	13.8	-2.9	0.5	4.0	9.9	-2.6	5.7	2.1	37.0	C36
C37	5.3	-5.2	4.3	0.4	-2.2	4.7	0.8	-4.4	0.5	-2.6	3.3	0.6	5.6	C37
C38	0.6	-13.7	6.1	6.8	4.2	1.2	0.5	-6.1	0.5	-2.6	3.3	0.6	1.3	C38
C39	-0.5	-16.0	3.5	19.6	7.4	0.2	0.5	-6.1	0.5	-2.6	2.7	0.6	9.9	C39
C40	4.5	-4.9	4.3	0.4	9.8	0.0	0.7	6.9	0.8	-4.1	6.3	0.6	25.3	C40
C41	-0.3	-13.4	6.1	6.8	16.3	-3.5	0.3	5.2	0.8	-4.1	6.3	0.6	21.1	C41
C42	-1.3	-15.6	3.5	19.6	19.5	-4.5	0.3	5.2	0.8	-4.1	5.7	0.6	29.6	C42
C43	3.4	9.9	-2.7	-6.0	-10.2	-4.8	0.4	8.8	-8.1	1.2	-0.3	-0.7	-9.1	C43
C44	-9.4	6.9	-2.7	-6.0	-10.2	-3.8	-0.9	7.2	-8.1	2.0	0.9	-0.7	-24.8	C44
C45	-6.6	7.6	3.5	0.4	-3.0	-3.1	-1.4	7.1	-8.1	0.5	-1.5	-0.7	-5.2	C45
C46	-8.3	0.2	4.3	6.8	3.4	-6.7	-1.4	6.0	-8.1	1.2	-2.1	-0.7	-5.2	C46
C47	-10.1	-2.2	0.8	19.6	6.6	-7.6	-1.6	6.0	-8.1	1.2	-2.7	-0.7	1.3	C47
C48	1.6	7.2	-0.1	-6.0	-8.6	1.6	0.8	1.7	-8.1	4.3	-3.3	-0.7	-9.5	C48
C49	-3.1	-1.3	1.7	0.4	-2.2	-2.0	0.4	0.1	-8.1	4.3	-3.3	-0.7	-13.8	C49
C50	-4.1	-3.6	-1.0	13.2	1.0	-2.9	0.4	0.1	-8.1	4.3	-3.9	-0.7	-5.2	C50
C51	10.9	11.7	-3.6	-6.0	-5.4	-1.4	0.7	7.6	5.9	-0.3	2.7	-0.7	22.0	C51
C52	-1.5	8.7	-3.6	-6.0	-3.0	-0.4	-0.6	5.9	5.9	0.5	3.9	-0.7	9.1	C52
C53	1.3	9.4	2.6	0.4	4.2	0.3	-1.1	5.9	5.9	-1.1	1.5	-0.7	28.7	C53
Minimum	**-14.7**	**-18.0**	**-8.9**	**-12.4**	**-21.5**	**-9.8**	**-2.2**	**-11.4**	**-14.9**	**-4.1**	**-5.1**	**-3.0**	**-58.9**	**Minimum**
Maximum	**25.3**	**13.8**	**11.4**	**26.0**	**24.3**	**10.6**	**2.1**	**9.8**	**15.0**	**4.3**	**10.5**	**3.2**	**68.4**	**Maximum**

KAMO Power Blackberry - Chouteau 345-kV
Weighted Route Scores

Weights	7.0	8.0	4.0	10.0	9.0	4.0	1.0	5.0	8.0	2.0	3.0	2.0		
Route	**Total Length (miles)**	**Not Parallel Existing T-Line (miles)**	**Heavy Angles (>30 degrees)**	**Residences 0-150 ft (number)**	**Residences 150-500 ft (number)**	**Agricultual cropland Within ROW (acres)**	**Pasture/ Grassland Within ROW (acres)**	**Woodland Within ROW (acres)**	**NLCD Wetland/ Riparian Areas Within ROW (acres)**	**Perennial Waterways (number)**	**Road Crossings (number)**	**Length Through Superfund Area (miles)**	**Total Score**	**Route**
C54	-0.4	2.0	3.5	6.8	10.6	-3.2	-1.1	4.7	5.9	-0.3	0.9	-0.7	28.8	C54
C55	-2.2	-0.4	-0.1	19.6	13.8	-4.2	-1.2	4.7	5.9	-0.3	0.3	-0.7	35.3	C55
C56	9.6	9.0	-1.0	-6.0	-1.4	5.0	1.1	0.5	5.9	2.7	-0.3	-0.7	24.4	C56
C57	4.8	0.5	0.8	0.4	5.0	1.5	0.8	-1.2	5.9	2.7	-0.3	-0.7	20.2	C57
C58	3.8	-1.7	-1.9	13.2	8.2	0.5	0.8	-1.2	5.9	2.7	-0.9	-0.7	28.7	C58
C59	-1.2	6.4	-1.0	-6.0	-3.8	2.1	0.0	-1.0	1.8	0.5	-2.1	-0.7	-4.9	C59
C60	-5.9	-2.1	0.8	0.4	2.6	-1.4	-0.3	-2.6	1.8	0.5	-2.1	-0.7	-9.1	C60
C61	-7.0	-4.3	-1.9	13.2	5.8	-2.4	-0.3	-2.6	1.8	0.5	-2.7	-0.7	-0.5	C61
C62	14.3	12.6	-2.7	-6.0	-7.8	-4.7	1.7	5.1	10.7	-0.3	1.5	3.0	27.3	C62
C63	1.9	9.5	-1.9	-6.0	-5.4	-3.7	0.5	3.5	10.7	0.5	2.7	3.0	15.3	C63
C64	-7.7	7.3	3.5	0.4	1.0	-3.4	-1.5	3.0	10.7	-1.8	-3.9	3.0	10.5	C64
C65	3.0	2.8	5.2	6.8	8.2	-6.6	0.0	2.3	10.7	-0.3	-0.3	3.0	34.9	C65
C66	2.0	0.6	2.6	19.6	11.4	-7.5	0.0	2.3	10.7	-0.3	-0.9	3.0	43.5	C66
C67	13.0	9.8	0.8	-6.0	-3.8	1.7	2.1	-2.0	10.7	2.7	-1.5	3.0	30.6	C67
C68	8.2	1.3	2.6	0.4	2.6	-1.9	1.8	-3.7	10.7	2.7	-1.5	3.0	26.3	C68
C69	7.2	-0.9	-0.1	13.2	5.8	-2.8	1.8	-3.7	10.7	2.7	-2.1	3.0	34.9	C69
C70	2.2	7.2	1.7	-6.0	-6.2	-1.2	1.1	-3.4	6.7	0.5	-3.3	3.0	2.2	C70
C71	-2.5	-1.3	3.5	0.4	0.2	-4.7	0.7	-5.1	6.7	0.5	-3.3	3.0	-2.1	C71
C72	-3.5	-3.5	0.8	13.2	3.4	-5.7	0.7	-5.1	6.7	0.5	-3.9	3.0	6.5	C72
C73	4.8	-1.7	6.1	-6.0	-3.0	0.9	1.2	-5.5	5.4	-0.3	2.1	3.2	7.2	C73
C74	0.1	-10.2	7.9	0.4	3.4	-2.6	0.9	-7.1	5.4	-0.3	2.1	3.2	3.0	C74
C75	-0.9	-12.5	5.2	13.2	6.6	-3.6	0.9	-7.1	5.4	-0.3	1.5	3.2	11.6	C75
C76	4.0	-1.3	6.1	-6.0	9.0	-3.8	1.0	5.8	5.7	-1.8	5.1	3.2	27.0	C76
C77	-0.8	-9.9	7.9	0.4	15.5	-7.3	0.7	4.1	5.7	-1.8	5.1	3.2	22.7	C77
C78	-1.8	-12.1	5.2	13.2	18.7	-8.3	0.7	4.1	5.7	-1.8	4.5	3.2	31.3	C78
C79	0.1	-6.5	2.6	6.8	2.6	-0.7	1.0	-4.3	-3.7	-1.8	2.1	1.7	-0.1	C79
C80	-4.7	-15.0	4.3	13.2	9.0	-4.2	0.7	-6.0	-3.7	-1.8	2.1	1.7	-4.3	C80
C81	-5.7	-17.2	1.7	26.0	12.2	-5.1	0.7	-6.0	-3.7	-1.8	1.5	1.7	4.3	C81
C82	-0.7	-6.1	2.6	6.8	14.7	-5.4	0.8	7.0	-3.4	-3.4	5.1	1.7	19.6	C82
C83	-5.5	-14.7	4.3	13.2	21.1	-8.9	0.5	5.3	-3.4	-3.4	5.1	1.7	15.4	C83
C84	-6.5	-16.9	1.7	26.0	24.3	-9.8	0.5	5.3	-3.4	-3.4	4.5	1.7	24.0	C84
Minimum	**-14.7**	**-18.0**	**-8.9**	**-12.4**	**-21.5**	**-9.8**	**-2.2**	**-11.4**	**-14.9**	**-4.1**	**-5.1**	**-3.0**	**-58.9**	**Minimum**
Maximum	**25.3**	**13.8**	**11.4**	**26.0**	**24.3**	**10.6**	**2.1**	**9.8**	**15.0**	**4.3**	**10.5**	**3.2**	**68.4**	**Maximum**

KAMO Power Blackberry - Chouteau 345 kV
Weighted Route Scores in Ascending Order

Route	Total Length (miles)	Not Parallel Existing T-Line (miles)	Heavy Angles (>30 degrees)	Residences 0-150 ft (number)	Residences 150-500 ft (number)	Agricultual cropland Within ROW (acres)	Pasture/ Grassland Within ROW (acres)	Woodland Within ROW (acres)	NLCD Wetland/ Riparian Areas Within ROW (acres)	Perennial Waterways (number)	Road Crossings (number)	Length Through Superfund Area (miles)	Total Score	Route
Weights	7.0	8.0	4.0	10.0	9.0	4.0	1.0	5.0	8.0	2.0	3.0	2.0		
A3	-14.7	5.4	-6.3	-6.0	-19.9	-3.4	-1.3	4.0	-13.1	-0.3	-0.3	-3.0	-58.9	A3
A22	-11.8	6.1	-7.2	-12.4	-12.6	1.8	-1.7	3.0	-14.9	2.0	0.9	-1.8	-48.6	A22
A8	-8.4	-2.8	-1.9	0.4	-11.8	-1.6	0.0	-3.2	-13.1	2.0	-4.5	-3.0	-47.9	A8
A1	-8.1	6.9	-8.9	-6.0	-21.5	-3.6	-1.6	9.8	-5.0	-1.8	-2.7	-3.0	-45.5	A1
A7	-3.6	5.7	-3.6	-6.0	-18.3	2.0	0.3	-1.5	-13.1	2.0	-4.5	-3.0	-43.6	A7
A2	-1.9	8.4	-6.3	-6.0	-19.9	-4.4	-0.1	5.6	-13.1	-1.1	-1.5	-3.0	-43.2	A2
A19	-11.2	-3.6	-2.7	0.4	-7.0	-1.0	-0.8	-5.9	-3.3	-1.8	-3.3	-3.0	-43.2	A19
B2	-9.7	6.6	-4.5	-12.4	-13.4	-1.8	-1.0	6.9	-12.7	2.0	-0.3	-1.8	-42.2	B2
A4	-11.8	6.1	-0.1	0.4	-12.6	-2.7	-1.8	3.9	-13.1	-1.8	-2.7	-3.0	-39.3	A4
A9	-9.4	-5.0	-4.5	13.2	-8.6	-2.5	0.0	-3.2	-13.1	2.0	-5.1	-3.0	-39.3	A9
A5	-13.6	-1.3	0.8	6.8	-6.2	-6.3	-1.8	2.8	-13.1	-1.1	-3.3	-3.0	-39.3	A5
A18	-6.4	4.9	-4.5	-6.0	-13.4	2.5	-0.4	-4.2	-3.3	-1.8	-3.3	-3.0	-38.9	A18
A27	-5.5	-2.1	-2.7	-6.0	-4.6	3.6	-0.3	-4.2	-14.9	4.3	-3.3	-1.8	-37.6	A27
A20	-12.2	-5.8	-5.4	13.2	-3.8	-2.0	-0.8	-5.9	-3.3	-1.8	-3.9	-3.0	-34.6	A20
A26	-0.7	6.4	-4.5	-12.4	-11.0	7.2	0.0	-2.5	-14.9	4.3	-3.3	-1.8	-33.3	A26
A21	1.0	9.1	-7.2	-12.4	-12.6	0.8	-0.4	4.6	-14.9	1.2	-0.3	-1.8	-32.9	A21
A38	-8.3	-2.9	-3.6	-6.0	0.2	4.2	-1.1	-6.9	-5.0	0.5	-2.1	-1.8	-32.9	A38
B7	-3.5	-1.6	-0.1	-6.0	-5.4	0.1	0.3	-0.2	-12.7	4.3	-4.5	-1.8	-31.1	B7
A6	-14.6	-3.5	-1.9	19.6	-3.0	-7.2	-1.8	2.8	-13.1	-1.1	-3.9	-3.0	-30.7	A6
A23	-8.9	6.8	-1.0	-6.0	-5.4	2.5	-2.2	2.9	-14.9	0.5	-1.5	-1.8	-29.0	A23
A58	-7.0	-15.8	-1.0	6.8	6.6	1.4	-0.1	-10.2	-10.6	-1.8	2.1	0.6	-29.0	A58
A28	-6.5	-4.3	-5.4	6.8	-1.4	2.7	-0.3	-4.2	-14.9	4.3	-3.9	-1.8	-29.0	A28
A24	-10.7	-0.6	-0.1	0.4	1.0	-1.1	-2.2	1.8	-14.9	1.2	-2.1	-1.8	-29.0	A24
A37	-3.5	5.6	-5.4	-12.4	-6.2	7.7	-0.7	-5.2	-5.0	0.5	-2.1	-1.8	-28.6	A37
B6	1.3	6.9	-1.9	-12.4	-11.8	3.6	0.7	1.5	-12.7	4.3	-4.5	-1.8	-26.9	B6
A49	-4.9	-2.1	-1.9	-6.0	-2.2	0.9	-0.1	-9.3	-0.2	0.5	-3.3	1.9	-26.7	A49
B1	3.1	9.6	-4.5	-12.4	-13.4	-2.8	0.3	8.6	-12.7	1.2	-1.5	-1.8	-26.5	B1
B18	-6.3	-2.4	-1.0	-6.0	-0.6	0.6	-0.4	-2.9	-2.9	0.5	-3.3	-1.8	-26.4	B18
A11	-6.8	7.2	-7.2	-6.0	-12.6	0.0	-1.0	2.7	0.8	-1.8	2.7	-3.0	-25.0	A11
C44	-9.4	6.9	-2.7	-6.0	-10.2	-3.8	-0.9	7.2	-8.1	2.0	0.9	-0.7	-24.8	C44
A57	-2.3	-7.3	-2.7	0.4	0.2	4.9	0.2	-8.5	-10.6	-1.8	2.1	0.6	-24.7	A57
A39	-9.3	-5.1	-6.3	6.8	3.4	3.2	-1.1	-6.9	-5.0	0.5	-2.7	-1.8	-24.3	A39
B3	-6.9	7.3	1.7	-6.0	-6.2	-1.1	-1.5	6.9	-12.7	0.5	-2.7	-1.8	-22.6	B3
B38	-5.0	-15.3	1.7	6.8	5.8	-2.1	0.6	-6.2	-8.4	-1.8	0.9	0.6	-22.5	B38
B8	-4.5	-3.9	-2.7	6.8	-2.2	-0.9	0.3	-0.2	-12.7	4.3	-5.1	-1.8	-22.5	B8
B4	-8.6	-0.1	2.6	0.4	0.2	-4.6	-1.5	5.8	-12.7	1.2	-3.3	-1.8	-22.5	B4
A48	-0.1	6.5	-3.6	-12.4	-8.6	4.4	0.3	-7.7	-0.2	0.5	-3.3	1.9	-22.5	A48
B17	-1.5	6.1	-2.7	-12.4	-7.0	4.2	-0.1	-1.2	-2.9	0.5	-3.3	-1.8	-22.2	B17
A52	-2.3	-11.0	2.6	-6.0	1.0	3.0	0.1	-11.4	-1.5	-0.3	2.1	2.1	-21.7	A52
Minimum	**-14.7**	**-18.0**	**-8.9**	**-12.4**	**-21.5**	**-9.8**	**-2.2**	**-11.4**	**-14.9**	**-4.1**	**-5.1**	**-3.0**	**-58.9**	**Minimum**
Maximum	**25.3**	**13.8**	**11.4**	**26.0**	**24.3**	**10.6**	**2.1**	**9.8**	**15.0**	**4.3**	**10.5**	**3.2**	**68.4**	**Maximum**

KAMO Power Blackberry - Chouteau 345 kV
Weighted Route Scores in Ascending Order

Route	Total Length (miles)	Not Parallel Existing T-Line (miles)	Heavy Angles (>30 degrees)	Residences 0-150 ft (number)	Residences 150-500 ft (number)	Length Through Agricultual cropland (acres)	Length Through Pasture/ Grassland (acres)	Woodland (acres)	NLCD Wetland/ Riparian Areas (acres)	Perennial Waterways (number)	Road Crossings (number)	Length Through Superfund Area (miles)	Total Score	Route
Weights	7.00	8.00	4.00	10.00	9.00	4.00	1.00	5.00	8.00	2.00	3.00	2.00		
A59	-8.1	-18.0	-3.6	19.6	9.8	0.5	-0.1	-10.2	-10.6	-1.8	1.5	0.6	-20.4	A59
A25	-11.7	-2.8	-2.7	13.2	4.2	-2.0	-2.2	1.8	-14.9	1.2	-2.7	-1.8	-20.4	A25
B29	-2.9	-1.6	0.8	-6.0	-3.0	-2.7	0.6	-5.4	2.0	0.5	-4.5	1.9	-20.3	B29
B37	-0.2	-6.8	-0.1	0.4	-0.6	1.4	0.9	-4.6	-8.4	-1.8	0.9	0.6	-18.3	B37
C2	-4.2	8.2	-0.1	-12.4	-15.1	1.5	-1.1	7.1	-3.8	1.2	2.1	-1.8	-18.3	C2
A50	-5.9	-4.3	-4.5	6.8	1.0	-0.1	-0.1	-9.3	-0.2	0.5	-3.9	1.9	-18.1	A50
B19	-7.3	-4.6	-3.6	6.8	2.6	-0.3	-0.4	-2.9	-2.9	0.5	-3.9	-1.8	-17.9	B19
A51	2.5	-2.5	0.8	-12.4	-5.4	6.5	0.4	-9.7	-1.5	-0.3	2.1	2.1	-17.4	A51
B28	1.9	7.0	-1.0	-12.4	-9.4	0.8	1.0	-3.7	2.0	0.5	-4.5	1.9	-16.0	B28
B5	-10.5	-2.5	-1.0	13.2	3.4	-5.6	-1.7	5.8	-12.7	1.2	-3.9	-1.8	-16.0	B5
B32	-0.3	-10.5	5.2	-6.0	0.2	-0.6	0.8	-7.4	0.7	-0.3	0.9	2.1	-15.2	B32
A30	-3.9	7.9	-8.0	-12.4	-5.4	5.2	-1.3	1.7	-1.0	0.5	3.9	-1.8	-14.7	A30
B39	-6.0	-17.5	-1.0	19.6	9.0	-3.1	0.6	-6.2	-8.4	-1.8	0.3	0.6	-14.0	B39
A16	-0.5	-1.0	-2.7	0.4	-4.6	1.9	0.3	-4.4	0.8	0.5	-1.5	-3.0	-13.9	A16
C49	-3.1	-1.3	1.7	0.4	-2.2	-2.0	0.4	0.1	-8.1	4.3	-3.3	-0.7	-13.8	C49
A53	-3.3	-13.2	-0.1	6.8	4.2	2.0	0.1	-11.4	-1.5	-0.3	1.5	2.1	-13.1	A53
A10	5.6	10.2	-7.2	-6.0	-15.1	-1.0	0.2	4.3	0.8	-2.6	1.5	-3.0	-12.1	A10
B30	-3.9	-3.8	-1.9	6.8	0.2	-3.7	0.6	-5.4	2.0	0.5	-5.1	1.9	-11.7	B30
B31	4.5	-2.0	3.5	-12.4	-6.2	3.0	1.1	-5.7	0.7	-0.3	0.9	2.1	-11.0	B31
A15	4.3	7.5	-4.5	-6.0	-11.0	5.4	0.7	-2.8	0.8	0.5	-1.5	-3.0	-9.7	A15
C48	1.6	7.2	-0.1	-6.0	-8.6	1.6	0.8	1.7	-8.1	4.3	-3.3	-0.7	-9.5	C48
A41	-0.4	8.7	-7.2	-12.4	-7.8	1.9	-0.3	-0.8	3.9	0.5	2.7	1.9	-9.4	A41
A61	-7.9	-15.4	-1.0	6.8	18.7	-3.3	-0.3	1.1	-10.3	-3.4	5.1	0.6	-9.3	A61
C43	3.4	9.9	-2.7	-6.0	-10.2	-4.8	0.4	8.8	-8.1	1.2	-0.3	-0.7	-9.1	C43
C60	-5.9	-2.1	0.8	0.4	2.6	-1.4	-0.3	-2.6	1.8	0.5	-2.1	-0.7	-9.1	C60
B10	-1.8	8.4	-5.4	-12.4	-6.2	1.6	-0.7	5.7	1.2	0.5	2.7	-1.8	-8.2	B10
B22	-8.0	7.0	0.8	-6.0	-2.2	-1.4	-1.6	2.7	6.1	-1.8	-5.1	1.9	-7.7	B22
C7	2.1	-0.1	4.3	-6.0	-7.0	3.4	0.2	0.0	-3.8	3.5	-2.1	-1.8	-7.2	C7
B33	-1.3	-12.7	2.6	6.8	3.4	-1.5	0.8	-7.4	0.7	-0.3	0.3	2.1	-6.6	B33
A12	-3.9	7.9	-1.0	0.4	-5.4	0.7	-1.5	2.6	0.8	-3.4	0.3	-3.0	-5.4	A12
A17	-1.5	-3.2	-5.4	13.2	-1.4	0.9	0.3	-4.4	0.8	0.5	-2.1	-3.0	-5.3	A17
A13	-5.7	0.5	-0.1	6.8	1.0	-2.8	-1.5	1.5	0.8	-2.6	-0.3	-3.0	-5.3	A13
C45	-6.6	7.6	3.5	0.4	-3.0	-3.1	-1.4	7.1	-8.1	0.5	-1.5	-0.7	-5.2	C45
C50	-4.1	-3.6	-1.0	13.2	1.0	-2.9	0.4	0.1	-8.1	4.3	-3.9	-0.7	-5.2	C50
C46	-8.3	0.2	4.3	6.8	3.4	-6.7	-1.4	6.0	-8.1	1.2	-2.1	-0.7	-5.2	C46
C59	-1.2	6.4	-1.0	-6.0	-3.8	2.1	0.0	-1.0	1.8	0.5	-2.1	-0.7	-4.9	C59
C80	-4.7	-15.0	4.3	13.2	9.0	-4.2	0.7	-6.0	-3.7	-1.8	2.1	1.7	-4.3	C80
A35	2.4	-0.3	-3.6	-6.0	2.6	7.1	0.0	-5.4	-1.0	2.7	-0.3	-1.8	-3.6	A35
C6	6.9	8.5	2.6	-12.4	-13.4	6.9	0.6	1.6	-3.8	3.5	-2.1	-1.8	-3.0	C6
B21	1.6	9.2	-4.5	-12.4	-8.6	-1.7	0.4	3.2	6.1	0.5	1.5	1.9	-2.9	B21
Minimum	**-14.7**	**-18.0**	**-8.9**	**-12.4**	**-21.5**	**-9.8**	**-2.2**	**-11.4**	**-14.9**	**-4.1**	**-5.1**	**-3.0**	**-58.9**	**Minimum**
Maximum	**25.3**	**13.8**	**11.4**	**26.0**	**24.3**	**10.6**	**2.1**	**9.8**	**15.0**	**4.3**	**10.5**	**3.2**	**68.4**	**Maximum**

KAMO Power Blackberry - Chouteau 345 kV
Weighted Route Scores in Ascending Order

Weights	7.00	8.00	4.00	10.00	9.00	4.00	1.00	5.00	8.00	2.00	3.00	2.00		
Route	**Total Length (miles)**	**Not Parallel Existing T-Line (miles)**	**Heavy Angles (>30 degrees)**	**Residences 0-150 ft (number)**	**Residences 150-500 ft (number)**	**Length Through Agricultual cropland (acres)**	**Length Through Pasture/ Grassland (acres)**	**Woodland (acres)**	**NLCD Wetland/ Riparian Areas (acres)**	**Perennial Waterways (number)**	**Road Crossings (number)**	**Length Through Superfund Area (miles)**	**Total Score**	**Route**
B41	-5.8	-15.0	1.7	6.8	17.9	-6.9	0.4	5.1	-8.1	-3.4	3.9	0.6	-2.8	B41
C1	8.6	11.2	-0.1	-12.4	-15.1	0.5	0.2	8.7	-3.8	0.5	0.9	-1.8	-2.6	C1
C18	-0.7	-0.8	3.5	-6.0	-2.2	4.0	-0.5	-2.7	6.1	-0.3	-0.9	-1.8	-2.6	C18
C71	-2.5	-1.3	3.5	0.4	0.2	-4.7	0.7	-5.1	6.7	0.5	-3.3	3.0	-2.1	C71
A55	-3.1	-10.7	2.6	-6.0	13.0	-1.7	-0.1	-0.1	-1.2	-1.8	5.1	2.1	-2.0	A55
A29	8.5	10.9	-8.0	-12.4	-7.8	4.2	-0.1	3.3	-1.0	-0.3	2.7	-1.8	-1.8	A29
A62	-8.9	-17.7	-3.6	19.6	21.9	-4.2	-0.3	1.1	-10.3	-3.4	4.5	0.6	-0.7	A62
C61	-7.0	-4.3	-1.9	13.2	5.8	-2.4	-0.3	-2.6	1.8	0.5	-2.7	-0.7	-0.5	C61
C79	0.1	-6.5	2.6	6.8	2.6	-0.7	1.0	-4.3	-3.7	-1.8	2.1	1.7	-0.1	C79
A34	7.2	8.2	-5.4	-12.4	-3.8	10.6	0.3	-3.8	-1.0	2.7	-0.3	-1.8	0.6	A34
C3	-1.3	8.9	6.1	-6.0	-7.8	2.2	-1.6	7.0	-3.8	-0.3	-0.3	-1.8	1.3	C3
C38	0.6	-13.7	6.1	6.8	4.2	1.2	0.5	-6.1	0.5	-2.6	3.3	0.6	1.3	C38
C8	1.1	-2.3	1.7	6.8	-3.8	2.5	0.3	0.0	-3.8	3.5	-2.7	-1.8	1.3	C8
C47	-10.1	-2.2	0.8	19.6	6.6	-7.6	-1.6	6.0	-8.1	1.2	-2.7	-0.7	1.3	C47
C4	-3.1	1.5	7.0	0.4	-1.4	-1.3	-1.6	5.9	-3.8	0.5	-0.9	-1.8	1.4	C4
B40	-1.1	-6.4	-0.1	0.4	11.4	-3.3	0.7	6.7	-8.1	-3.4	3.9	0.6	1.4	B40
A46	5.8	0.5	-2.7	-6.0	0.2	3.7	1.0	-7.9	3.9	2.7	-1.5	1.9	1.7	A46
C17	4.1	7.7	1.7	-12.4	-8.6	7.5	-0.2	-1.1	6.1	-0.3	-0.9	-1.8	1.7	C17
C70	2.2	7.2	1.7	-6.0	-6.2	-1.2	1.1	-3.4	6.7	0.5	-3.3	3.0	2.2	C70
A54	1.6	-2.1	0.8	-12.4	6.6	1.8	0.3	1.6	-1.2	-1.8	5.1	2.1	2.3	A54
A40	11.9	11.8	-8.0	-12.4	-10.2	0.9	0.9	0.8	3.9	-0.3	1.5	1.9	2.6	A40
B15	4.5	0.2	-1.0	-6.0	1.8	3.5	0.7	-1.5	1.2	2.7	-1.5	-1.8	2.8	B15
C74	0.1	-10.2	7.9	0.4	3.4	-2.6	0.9	-7.1	5.4	-0.3	2.1	3.2	3.0	C74
A14	-6.7	-1.7	-2.7	19.6	4.2	-3.8	-1.5	1.5	0.8	-2.6	-0.9	-3.0	3.3	A14
C29	2.7	0.0	5.2	-6.0	-4.6	0.6	0.5	-5.2	10.9	-0.3	-2.1	1.9	3.6	C29
C81	-5.7	-17.2	1.7	26.0	12.2	-5.1	0.7	-6.0	-3.7	-1.8	1.5	1.7	4.3	C81
B35	-1.1	-10.2	5.2	-6.0	12.2	-5.3	0.6	3.9	1.0	-1.8	3.9	2.1	4.5	B35
B9	10.6	11.4	-5.4	-12.4	-8.6	0.6	0.6	7.3	1.2	-0.3	1.5	-1.8	4.7	B9
A31	-1.0	8.6	-1.9	-6.0	1.8	5.9	-1.8	1.6	-1.0	-1.1	1.5	-1.8	4.9	A31
A36	1.4	-2.5	-6.3	6.8	5.8	6.1	0.0	-5.4	-1.0	2.7	-0.9	-1.8	5.0	A36
A32	-2.8	1.2	-1.0	0.4	8.2	2.4	-1.8	0.5	-1.0	-0.3	0.9	-1.8	5.0	A32
C37	5.3	-5.2	4.3	0.4	-2.2	4.7	0.8	-4.4	0.5	-2.6	3.3	0.6	5.6	C37
B42	-6.9	-17.2	-1.0	19.6	21.1	-7.8	0.4	5.1	-8.1	-3.4	3.3	0.6	5.8	B42
A45	10.6	9.0	-4.5	-12.4	-6.2	7.3	1.4	-6.3	3.9	2.7	-1.5	1.9	5.9	A45
C19	-1.7	-3.1	0.8	6.8	1.0	3.0	-0.5	-2.7	6.1	-0.3	-1.5	-1.8	6.0	C19
A60	2.3	-5.6	-1.0	0.4	12.2	1.2	0.6	2.8	-10.3	-3.4	6.3	0.6	6.1	A60
C72	-3.5	-3.5	0.8	13.2	3.4	-5.7	0.7	-5.1	6.7	0.5	-3.9	3.0	6.5	C72
A56	-4.2	-12.9	-0.1	6.8	16.3	-2.7	-0.1	-0.1	-1.2	-1.8	4.5	2.1	6.6	A56
B14	9.2	8.7	-2.7	-12.4	-4.6	7.0	1.0	0.2	1.2	2.7	-1.5	-1.8	7.1	B14
C73	4.8	-1.7	6.1	-6.0	-3.0	0.9	1.2	-5.5	5.4	-0.3	2.1	3.2	7.2	C73
Minimum	**-14.7**	**-18.0**	**-8.9**	**-12.4**	**-21.5**	**-9.8**	**-2.2**	**-11.4**	**-14.9**	**-4.1**	**-5.1**	**-3.0**	**-58.9**	**Minimum**
Maximum	**25.3**	**13.8**	**11.4**	**26.0**	**24.3**	**10.6**	**2.1**	**9.8**	**15.0**	**4.3**	**10.5**	**3.2**	**68.4**	**Maximum**

KAMO Power Blackberry - Chouteau 345 kV
Weighted Route Scores in Ascending Order

Route	Total Length (miles)	Not Parallel Existing T-Line (miles)	Heavy Angles (>30 degrees)	Residences 0-150 ft (number)	Residences 150-500 ft (number)	Length Through Agricultual cropland (acres)	Length Through Pasture/ Grassland (acres)	Woodland (acres)	NLCD Wetland/ Riparian Areas (acres)	Perennial Waterways (number)	Road Crossings (number)	Length Through Superfund Area (miles)	Total Score	Route
Weights	7.00	8.00	4.00	10.00	9.00	4.00	1.00	5.00	8.00	2.00	3.00	2.00		
C28	7.5	8.5	3.5	-12.4	-11.0	4.1	0.9	-3.6	10.9	-0.3	-2.1	1.9	7.9	C28
C5	-4.9	-1.0	3.5	13.2	1.8	-2.3	-1.7	5.9	-3.8	0.5	-1.5	-1.8	7.9	C5
B26	7.9	1.0	-0.1	-6.0	-0.6	0.2	1.7	-3.9	6.1	2.7	-2.7	1.9	8.1	B26
C32	5.3	-9.0	9.7	-6.0	-1.4	2.8	0.7	-7.2	9.6	-1.1	3.3	2.1	8.7	C32
B34	3.7	-1.6	3.5	-12.4	5.8	-1.7	0.9	5.5	1.0	-1.8	3.9	2.1	8.7	B34
B20	14.0	12.3	-5.4	-12.4	-11.0	-2.7	1.6	4.8	6.1	-0.3	0.3	1.9	9.1	B20
C52	-1.5	8.7	-3.6	-6.0	-3.0	-0.4	-0.6	5.9	5.9	0.5	3.9	-0.7	9.1	C52
C39	-0.5	-16.0	3.5	19.6	7.4	0.2	0.5	-6.1	0.5	-2.6	2.7	0.6	9.9	C39
A42	2.4	9.5	-1.0	-6.0	-0.6	2.6	-0.8	-0.8	3.9	-1.1	0.3	1.9	10.2	A42
A47	4.8	-1.7	-5.4	6.8	3.4	2.8	1.0	-7.9	3.9	2.7	-2.1	1.9	10.2	A47
A43	0.7	2.0	-0.1	0.4	5.8	-1.0	-0.8	-2.0	3.9	-0.3	-0.3	1.9	10.3	A43
C64	-7.7	7.3	3.5	0.4	1.0	-3.4	-1.5	3.0	10.7	-1.8	-3.9	3.0	10.5	C64
B11	1.0	9.1	0.8	-6.0	1.0	2.3	-1.2	5.6	1.2	-1.1	0.3	-1.8	11.4	B11
B16	3.4	-2.0	-3.6	6.8	5.0	2.6	0.7	-1.5	1.2	2.7	-2.1	-1.8	11.4	B16
B12	-0.7	1.7	1.7	0.4	7.4	-1.2	-1.2	4.5	1.2	-0.3	-0.3	-1.8	11.4	B12
C75	-0.9	-12.5	5.2	13.2	6.6	-3.6	0.9	-7.1	5.4	-0.3	1.5	3.2	11.6	C75
C30	1.7	-2.2	2.6	6.8	-1.4	-0.3	0.5	-5.2	10.9	-0.3	-2.7	1.9	12.2	C30
B25	12.6	9.5	-1.9	-12.4	-7.0	3.7	2.0	-2.3	6.1	2.7	-2.7	1.9	12.3	B25
C31	10.1	-0.4	7.9	-12.4	-7.8	6.3	1.0	-5.6	9.6	-1.1	3.3	2.1	12.9	C31
B36	-2.1	-12.4	2.6	6.8	15.5	-6.2	0.6	3.9	1.0	-1.8	3.3	2.1	13.1	B36
A33	-3.8	-1.0	-3.6	13.2	11.4	1.4	-1.8	0.5	-1.0	-0.3	0.3	-1.8	13.6	A33
C63	1.9	9.5	-1.9	-6.0	-5.4	-3.7	0.5	3.5	10.7	0.5	2.7	3.0	15.3	C63
C83	-5.5	-14.7	4.3	13.2	21.1	-8.9	0.5	5.3	-3.4	-3.4	5.1	1.7	15.4	C83
C10	3.8	10.0	-1.0	-12.4	-7.8	5.0	-0.7	5.8	10.1	-0.3	5.1	-1.8	15.7	C10
C22	-2.5	8.5	5.2	-6.0	-3.8	1.9	-1.7	2.9	15.0	-2.6	-2.7	1.9	16.2	C22
B27	6.9	-1.2	-2.7	6.8	2.6	-0.8	1.7	-3.9	6.1	2.7	-3.3	1.9	16.7	B27
B23	2.7	2.5	2.6	0.4	5.0	-4.5	-0.1	2.0	6.1	-0.3	-1.5	1.9	16.7	B23
C33	4.3	-11.2	7.0	6.8	1.8	1.8	0.7	-7.2	9.6	-1.1	2.7	2.1	17.2	C33
B13	-2.5	-0.7	-1.9	13.2	10.6	-2.1	-1.3	4.5	1.2	-0.3	-0.9	-1.8	18.0	B13
A44	-0.4	-0.2	-2.7	13.2	9.0	-1.9	-0.8	-2.0	3.9	-0.3	-0.9	1.9	18.8	A44
C82	-0.7	-6.1	2.6	6.8	14.7	-5.4	0.8	7.0	-3.4	-3.4	5.1	1.7	19.6	C82
C57	4.8	0.5	0.8	0.4	5.0	1.5	0.8	-1.2	5.9	2.7	-0.3	-0.7	20.2	C57
C21	7.2	10.8	-0.1	-12.4	-10.2	1.6	0.3	3.3	15.0	-0.3	3.9	1.9	20.9	C21
C41	-0.3	-13.4	6.1	6.8	16.3	-3.5	0.3	5.2	0.8	-4.1	6.3	0.6	21.1	C41
C51	10.9	11.7	-3.6	-6.0	-5.4	-1.4	0.7	7.6	5.9	-0.3	2.7	-0.7	22.0	C51
C77	-0.8	-9.9	7.9	0.4	15.5	-7.3	0.7	4.1	5.7	-1.8	5.1	3.2	22.7	C77
C84	-6.5	-16.9	1.7	26.0	24.3	-9.8	0.5	5.3	-3.4	-3.4	4.5	1.7	24.0	C84
C56	9.6	9.0	-1.0	-6.0	-1.4	5.0	1.1	0.5	5.9	2.7	-0.3	-0.7	24.4	C56
B24	1.7	0.3	-0.1	13.2	8.2	-5.5	-0.1	2.0	6.1	-0.3	-2.1	1.9	25.3	B24
C40	4.5	-4.9	4.3	0.4	9.8	0.0	0.7	6.9	0.8	-4.1	6.3	0.6	25.3	C40
Minimum	**-14.7**	**-18.0**	**-8.9**	**-12.4**	**-21.5**	**-9.8**	**-2.2**	**-11.4**	**-14.9**	**-4.1**	**-5.1**	**-3.0**	**-58.9**	**Minimum**
Maximum	**25.3**	**13.8**	**11.4**	**26.0**	**24.3**	**10.6**	**2.1**	**9.8**	**15.0**	**4.3**	**10.5**	**3.2**	**68.4**	**Maximum**

KAMO Power Blackberry - Chouteau 345 kV
Weighted Route Scores in Ascending Order

Weights	7.00	8.00	4.00	10.00	9.00	4.00	1.00	5.00	8.00	2.00	3.00	2.00		
Route	**Total Length (miles)**	**Not Parallel Existing T-Line (miles)**	**Heavy Angles (>30 degrees)**	**Residences 0-150 ft (number)**	**Residences 150-500 ft (number)**	**Length Through Agricultual cropland (acres)**	**Length Through Pasture/ Grassland (acres)**	**Woodland (acres)**	**NLCD Wetland/ Riparian Areas (acres)**	**Perennial Waterways (number)**	**Road Crossings (number)**	**Length Through Superfund Area (miles)**	**Total Score**	**Route**
C68	8.2	1.3	2.6	0.4	2.6	-1.9	1.8	-3.7	10.7	2.7	-1.5	3.0	26.3	C68
C15	10.0	1.7	3.5	-6.0	0.2	6.8	0.6	-1.3	10.1	2.0	0.9	-1.8	26.7	C15
C76	4.0	-1.3	6.1	-6.0	9.0	-3.8	1.0	5.8	5.7	-1.8	5.1	3.2	27.0	C76
C62	14.3	12.6	-2.7	-6.0	-7.8	-4.7	1.7	5.1	10.7	-0.3	1.5	3.0	27.3	C62
C9	16.1	13.0	-1.0	-12.4	-10.2	4.0	0.5	7.5	10.1	-1.1	3.9	-1.8	28.6	C9
C53	1.3	9.4	2.6	0.4	4.2	0.3	-1.1	5.9	5.9	-1.1	1.5	-0.7	28.7	C53
C58	3.8	-1.7	-1.9	13.2	8.2	0.5	0.8	-1.2	5.9	2.7	-0.9	-0.7	28.7	C58
C54	-0.4	2.0	3.5	6.8	10.6	-3.2	-1.1	4.7	5.9	-0.3	0.9	-0.7	28.8	C54
C42	-1.3	-15.6	3.5	19.6	19.5	-4.5	0.3	5.2	0.8	-4.1	5.7	0.6	29.6	C42
C67	13.0	9.8	0.8	-6.0	-3.8	1.7	2.1	-2.0	10.7	2.7	-1.5	3.0	30.6	C67
C14	14.8	10.3	1.7	-12.4	-6.2	10.4	0.9	0.4	10.1	2.0	0.9	-1.8	31.0	C14
C78	-1.8	-12.1	5.2	13.2	18.7	-8.3	0.7	4.1	5.7	-1.8	4.5	3.2	31.3	C78
C26	13.4	2.6	4.3	-6.0	-2.2	3.5	1.6	-3.8	15.0	2.0	-0.3	1.9	32.0	C26
C34	9.2	-0.1	7.9	-12.4	4.2	1.6	0.9	5.7	9.9	-2.6	6.3	2.1	32.6	C34
C20	19.5	13.8	-1.0	-12.4	-12.6	0.6	1.5	5.0	15.0	-1.1	2.7	1.9	32.9	C20
C69	7.2	-0.9	-0.1	13.2	5.8	-2.8	1.8	-3.7	10.7	2.7	-2.1	3.0	34.9	C69
C65	3.0	2.8	5.2	6.8	8.2	-6.6	0.0	2.3	10.7	-0.3	-0.3	3.0	34.9	C65
C11	6.6	10.7	5.2	-6.0	-0.6	5.7	-1.2	5.8	10.1	-1.8	2.7	-1.8	35.3	C11
C16	9.0	-0.5	0.8	6.8	3.4	5.9	0.6	-1.3	10.1	2.0	0.3	-1.8	35.3	C16
C55	-2.2	-0.4	-0.1	19.6	13.8	-4.2	-1.2	4.7	5.9	-0.3	0.3	-0.7	35.3	C55
C12	4.9	3.3	6.1	0.4	5.8	2.1	-1.3	4.6	10.1	-1.1	2.1	-1.8	35.3	C12
C25	18.2	11.1	2.6	-12.4	-8.6	7.0	2.0	-2.1	15.0	2.0	-0.3	1.9	36.2	C25
C36	3.5	-10.8	7.0	6.8	13.8	-2.9	0.5	4.0	9.9	-2.6	5.7	2.1	37.0	C36
C27	12.4	0.3	1.7	6.8	1.0	2.5	1.6	-3.8	15.0	2.0	-0.9	1.9	40.6	C27
C23	8.3	4.1	7.0	0.4	3.4	-1.2	-0.2	2.2	15.0	-1.1	0.9	1.9	40.6	C23
C13	3.0	0.9	2.6	13.2	9.0	1.2	-1.4	4.6	10.1	-1.1	1.5	-1.8	41.9	C13
C66	2.0	0.6	2.6	19.6	11.4	-7.5	0.0	2.3	10.7	-0.3	-0.9	3.0	43.5	C66
C24	7.3	1.9	4.3	13.2	6.6	-2.2	-0.2	2.2	15.0	-1.1	0.3	1.9	49.2	C24
C35	25.3	-5.0	11.4	-6.0	11.4	8.7	1.6	4.7	6.4	-2.6	10.5	2.1	68.4	C35
Minimum	**-14.7**	**-18.0**	**-8.9**	**-12.4**	**-21.5**	**-9.8**	**-2.2**	**-11.4**	**-14.9**	**-4.1**	**-5.1**	**-3.0**	**-58.9**	**Minimum**
Maximum	**25.3**	**13.8**	**11.4**	**26.0**	**24.3**	**10.6**	**2.1**	**9.8**	**15.0**	**4.3**	**10.5**	**3.2**	**68.4**	**Maximum**

KAMO Power Blackberry - Chouteau 345-kV
Route Scores in Ascending Order

Total Score	Score Difference to Previous Route	Route	Segments
-58.9	0.0	A3	1,3,50,52,6a,13,23,25,28,29,49,42,45,46,47
-48.6	-10.3	A22	1,3,3a,7,10,13,23,25,28,29,49,42,45,46,47
-47.9	-0.8	A8	1,3,50,52,6a,13,23,26,33,36,38,41,43,45,46,47
-45.5	-2.4	A1	1,3,50,53,48a,49,42,45,46,47
-43.6	-1.8	A7	1,3,50,52,6a,13,23,26,33,36,37,40,42,45,46,47
-43.2	-0.4	A2	1,3,50,52,6a,13z,48,48a,49,42,45,46,47
-43.2	0.0	A19	1,3,50,52,6a,14,20,33,36,38,41,43,45,46,47
-42.2	-1.0	b29	1,4,5,7,10,13,23,25,28,29,49,42,45,46,47
-39.3	-2.9	A4	1,3,50,52,6a,13,23,25,27,34,42,45,46,47
-39.3	0.0	A9	1,3,50,52,6a,13,23,26,33,36,38,41,44,46,47
-39.3	0.0	A5	1,3,50,52,6a,13,23,25,27,35,39,41,43,45,46,47
-38.9	-0.3	A18	1,3,50,52,6a,14,20,33,36,37,40,42,45,46,47
-37.6	-1.4	A27	1,3,3a,7,10,13,23,26,33,36,38,41,43,45,46,47
-34.6	-3.0	A20	1,3,50,52,6a,14,20,33,36,38,41,44,46,47
-33.3	-1.3	A26	1,3,3a,7,10,13,23,26,33,36,37,40,42,45,46,47
-32.9	-0.4	A21	1,3,3a,7,10,13z,48,48a,49,42,45,46,47
-32.9	0.0	A38	1,3,3a,7,10,14,20,33,36,38,41,43,45,46,47
-31.1	-1.8	B7	1,4,5,7,10,13,23,26,33,36,38,41,43,45,46,47
-30.7	-0.4	A6	1,3,50,52,6a,13,23,25,27,35,39,41,44,46,47
-29.0	-1.7	A23	1,3,3a,7,10,13,23,25,27,34,42,45,46,47
-29.0	0.0	A58	1,3,3a,7,11,15,22,30,31,33,36,38,41,43,45,46,47
-29.0	0.0	A28	1,3,3a,7,10,13,23,26,33,36,38,41,44,46,47
-29.0	0.0	A24	1,3,3a,7,10,13,23,25,27,35,39,41,43,45,46,47
-28.6	-0.3	A37	1,3,3a,7,10,14,20,33,36,37,40,42,45,46,47
-26.9	-1.8	B6	1,4,5,7,10,13,23,26,33,36,37,40,42,45,46,47
-26.7	-0.1	A49	1,3,3a,7,11,15,16,17z,20,33,36,38,41,43,45,46,47
-26.5	-0.3	B1	1,4,5,7,10,13z,48,48a,49,42,45,46,47
-26.4	0.0	B18	1,4,5,7,10,14,20,33,36,38,41,43,45,46,47
-25.0	-1.5	A11	1,3,50,52,6a,14,18z,23,25,28,29,49,42,45,46,47
-24.8	-0.1	C44	2,51,9,10,13,23,25,28,29,49,42,45,46,47
-24.7	-0.1	A57	1,3,3a,7,11,15,22,30,31,33,36,37,40,42,45,46,47
-24.3	-0.4	A39	1,3,3a,7,10,14,20,33,36,38,41,44,46,47
-22.6	-1.7	b38	1,4,5,7,10,13,23,25,27,34,42,45,46,47
-22.5	0.0	B38	1,4,5,7,11,15,22,30,31,33,36,38,41,43,45,46,47
-22.5	0.0	B8	1,4,5,7,10,13,23,26,33,36,38,41,44,46,47
-22.5	0.0	B4	1,4,5,7,10,13,23,25,27,35,39,41,43,45,46,47
-22.5	0.0	A48	1,3,3a,7,11,15,16,17z,20,33,36,37,40,42,45,46,47
-22.2	-0.3	B17	1,4,5,7,10,14,20,33,36,37,40,42,45,46,47
-21.7	-0.5	A52	1,3,3a,7,11,15,16,21,30,31,33,36,38,41,43,45,46,47
-20.4	-1.3	A59	1,3,3a,7,11,15,22,30,31,33,36,38,41,44,46,47
-20.4	0.0	A25	1,3,3a,7,10,13,23,25,27,35,39,41,44,46,47
-20.3	-0.1	B29	1,4,5,7,11,15,16,17z,20,33,36,38,41,43,45,46,47

-58.9	**Minimum**
68.4	**Maximum**

KAMO Power Blackberry - Chouteau 345-kV
Route Scores in Ascending Order

Score	Score Difference to Previous Route	Route	Segments
-18.3	-2.0	B37	1,4,5,7,11,15,22,30,31,33,36,37,40,42,45,46,47
-18.3	0.0	C2	2z,2a,5,7,10,13,23,25,28,29,49,42,45,46,47
-18.1	-0.1	A50	1,3,3a,7,11,15,16,17z,20,33,36,38,41,44,46,47
-17.9	-0.3	A19	1,4,5,7,10,14,20,33,36,38,41,44,46,47
-17.4	-0.4	A51	1,3,3a,7,11,15,16,21,30,31,33,36,37,40,42,45,46,47
-16.0	-1.4	B28	1,4,5,7,11,15,16,17z,20,33,36,37,40,42,45,46,47
-16.0	0.0	B5	1,4,5,7,10,13,23,25,27,35,37,41,44,46,47
-15.2	-0.8	B32	1,4,5,7,11,15,16,121,30,31,33,36,38,41,43,45,46,47
-14.7	-0.6	A30	1,3,3a,7,10,14,18z,23,25,28,29,49,42,45,46,47
-14.0	-0.7	B39	1,4,5,7,11,15,22,30,31,33,36,38,41,44,46,47
-13.9	0.0	A16	1,3,50,52,6a,14,18z,23,26,33,36,38,41,43,45,46,47
-13.8	-0.1	C49	2,51,9,10,13,23,26,33,36,38,41,43,45,46,47
-13.1	-0.7	A53	1,3,3a,7,11,15,16,21,30,31,33,36,38,41,44,46,47
-12.1	-1.0	A10	1,3,50,52,6a,14,18z,48,48a,49,42,45,46,47
-11.7	-0.4	B30	1,4,5,7,11,15,16,17z,20,33,36,38,41,44,46,47
-11.0	-0.7	B31	1,4,5,7,11,15,16,21,30,31,33,36,37,40,42,45,46,47
-9.7	-1.3	A15	1,3,50,52,6a,14,18z,23,26,33,36,37,40,42,45,46,47
-9.5	-0.1	C48	2,51,9,10,13,23,26,33,36,37,40,42,45,46,47
-9.4	-0.1	A41	1,3,3a,7,11,15,16,17,18z,23,25,28,29,49,42,45,46,47
-9.3	-0.1	A61	1,3,3a,7,11,15,22,30,32,36,38,41,43,45,46,47
-9.1	-0.1	C43	2,51,9,10,13z,48,48a,49,42,45,46,47
-9.1	0.0	C60	2,51,9,10,14,20,33,36,38,41,43,45,46,47
-8.2	-0.9	B10	1,4,5,7,10,14,18z,23,25,28,29,49,42,45,46,47
-7.7	-0.5	B22	1,4,5,7,11,15,16,17,18z,23,23,27,34,42,45,46,47
-7.2	-0.5	C7	2z,2a,5,7,10,13,23,26,33,36,38,41,43,45,46,47
-6.6	-0.6	B33	1,4,5,7,11,15,16,21,30,31,33,36,38,41,44,46,47
-5.4	-1.3	A12	1,3,50,52,6a,14,18z,23,25,27,34,42,45,46,47
-5.3	0.0	A17	1,3,50,52,6a,14,18z,23,26,33,36,38,41,44,46,47
-5.3	0.0	A13	1,3,50,52,6a,14,18z,23,25,27,35,39,41,43,45,46,47
-5.2	-0.1	C45	2,51,9,10,13,23,25,27,34,42,45,46,47
-5.2	0.0	C50	2,51,9,10,13,23,26,33,36,38,41,44,46,47
-5.2	0.0	A46	2,51,9,10,13,23,25,27,35,39,41,43,45,46,47
-4.9	-0.3	C59	2,51,9,10,14,20,33,36,37,40,42,45,46,47
-4.3	-0.5	C80	2,51,9z,11,15,22,30,31,33,36,38,41,43,45,46,47
-3.6	-0.7	A35	1,3,3a,7,10,14,18z,23,26,33,36,38,41,43,45,46,47
-3.0	-0.6	C6	2z,2a,5,7,10,13,23,26,33,36,37,40,42,45,46,47
-2.9	0.0	B21	1,4,5,7,11,15,16,17,18z,23,25,28,29,49,42,45,46,47
-2.8	-0.1	B41	1,4,5,7,11,15,22,30,32,36,38,41,43,45,46,47
-2.6	-0.2	C1	2z,2a,5,7,10,13z,48,48a,49,42,45,46,47
-2.6	0.0	C18	2z,2a,5,7,10,14,20,33,36,38,41,43,45,46,47
-2.1	-0.5	C71	2,51,9z,11,15,16,17z,20,33,36,38,41,43,45,46,47
-2.0	-0.1	A55	1,3,3a,7,11,15,16,21,30,32,36,38,41,43,45,46,47
-1.8	-0.2	A29	1,3,3a,7,10,14,18z,48,48a,49,42,45,46,47
-58.9	**Minimum**		
68.4	**Maximum**		

KAMO Power Blackberry - Chouteau 345-kV
Route Scores in Ascending Order

Score	Score Difference to Previous Route	Route	Segments
-0.7	-1.1	A62	1,3,3a,7,11,15,22,30,32,36,38,41,44,46,47
-0.5	-0.2	C61	2,51,9,10,14,20,33,36,38,41,44,46,47
-0.1	-0.4	C79	2,51,9z,11,15,22,30,31,33,36,37,40,42,45,46,47
0.6	-0.7	A34	1,3,3a,7,10,14,18z,23,26,33,36,37,40,42,45,46,47
1.3	-0.7	C3	2z,2a,5,7,10,13,23,25,27,34,42,45,46,47
1.3	0.0	C38	2z,2a,5,7,11,15,22,30,31,33,36,38,41,43,45,46,47
1.3	0.0	C8	2z,2a,5,7,10,13,23,26,33,36,38,41,44,46,47
1.3	0.0	C47	2,51,9,10,13,23,25,27,35,37,41,44,46,47
1.4	0.0	C4	2z,2a,5,7,10,13,23,25,27,35,39,41,43,45,46,47
1.4	-0.1	B40	1,4,5,7,11,15,22,30,32,36,37,40,42,45,46,47
1.7	-0.2	A46	1,3,3a,7,11,15,16,17,18z,23,26,33,36,38,41,43,45,46,47
1.7	0.0	C17	2z,2a,5,7,10,14,20,33,36,37,40,42,45,46,47
2.2	-0.5	C70	2,51,9z,11,15,16,17z,20,33,36,37,40,42,45,46,47
2.3	-0.1	A54	1,3,3a,7,11,15,16,21,30,32,36,37,40,42,45,46,47
2.6	-0.3	A40	1,3,3a,7,11,15,16,17,18,48,48a,49,42,45,46,47
2.8	-0.2	B15	1,4,5,7,10,14,18z,23,26,33,36,38,41,43,45,46,47
3.0	-0.2	C74	2,51,9z,11,15,16,121,30,31,33,36,38,41,43,45,46,47
3.3	-0.3	A14	1,3,50,52,6a,14,18z,23,25,27,35,39,41,44,46,47
3.6	-0.3	C29	2z,2a,5,7,11,15,16,17z,20,33,36,38,41,43,45,46,47
4.3	-0.6	C81	2,51,9z,11,15,22,30,31,33,36,38,41,44,46,47
4.5	-0.2	B35	1,4,5,7,11,15,16,21,30,32,36,38,41,43,45,46,47
4.7	-0.2	B9	1,4,5,7,10,14,18z,48,48a,49,42,45,46,47
4.9	-0.3	A31	1,3,3a,7,10,14,18z,23,25,27,34,42,45,46,47
5.0	0.0	A36	1,3,3a,7,10,14,18z,23,26,33,36,38,41,44,46,47
5.0	0.0	A32	1,3,3a,7,10,14,18z,23,25,27,35,39,41,43,45,46,47
5.6	-0.6	C37	2z,2a,5,7,11,15,22,30,31,33,36,37,40,42,45,46,47
5.8	-0.2	B42	1,4,5,7,11,15,22,30,32,36,38,41,44,46,47
5.9	-0.1	A45	1,3,3a,7,11,15,16,17,18z,23,26,33,36,37,40,42,45,46,47
6.0	-0.1	C19	2z,2a,5,7,10,14,20,33,36,38,41,44,46,47
6.1	-0.1	A60	1,3,3a,7,11,15,22,30,32,36,37,40,42,45,45,46,47
6.5	-0.4	C72	2,51,9z,11,15,16,17z,20,33,36,38,41,44,46,47
6.6	-0.1	A56	1,3,3a,7,11,15,16,21,30,32,36,38,41,44,46,47
7.1	-0.4	B14	1,4,5,7,10,14,18z,23,26,33,36,37,40,42,45,46,47
7.2	-0.2	C73	2,51,9z,11,15,16,21,30,31,33,36,37,40,42,45,46,47
7.9	-0.6	C28	2z,2a,5,7,11,15,16,17z,20,33,36,37,40,42,45,46,47
7.9	0.0	C5	2z,2a,5,7,10,13,23,25,27,35,37,41,44,46,47
8.1	-0.2	B26	1,4,5,7,11,15,16,17,18z,23,26,33,36,38,41,43,45,46,47
8.7	-0.6	C32	2z,2a,5,7,11,15,16,21,30,31,33,36,38,41,43,45,46,47
8.7	-0.1	B34	1,4,5,7,11,15,16,21,30,32,36,37,40,42,45,46,47
9.1	-0.3	B20	1,4,5,7,11,15,16,17,18,48,48a,49,42,45,46,47
9.1	-0.1	C52	2,51,9,10,14,18z,23,25,28,29,49,42,45,46,47
9.9	-0.8	C39	2z,2a,5,7,11,15,22,30,31,33,36,38,41,44,46,47
10.2	-0.3	A42	1,3,3a,7,11,15,16,17,18z,23,25,27,34,42,45,46,47
-58.9	**Minimum**		
68.4	**Maximum**		

KAMO Power Blackberry - Chouteau 345-kV
Route Scores in Ascending Order

Score	Score Difference to Previous Route	Route	Segments
10.2	0.0	A47	1,3,3a,7,11,15,16,17,18z,23,26,33,36,38,41,44,46,47
10.3	0.0	A43	1,3,3a,7,11,15,16,17,18z,23,25,27,35,39,41,43,45,46,47
10.5	-0.3	A64	2,51,9z,11,15,16,17,18z,23,23,27,34,42,45,46,47
11.4	-0.9	B11	1,4,5,7,10,14,18z,23,25,27,34,42,45,46,47
11.4	0.0	B16	1,4,5,7,10,14,18z,23,26,33,36,38,41,44,46,47
11.4	0.0	B12	1,4,5,7,10,14,18z,23,25,27,35,39,41,43,45,46,47
11.6	-0.1	C75	2,51,9z,11,15,16,21,30,31,33,36,38,41,44,46,47
12.2	-0.6	C30	2z,2a,5,7,11,15,16,17z,20,33,36,38,41,44,46,47
12.3	-0.2	B25	1,4,5,7,11,15,16,17,18z,23,26,33,36,37,40,42,45,46,47
12.9	-0.6	C31	2z,2a,5,7,11,15,16,21,30,31,33,36,37,40,42,45,46,47
13.1	-0.2	B36	1,4,5,7,11,15,16,21,30,32,36,38,41,44,46,47
13.6	-0.5	A33	1,3,3a,7,10,14,18z,23,25,27,35,39,41,44,46,47
15.3	-1.7	C63	2,51,9z,11,15,16,17,18z,23,25,28,29,49,42,45,46,47
15.4	-0.1	C83	2,51,9z,11,15,22,30,32,36,38,41,43,45,46,47
15.7	-0.3	C10	2z,2a,5,7,10,14,18z,23,25,28,29,49,42,45,46,47
16.2	-0.5	C22	2z,2a,5,7,11,15,16,17,18z,23,23,27,34,42,45,46,47
16.7	-0.5	B27	1,4,5,7,11,15,16,17,18z,23,26,33,36,38,41,44,46,47
16.7	0.0	B23	1,4,5,7,11,15,16,17,18z,23,25,27,35,39,41,43,45,46,47
17.2	-0.5	C33	2z,2a,5,7,11,15,16,21,30,31,33,36,38,41,44,46,47
18.0	-0.7	B13	1,4,5,7,10,14,18z,23,25,27,35,37,41,44,46,47
18.8	-0.9	A44	1,3,3a,7,11,15,16,17,18z,23,25,27,35,39,41,44,46,47
19.6	-0.8	C82	2,51,9z,11,15,22,30,32,36,37,40,42,45,46,47
20.2	-0.5	C57	2,51,9,10,14,18z,23,26,33,36,38,41,43,45,46,47
20.9	-0.8	C21	2z,2a,5,7,11,15,16,17,18z,23,25,28,29,49,42,45,46,47
21.1	-0.1	C41	2z,2a,5,7,11,15,22,30,32,36,38,41,43,45,46,47
22.0	-0.9	C51	2,51,9,10,14,18z,48,48a,49,42,45,46,47
22.7	-0.7	C77	2,51,9z,11,15,16,21,30,32,36,38,41,43,45,46,47
24.0	-1.3	C84	2,51,9z,11,15,22,30,32,36,38,41,44,46,47
24.4	-0.4	C56	2,51,9,10,14,18z,23,26,33,36,37,40,42,45,46,47
25.3	-0.9	B24	1,4,5,7,11,15,16,17,18z,23,25,27,35,39,41,44,46,47
25.3	0.0	C40	2z,2a,5,7,11,15,22,30,32,36,37,40,42,45,46,47
26.3	-1.0	C68	2,51,9z,11,15,16,17,18z,23,26,33,36,38,41,43,45,46,47
26.7	-0.4	C15	2z,2a,5,7,10,14,18z,23,26,33,36,38,41,43,45,46,47
27.0	-0.2	C76	2,51,9z,11,15,16,21,30,32,36,37,40,42,45,46,47
27.3	-0.3	C62	2,51,9z,11,15,16,17,18,48,48a,49,42,45,46,47
28.6	-1.3	C9	2z,2a,5,7,10,14,18z,48,48a,49,42,45,46,47
28.7	-0.2	C53	2,51,9,10,14,18z,23,25,27,34,42,45,46,47
28.7	0.0	C58	2,51,9,10,14,18z,23,26,33,36,38,41,44,46,47
28.8	0.0	C54	2,51,9,10,14,18z,23,25,27,35,39,41,43,45,46,47
29.6	-0.9	C42	2z,2a,5,7,11,15,22,30,32,36,38,41,44,46,47
30.6	-0.9	C67	2,51,9z,11,15,16,17,18z,23,26,33,36,37,40,42,45,46,47
31.0	-0.4	C14	2z,2a,5,7,10,14,18z,23,26,33,36,37,40,42,45,46,47
31.3	-0.3	C78	2,51,9z,11,15,16,21,30,32,36,38,41,44,46,47
-58.9	**Minimum**		
68.4	**Maximum**		

KAMO Power Blackberry - Chouteau 345-kV
Route Scores in Ascending Order

Score	Score Difference to Previous Route	Route	Segments
32.0	-0.7	C26	2z,2a,5,7,11,15,16,17,18z,23,26,33,36,38,41,43,45,46,47
32.6	-0.6	C34	2z,2a,5,7,11,15,16,21,30,32,36,37,40,42,45,46,47
32.9	-0.3	C20	2z,2a,5,7,11,15,16,17,18,48,48a,49,42,45,46,47
34.9	-2.0	C69	2,51,9z,11,15,16,17,18z,23,26,33,36,38,41,44,46,47
34.9	0.0	C65	2,51,9z,11,15,16,17,18z,23,25,27,35,39,41,43,45,46,47
35.3	-0.3	C11	2z,2a,5,7,10,14,18z,23,25,27,34,42,45,46,47
35.3	0.0	C16	2z,2a,5,7,10,14,18z,23,26,33,36,38,41,44,46,47
35.3	0.0	C55	2,51,9,10,14,18z,23,25,27,35,37,41,44,46,47
35.3	0.0	C12	2z,2a,5,7,10,14,18z,23,25,27,35,39,41,43,45,46,47
36.2	-0.9	C25	2z,2a,5,7,11,15,16,17,18z,23,26,33,36,37,40,42,45,46,47
37.0	-0.7	C36	2z,2a,5,7,11,15,16,21,30,32,36,38,41,44,46,47
40.6	-3.6	C27	2z,2a,5,7,11,15,16,17,18z,23,26,33,36,38,41,44,46,47
40.6	0.0	C23	2z,2a,5,7,11,15,16,17,18z,23,25,27,35,39,41,43,45,46,47
41.9	-1.3	C13	2z,2a,5,7,10,14,18z,23,25,27,35,37,41,44,46,47
43.5	-1.7	C66	2,51,9z,11,15,16,17,18z,23,25,27,35,39,41,44,46,47
49.2	-5.7	C24	2z,2a,5,7,11,15,16,17,18z,23,25,27,35,39,41,44,46,47
68.4	-19.3	C35	2z,2a,5,7,11,15,16,21,30,32,36,38,41,43,45,46,47
-58.9	**Minimum**		
68.4	**Maximum**		

APPENDIX E – 345-kV PREFERRED AND ALTERNATE ROUTE MAPS

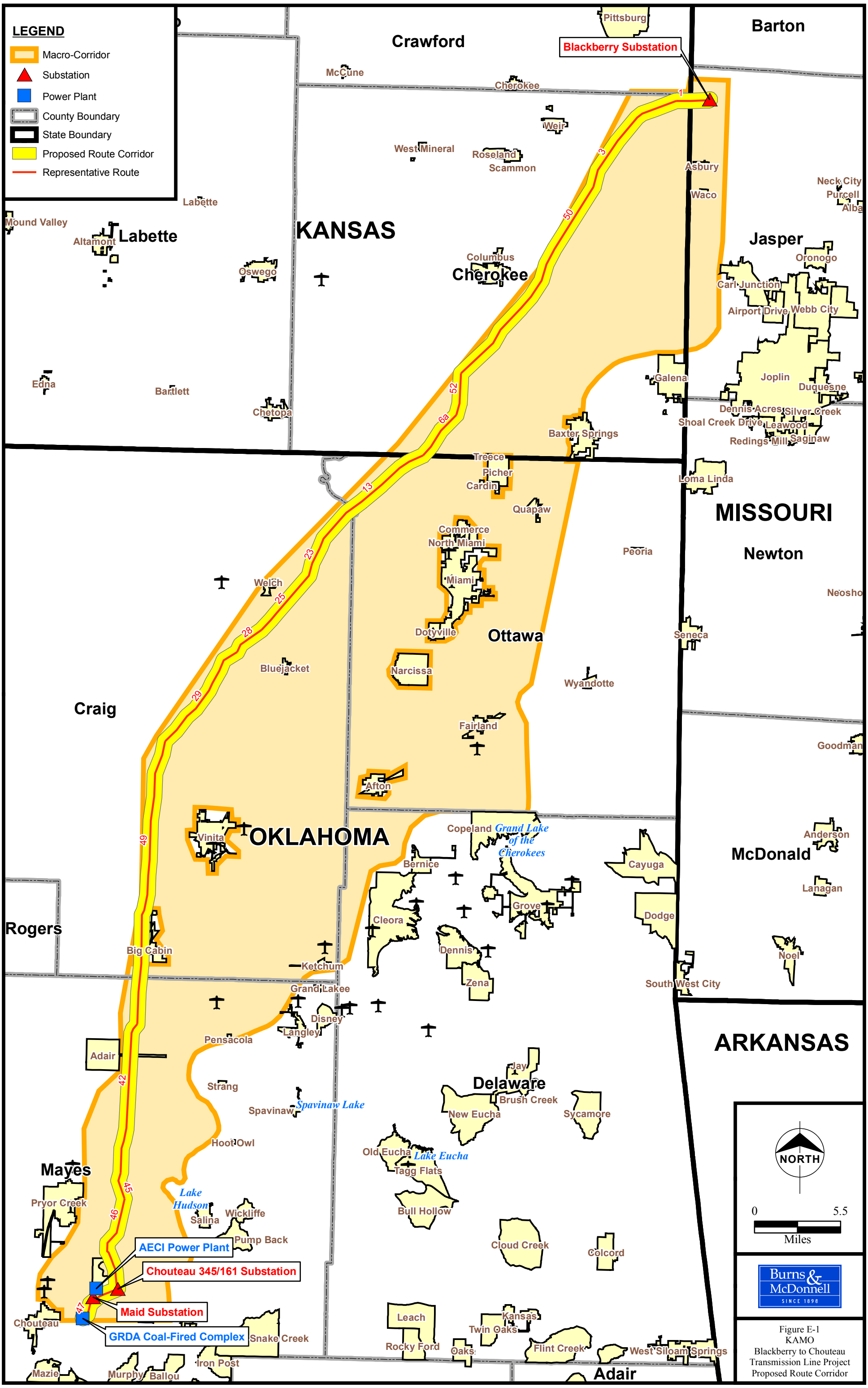

Figure E-1
KAMO
Blackberry to Chouteau
Transmission Line Project
Proposed Route Corridor

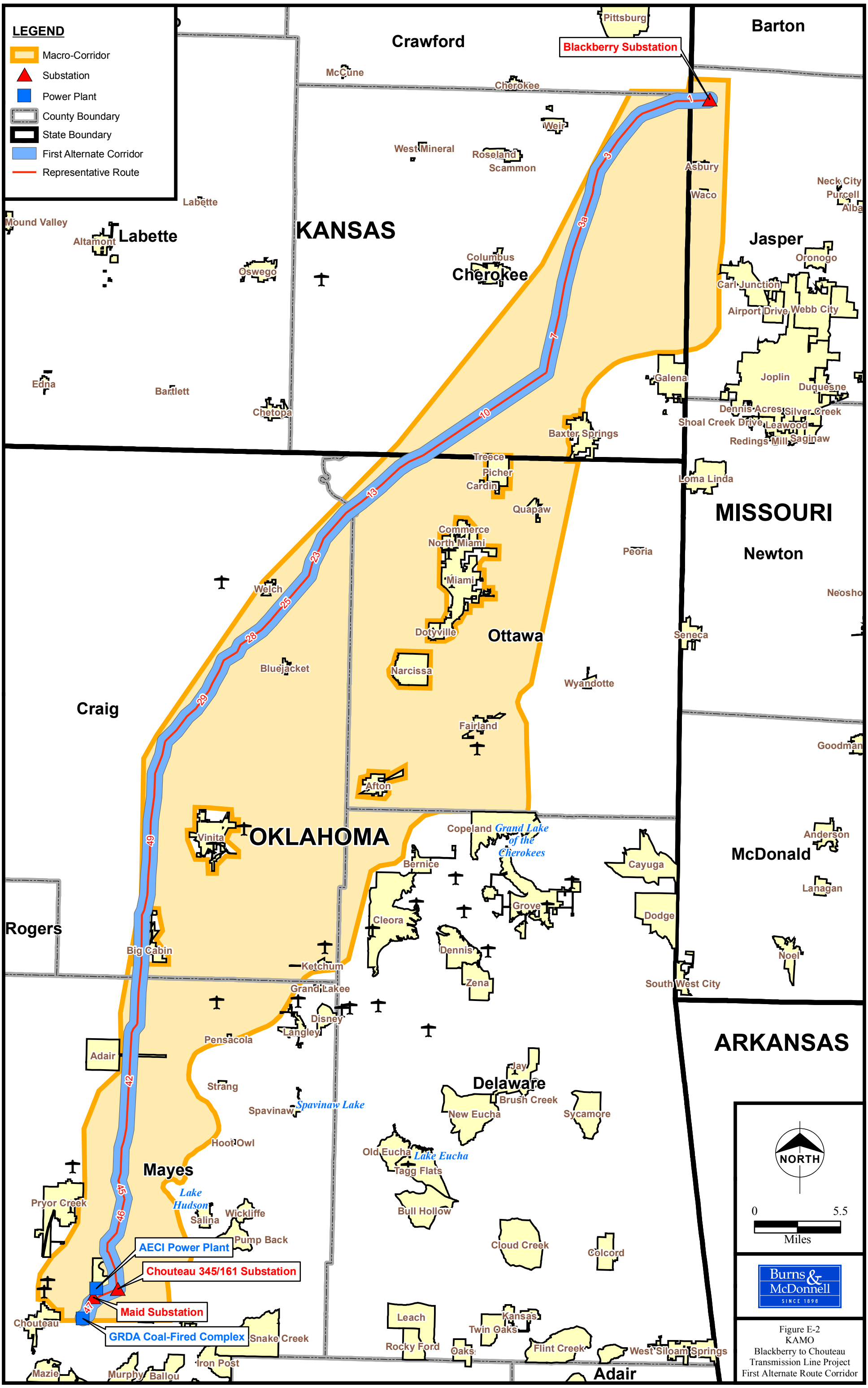

Figure E-2
KAMO
Blackberry to Chouteau
Transmission Line Project
First Alternate Route Corridor

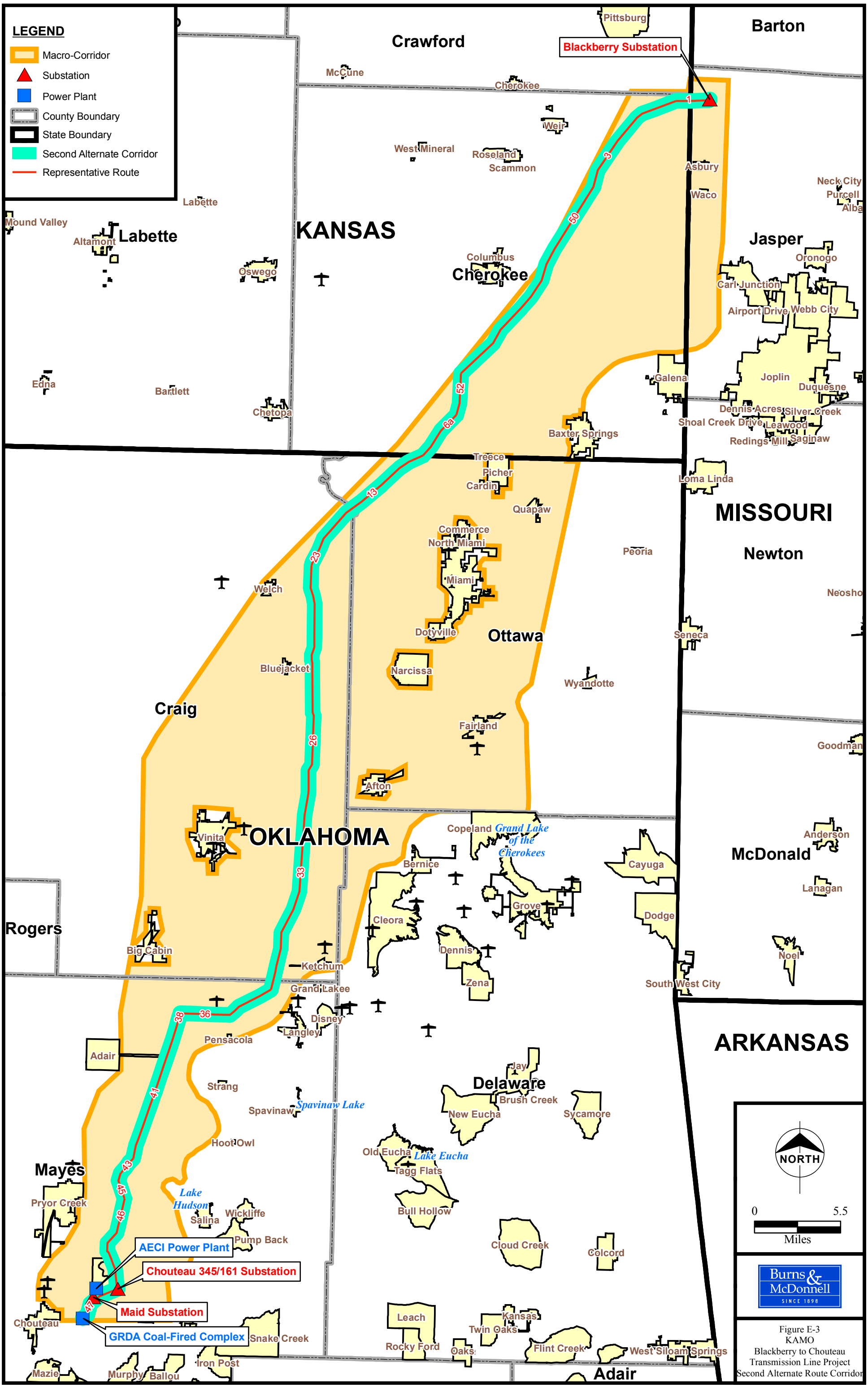

Figure E-3
KAMO
Blackberry to Chouteau
Transmission Line Project
Second Alternate Route Corridor

APPENDIX F – 161-kV ROUTE MAP

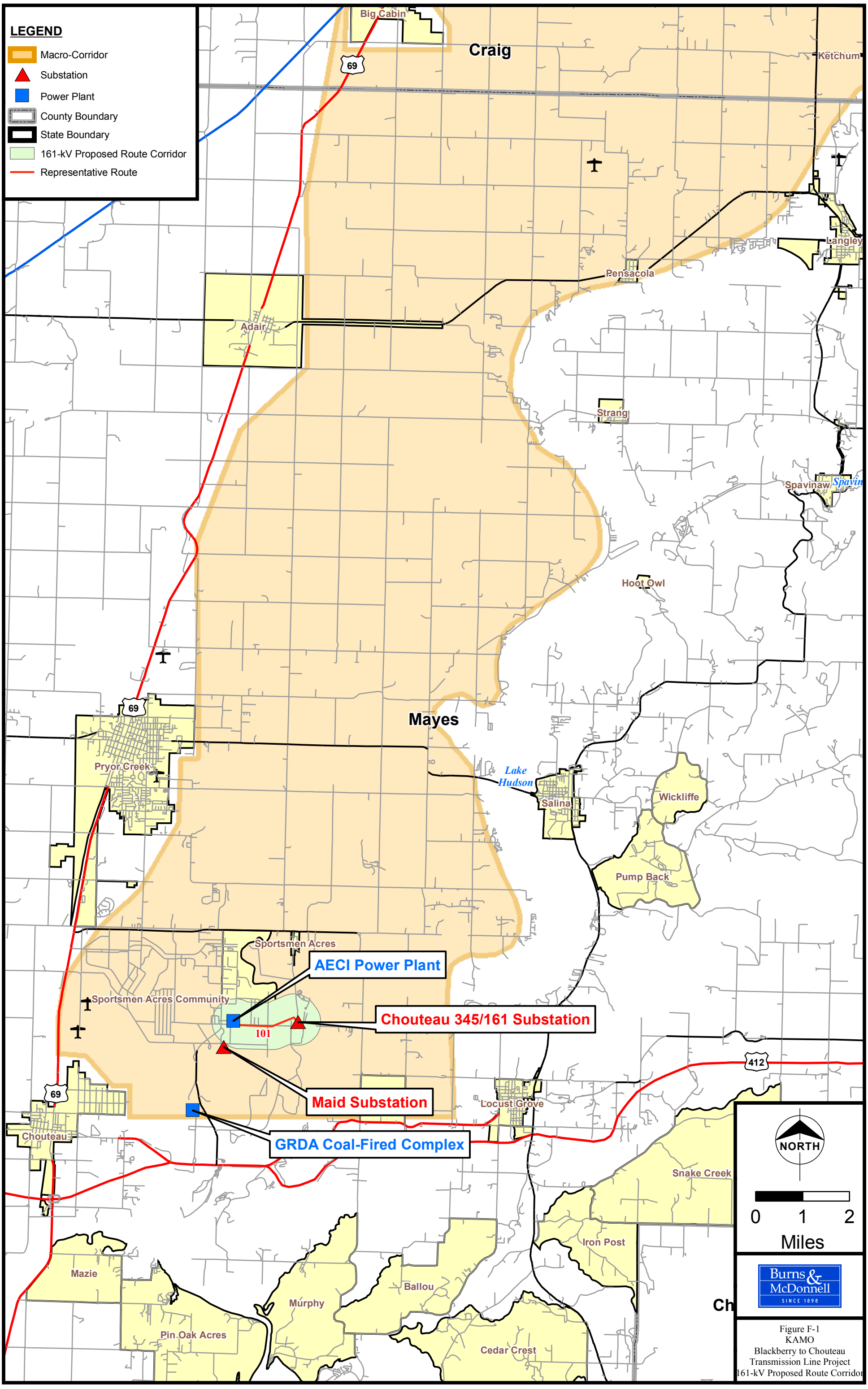

Figure F-1
KAMO
Blackberry to Chouteau
Transmission Line Project
161-kV Proposed Route Corridor