6.0 SITING ALTERNATIVES

This section describes the site selection process that Associated Electric Cooperative, Inc. (AECI) conducted in determining their proposed site for a proposed new 660 megawatt (MW) coal-based electric generating facility in Missouri.

The primary purpose of the site selection study is to identify the potential site for locating the new unit. Ultimately, the proposed site will be one that can accommodate a new 660 MW coal-based unit and also best meets the following general criteria:

- Satisfies the requirements and guidelines of the Rural Utilities Service (RUS)
- Minimizes adverse environmental and social impacts
- Possesses the necessary physical attributes such as size and topography
- Provides access to adequate fuel and water supplies, and transmission facilities
- Allows for economical construction and operation of the proposed generating station

For the proposed 660 MW unit, there are several critical elements that need to be considered in the siting process. These elements include:

- Land Area. The land area required for this type of facility requires a minimum of between 1,200-1,500 acres, depending on the topography, with a level site that is outside of a floodplain being the best choice. The proposed facility will include the power generating equipment, an on-site ash disposal facility, rail spur with a coal off loading area, a coal storage area, plus ancillary buildings and equipment.
- Water Source. The proposed coal-based generating unit will require water for steam condensation and other plant uses. An adequate, reliable water supply is essential for plant operation. For this proposed facility, rivers or lakes that can provide an annual average daily supply of 8 million gallons per day (mgd) [5,600 gallons per minute (gpm)] will be required. In Missouri, the primary water resources that can satisfy this need are the Missouri River and the Mississippi River.
- Rail Access. This proposed facility will burn coal coming from the Powder River Basin in Wyoming and delivered by train. Therefore, nearby rail access to interstate rail lines that can deliver coal in unit trains will be required, with the location of two nearby rail lines being optimal to maintain competitive fuel delivery costs.

- Class I Areas. Under the Prevention of Significant Deterioration (PSD) regulations promulgated in the Clean Air Act Amendments of 1977, maximum pollutant concentration increases (increments) were established for each criteria pollutant. These allowable increments are smallest for areas designated as Class I areas. In addition, there are restrictions with regard to visual impacts at a Class I area. As a general rule, visibility issues related to emission sources that are over 200 kilometers from a Class I area are not significant.
- Nonattainment Areas. Nonattainment locations are regions where ambient ground-level concentrations are higher than the National Ambient Air Quality Standards (NAAQS). Major metropolitan areas are the primary nonattainment areas. In Missouri, the St. Louis air quality control region is a nonattainment area. The Kansas City air quality control region is currently in attainment but it has had recent episodes of ozone levels that are close to nonattainment conditions. Therefore, it is best to locate the proposed facility and its emissions away from any nonattainment areas.

The identification and assessment of potential generation site areas for the project were based on the following four steps.

- Step 1 – Identify the scope of the project
- Step 2- Identify potential siting opportunities (alternatives) within the scope of the project
- Step 3 – Conduct field reconnaissance at the alternative areas to obtain and confirm information and identify potential individual sites with those areas
- Step 4 – Evaluate each potential site to assess its relative advantages and disadvantages
- Step 5 – Select the best site for the new unit

The following sections describe the previously completed siting studies, recent field reconnaissance of proposed sites, and evaluation of the final alternative sites.

6.1 PREVIOUS SITE SELECTION STUDIES

AECI continually evaluates its service area and the current and future demand for electricity to meets the needs of its cooperatives and their customers. As part of their evaluation of the

current power production facilities and areas requiring increased capacity, AECI periodically identifies locations that are best suited for development of a generation resource. In 1981, AECI completed a site selection study to identify greenfield sites within Missouri for a new coal-based (1,200 MW) generating station. The study identified 18 potential sites which were evaluated using primary criteria such as water resources and fuel supply delivery as part of the initial screening to locate regions and then sites within those regions.

The full site selection process involved several phases of investigation and evaluation. Within each phase progressively more stringent criteria were applied, first to the siting regions and then to potential sites.

The site selection process followed the following four-step systematic approach. The studies:

1) Establish minimum evaluation criteria
2) Apply the criteria by using a series of overlays to designate favorable power plant siting regions within Missouri
3) Delineate potential generalized site locations within the siting regions
4) Use field reconnaissance information and available literature to evaluate the generalized site locations and designate candidate sites

Extensive map studies and research were conducted to identify potential site areas within the siting regions. The map studies included the application of evaluation criteria that included favorable air quality, available water resources, proximity to rail for fuel transport, and compatible land use in the siting regions. The results of this level of investigation identified three suitable regions in Missouri: the Southeast region, the West Central Region and the Northwest Region (Figure 6-1).

Field reconnaissance of the regions was then undertaken to obtain first-hand knowledge of present land use, recent changes that were not apparent on published topographic maps, residential density, agricultural use, access, drainage, ecological and geological observable conditions, and characteristics of the source rivers. This analysis resulted in the identification of seven siting areas within the three regions including:

- Southeast Region (Lusk and Wyatt areas)

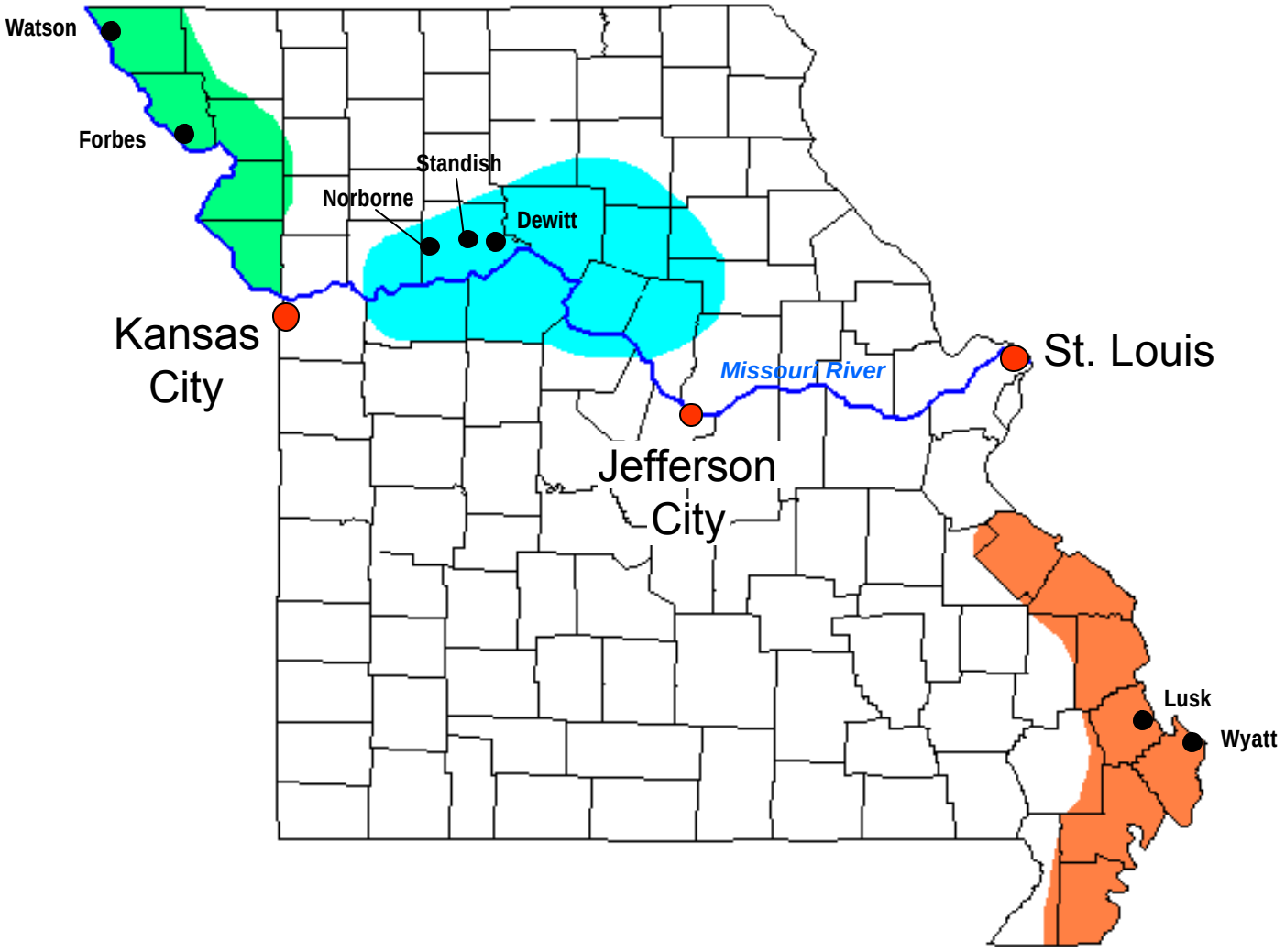


Figure 6-1
Regions and Potential Siting Areas from Previous Studies

- West Central Region (Dewitt, Norborne and Standish areas)
- Northwest Region (Forbes and Watson areas)

By early 2001, AECI had concluded that the additional generation its system would eventually need should be located in Northwest or West Central Missouri, along the Missouri River. This was based on projected loads, transportation of fuel, water availability and environmental considerations. The siting areas in Southeast Missouri (Lusk and Wyatt) were not considered further because they were located at a considerable distance from AECI's needed delivery points.

AECI also considered expansion of the existing Thomas Hill Power Plant, located in West Central Missouri in Randolph County, as a potential site. The possibility of adding a fourth unit at Thomas Hill was evaluated. AECI recognized the benefits of meeting its resource need by adding a fourth unit at the existing Thomas Hill Plant. However, three problems with the Thomas Hill site were identified. First, a detailed water supply study conducted by AECI's Engineer concluded that the current Thomas Hill Reservoir is inadequate to meet the water supply needs of an additional 660 MW power plant. Alternatives for additional water included raising the reservoir level and supplemental supplies from other regional water supplies. All the options considered were determined to be costly, not viable and/or result in substantial environmental impacts. Transmission and fuel transportation costs were also much higher for Thomas Hill.

The water supply constraints and higher transmission and fuel transportation costs were greater than the benefits of developing this project at an existing site. Therefore, Thomas Hill was eliminated from further consideration.

Having potential sites located in Northwest Missouri and in West Central Missouri provides AECI with the flexibility it needs for cost effective interconnections with its electrical transmission system in two general areas, maintaining separate geographic areas that positions AECI to receive competitive site costs, and provides for alternative areas to locate the proposed power plant if environmental constraints would limit development in one geographical area. From the West Central area sites going further west would be unacceptable because of the proximity to the Kansas City metropolitan area. Similarly from

the Northwest area sites to the south would be unacceptable because of the proximity to Kansas City metropolitan area. Obtaining site permits for a power plant in or near Kansas City could be difficult if the metropolitan area air quality status changes to nonattainment for ozone or other parameters. As a result, AECI decided to investigate siting areas in the Northwest and West Central areas of Missouri.

As a first step in determining potential sites, eight siting areas were analyzed during 2004 (Figure 6-2). All of the sites were located in the Missouri River floodplain because of the increased costs associated with site development in the hilly terrain adjacent to the floodplain, obtaining water from the Missouri River or adjacent alluvial wells is cost beneficial to the plant operations because of the quantity and minimal costs associated with getting water to the plant, and a greater intrusion into the visual landscape if a power plant would be constructed in the upland areas rather than in the floodplain.

Of the eight sites, two are in the Northwest area and six in the West Central area. The eight sites were evaluated using criteria that included site topography, access, fuel transportation to the site, water supply, land use on site and adjacent, nearby sensitive resources or land uses, air quality, wetlands, and threatened/endangered species. Table 6-1 lists the sites and primary constraints for each of the sites.

6.2 IDENTIFICATION OF PROPOSED SITES

As noted in Table 6-1, all eight sites have a variety of constraints to proposed development of a power plant. None of the eight siting areas resulted in a location that was clearly above and beyond the other sites. Based on this analysis, AECI focused on the next step in the site selection process and focused on specific tracts of land that that could be assembled in the vicinity of the siting areas. This investigation resulted in the two sites, one near the Forbes siting areas and one near the Norborne siting areas (Figure 6-3). These two sites both are located in the floodplain and have good proximity to water supply from the Missouri River. The proposed Forbes site has good road access, nearby primary railroad and relatively isolated. The proposed Norborne site has good road access and has good proximity to primary and secondary rail access. Because of the better rail access, Norborne was identified as AECI's proposed site and Forbes as the alternate site.

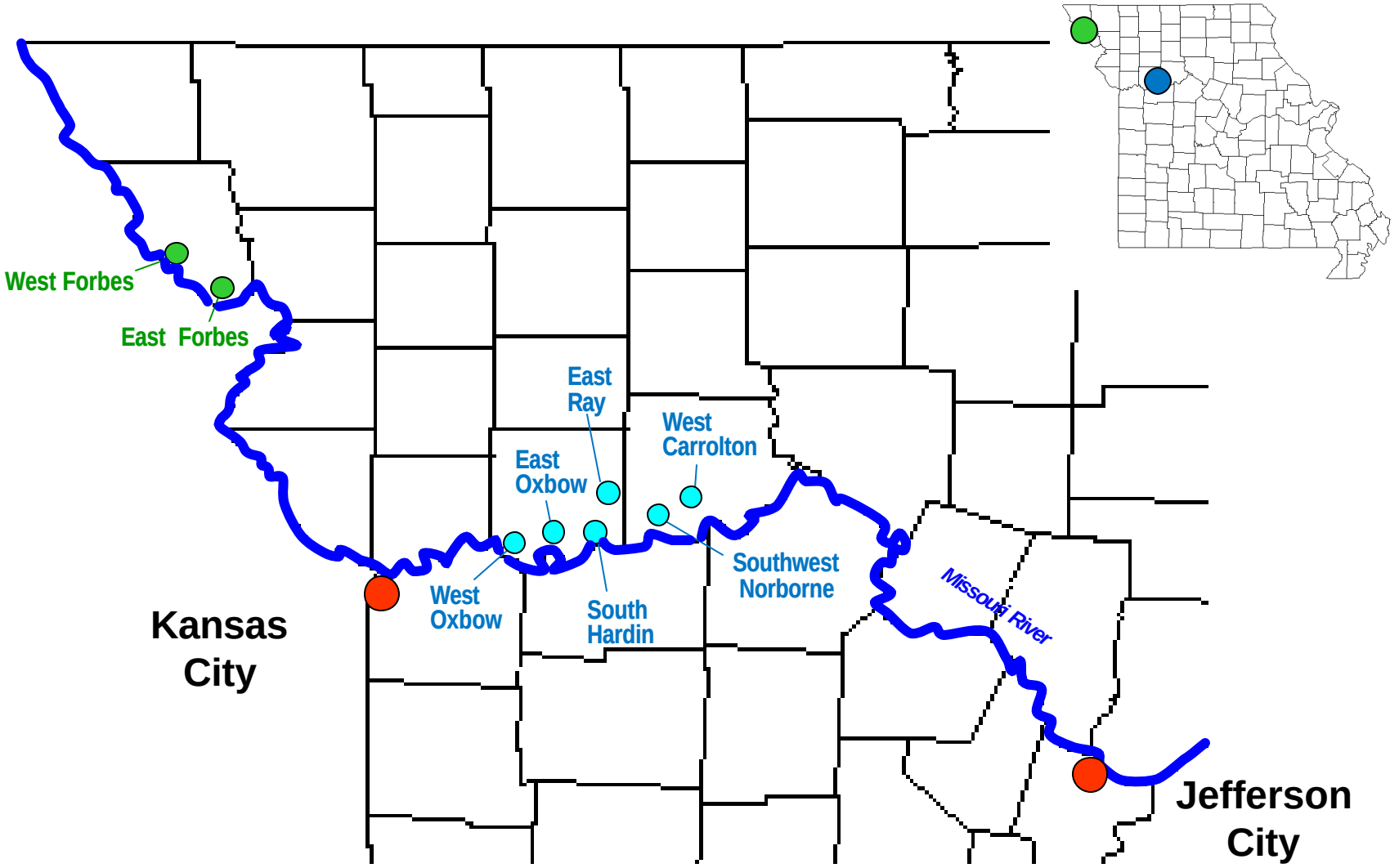


Figure 6-2
2004 Potential Siting Areas

Table 6-1 2004 Site Analysis

Site Constraints	East Forbes	West Forbes	West Carrolton	Southwest Norborne	East Ray	South Hardin	West Oxbow	East Oxbow
Floodplains	Site would have to be raised 16 feet with fill material	Site would have to be raised 11 feet with fill material	Siting area is in the floodplain but not behind a federal levee	Siting area is in the floodplain but not behind a levee and would have to be raised 13 feet with fill material	Siting area is in the floodplain but not behind a levee	Siting area is in the floodplain but not behind a levee and would have to be raised 16 feet with fill material	Siting area is in the floodplain but not behind a levee	Siting area is in the floodplain but not behind a levee
Railroads	Alternate rail access over 9 miles away and across the Missouri River	Alternate rail access over 12 miles away and across the Missouri River	Alternate Rail connection is 28 miles away	Alternate rail access over 23 miles away	Alternate rail connection is 16 miles away	Alternate rail is 13 miles away	--	--
Air	--	--	--	--	--	Siting area is less than 17 miles from Jackson County (KC metro area)	Siting area is 3 miles from Jackson Co. (KC Metro area)	Siting area is 5 miles from Jackson Co. (KC Metro area)
Conservation Area	Siting area was less than 2 miles from a Missouri Conservation Area	Siting area was less than 0.8 miles from a Missouri Conservation Area	--	--	--	--	--	--
Wetlands	--	--	Potential to impact 15 acres of wetlands	Potential to impact 7 acres of wetlands	--	--	Potential to impact 20 acres of wetlands	Potential to impact 20 acres of wetlands
Towns	Siting area was less than 1 mile from the town of Forbes	--	--	Siting area is 1.5 miles from town of Norborne	Siting area is 2.4 miles from Hardin	Siting area is 3 miles from Lexington state historical site and 2.2 miles from the town of Hardin	Siting area is less than 1.6 miles to town of Fleming	Siting area is less than 0.6 miles to town of Camden

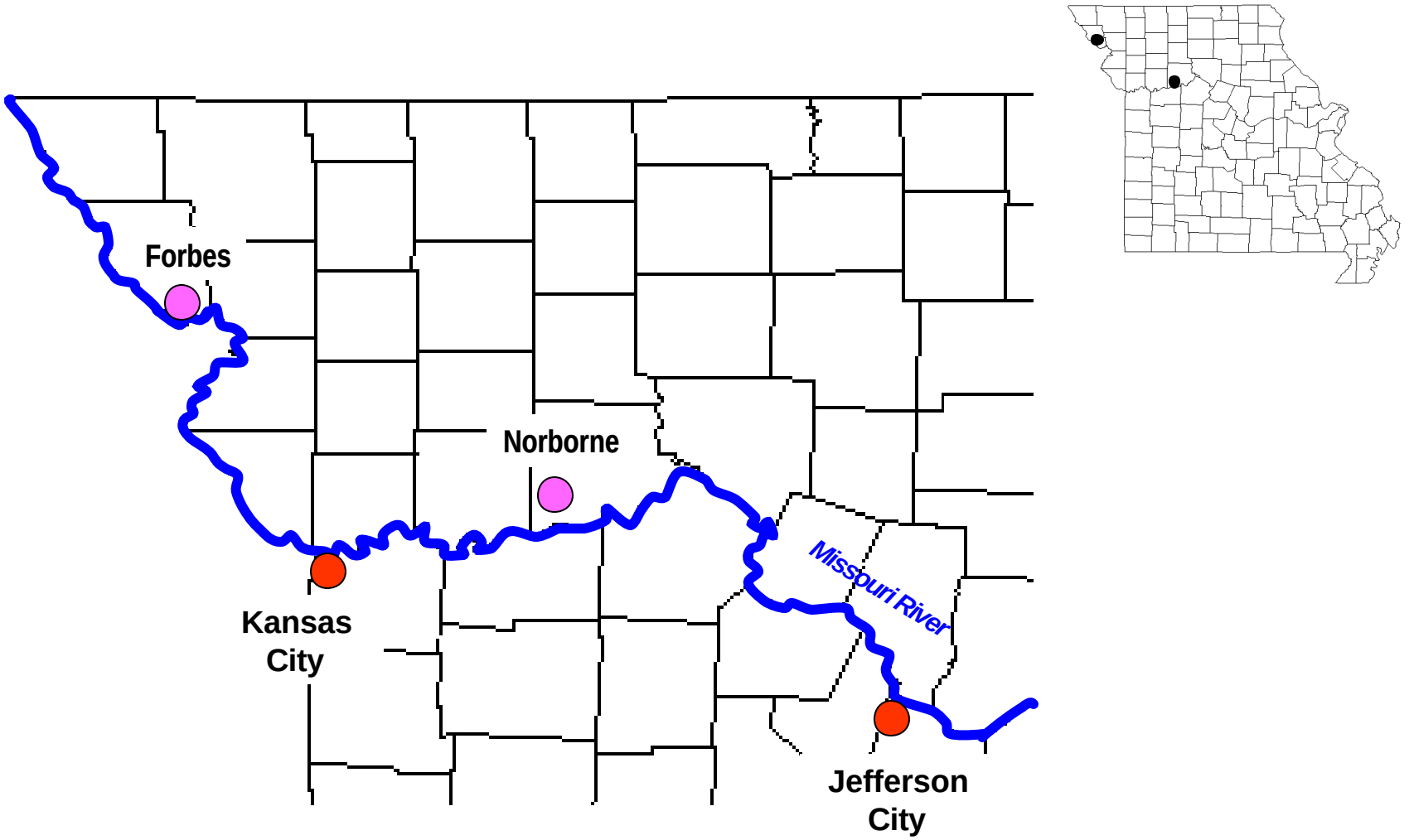


Figure 6-3
Alternative Site Areas

6.3 EVALUATION OF FINAL ALTERNATIVE SITES

6.3.1 Site Reconnaissance

Visits to the two sites were conducted in February and March of 2005. The purpose of this field reconnaissance was to obtain first-hand information about each site and its surrounding area. The field reconnaissance consisted of an automobile survey along public roads in the vicinity of each site. To the extent possible, each site area was assessed to:

- Confirm environmental information regarding presence or proximity to wetlands, floodplains, and topographic features
- Evaluate the site from constructability, access to transportation, and visibility standpoints
- Identify its proximity to existing development and sensitive noise receptors
- Confirm potential water supply sources
- Assess the likelihood of environmental impacts to historic structures, habitat suitable for threatened or endangered species, and receiving waterbodies water discharge
- Review potential routing for rail, transmission, and water infrastructure facilities

6.3.2 Evaluations

The two areas, Forbes and Norborne, were evaluated against a list of criteria designed to minimize adverse impacts to the environment, surrounding areas, and overall project viability. As the site areas were evaluated against the criteria, they were scored based on specific attributes. The attributes represented by the criteria are those that can help differentiate one site from another; attributes considered roughly equivalent for both sites were not included as evaluation criteria although they may be important considerations.

In total, 15 different criteria were used to evaluate the site areas. These criteria were organized into six major categories; three categories were further organized into 11 sub categories, and were allocated weights that totaled 100 percent. The evaluation categories, category weights, criteria, and composite weights were determined based on the professional judgment of an interdisciplinary team of engineers, biologists, and environmental scientists, and are summarized in Table 6-2. A detailed discussion of each of these criteria, which

includes the rationale used to assign the ratings for each criterion and the resulting scores for each of the site areas, follows this table.

Table 6-2 Site Evaluation Criteria

Major Category	Category Weight	Criterion	Composite Weight
Air Quality Impacts	10%	Non-attainment areas	10%
Fuel Supply	20%	Rail Line Proximity Competitive Rail Access Railroad Considerations	10% 6% 4%
Transmission	20%	Proximity to Interconnection Point	20%
Water Supply	20%	Proximity to Source	20%
Environmental	20%	Land Use Compatibility Protected Species Impacts Noise Impacts Wetlands Impacts Floodplains Impacts Cultural Resources Impacts	2% 3% 6% 3% 3% 3%
Other	10%	Site Accessibility Land Availability Constructability	2% 4% 4%

6.3.2.1 Air Quality Impacts

The air impacts category was assigned a total weight of 10 percent. Ideally, the proposed generating facilities should be located on a site where air quality conditions are favorable. Favorable air quality conditions at a given potential site area are those where a construction permit and operation permit for air emissions from the proposed generating units can be obtained in a timely manner without significant permit conditions or other restrictions. The relative attractiveness of the sites with regard to air quality are generally based on the assessment of air quality attainment status or its location relative to a Class I area, and the potential impacts the proposed facility may have on nearby Class I areas.

The Clean Air Act Amendments of 1977 resulted in establishment of the Prevention of Significant Deterioration (PSD) regulations. Under these regulations, maximum pollutant concentration increases (increments) were established for each criteria pollutant. These

allowable increments are most restrictive (lowest) for Class I areas. Congress designated all National parks and monuments over 6,000 acres in size a Class I area. Over time, wilderness areas and similar areas meeting the specified criteria have been designated Class I. These include areas managed by the National Park Service (NPS), U.S. Forest Service (USFS), and the U.S. Fish and Wildlife Service (USFWS), plus some Native American land. Typically, the distance that air modeling must consider impacts is 200 kilometers (km). There are no Class I areas located within 200 km of either site. However, two Class I areas are present in the state of Missouri. These are the Hercules-Glades Wilderness Area and the Mingo National Wildlife Refuge (NWR). Hercules-Glades is located in Taney County in southwestern Missouri near Arkansas state line. Mingo NWR is located on the border of Wayne and Stoddard counties in southeastern Missouri.

Under the CAA, Federal Land Managers (FLM) were given the responsibility to protect the natural and cultural resources of Class I areas from the adverse impacts of air pollution. FLM responsibilities include the review of air quality permit applications from proposed new or modified major pollution sources near Class I areas. If, in their review, an FLM demonstrates that emissions from a proposed source will cause or contribute to adverse impacts on the air quality related values (AQRV) of a Class I area, the permitting authority, typically the State, can deny the permit.

The FLMs' AQRV Work Group (FLAG) was established to develop a more consistent approach for the FLM to evaluate air pollution effects on their resources. Specifically, a more consistent approach in the review of the New Source Review (NSR) program, especially in the review of PSD regulations of air quality permit applications. The goal of FLAG is to provide consistent policies and processes for identifying AQRVs and for evaluating the effects of air pollution on AQRVs, primarily those in Class I areas. FLAG members include representatives from the three FLMs that administer the Class I areas; the USFS, the NPS, and the USFWS. The primary areas of concern are visibility impairment, ozone effects on vegetation, and effects of pollutant deposition on soils and surface waters.

Section 165 of the CAA requires the EPA or State permitting authority, to notify the FLM if emissions from a proposed project may impact a Class I area. Generally, the permitting

authority should notify the FLM of all new or modified major facilities proposing to be located within 100 km of a Class I area or, additionally, "very large sources" with the potential to affect Class I areas located at greater distances than 100 km. The process of FLM permit review would include a pre-application meeting with the permitting authority and the applicants to discuss air quality concerns for the specific Class I area potentially impacted, share preliminary information, and advise the applicant of analyses needed to assess the potential impacts on these resources. Upon conducting all of the necessary air quality impact analyses, a completeness determination would be completed by the permitting authority, and notification provided to the FLM. The process will then include a public comment period. Following the review process, the FLM will make one of the four following determinations:

- No Class I Increment Violated and No Adverse Impacts
- No Class I Increment Violated but AQRV Impact Uncertainty
- Class I Increment Violated but No Adverse AQRV Impacts
- Adverse Impact Determination

Nonattainment areas occur where ambient ground-level concentrations of one or more criteria pollutants are higher than the National Ambient Air Quality Standards (NAAQS). The criteria pollutants are ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), SO_2, particulate matter (PM), and lead (Pb). Neither of the sites is located in a nonattainment area. However, portions of Missouri are nonattainment for lead and ozone. A portion of Jefferson County and an area within the city limits of Herculaneum, Missouri are in nonattainment for lead. Jefferson County is the county located just south of the St. Louis area and the city of Herculaneum is located within Jefferson County. Jefferson County, Franklin County, St. Charles County, St. Louis County, and the city of St. Louis are all in nonattainment for ozone. All of the counties are located on the eastern border of the State, surrounding and within the St. Louis metropolitan area.

Both of the sites are located in attainment areas for all air criteria pollutants. In addition, the Metropolitan Kansas City Interstate Air Quality Control Region (AQCR) is currently in attainment. However, in recent years, the Metropolitan Kansas City AQCR has had occasional exceedances of the ozone standard, but not enough to push it into nonattainment

status. Both Forbes and Norborne sites are outside of the Kansas City AQCR. Therefore, there should be no significant obstacles to obtaining an air emissions permit at either of the sites. As a result both of the sites were assigned a score of five. Since air quality impacts are not considered a decisive concern because these sites are located in attainment areas, this criterion was assigned a weight of ten.

Forbes Site

The Forbes site area is located in Holt County, Missouri which is in attainment for all criteria air pollutants. The Forbes site is located approximately 235 miles (375 km) to the northwest of the edge of the nearest nonattainment area (St. Louis metropolitan area). The nearest Class I area is Hercules-Glades, approximately 270 miles (430 km) from the site. Therefore, the Forbes site is not expected to have a significant impact on Class I air quality or visibility. There should be no significant obstacles to obtaining an air permit at this site. The site was given an air impact rating five.

Norborne Site

The Norborne site area is located in Carroll County, Missouri, which is in attainment for all criteria air pollutants. The Norborne site is located approximately 135 miles (215 km) to the northwest from the edge of the nearest nonattainment area (St. Louis metropolitan area). As with the Forbes site, the Hercules-Glades, which is located approximately 188 miles (300 km) to the south, is the nearest Class I area to the Norborne site. Mingo Swamp Class I area is located approximately 250 miles (400 km) to the southwest of the site. Therefore, the Norborne site is not expected to have a significant impact on Class I air quality or visibility. There should be no significant obstacles to obtaining an air permit at this site. The air impact rating for this site is five.

6.3.2.2 Fuel Supply

The fuel supply category, which was assigned a total weight of 20 percent, is comprised of three component evaluation criteria. These criteria are described in the following paragraphs.

6.3.2.2.1 Rail Line Proximity

Rail delivery of coal is the only practicable option for this project. In addition, construction techniques and economics favor delivery of power plant components in large prefabricated

modules. Transport of these large and/or heavy components to a site is practical over long distances only by rail or barge. However, the Missouri River is not navigable for all seasons of the year at these points along the river[1]; therefore, barges would not be a practical delivery mode for the fuel supply for these sites.

The ideal site for this criterion would be one that is located adjacent to an existing rail line. To reduce economical and environmental impacts from rail line construction, the ratings for this criterion were assigned based on the distance from the site to a potential rail line using the scoring criteria listed below.

- Existing on-site rail spur → Score = 5
- Distance ≤ 5 miles → Score = 4
- 5 miles < Distance ≤ 10 miles → Score = 3
- 10 miles < Distance ≤ 15 miles → Score = 2
- Distance > 15 miles → Score = 1

Following is a description of the rail line proximity and associated scores for each site.

Forbes Site

The nearest rail access for the Forbes site is from an existing Burlington-Northern Santa Fe Railroad (BNSF) line located just north of U.S. Highway 159 which borders the site. This site would require the construction of approximately four miles of rail spur and coal unloading loop to connect the proposed generation facility to the existing BNSF line. The rail spur will require a crossing of U.S. Highway 159. There is one residence within a quarter mile of the proposed rail route. The rail proximity rating for this site is a score of four.

[1]According to the U.S. Army Corps of Engineers, Northwestern Division, 1998 System Description and Operation for the Missouri River Basin, the Missouri River navigation channel extends for 734.8 miles from near Sioux City, Iowa (River Mile 732.3) to the mouth near St. Louis, Missouri (River Mile 0). Navigation on the Missouri River is limited to the normal ice-free season with a full length season normally extending from April 1 to December 1 at the mouth.

Norborne Site

The nearest rail access for the Norborne site is from an existing BNSF line located approximately 1.5 miles to the south of the site. However, the BNSF, is a principal Intermodal/Automotive Business Units rail line and is dedicated to this type of high speed intermodal traffic. This type of designated rail line may be unavailable and incompatible for delivery of fuel.

The second nearest rail line to the site is a Norfolk Southern Railroad line approximately 1.5 miles to the south. This line runs parallel to and south of the BNSF line. Routing of the rail spur from this line to the proposed power plant would require the rail spur to exit to the south, creating the need for an approximately 400 foot bridge over this line and the existing BNSF line. Total track length for the connection would be approximately 3.5 miles (including the rail spur and coal unloading loop), and would also require an at-grade road crossing of State Road DD and a crossing of the Norborne Drainage Ditch. There are no residences within a quarter mile of this alternate rail route. The rail proximity rating for this site is a score of four.

6.3.2.2.2 Competitive Rail Access

In order to secure the most competitive delivery rates for coal, it is advantageous to locate a generating station where it can be served by more than one rail carrier or multiple delivery modes. The scores for this criterion were assigned based on the distance from the site to the second closest delivery option and the constructability (both from an economical and feasible comparison) of a rail spur to the competing carrier. To reduce economical and environmental impacts from rail line construction, the ratings for this criterion were assigned based on the distance from the site to a potential secondary rail line using the scoring criteria listed below.

- Existing on-site rail spur $\rightarrow$ Score = 5
- Distance $\leq$ 5 miles $\rightarrow$ Score = 4
- 5 miles < Distance $\leq$ 10 miles $\rightarrow$ Score = 3
- 10 miles < Distance $\leq$ 15 miles $\rightarrow$ Score = 2
- Distance > 15 miles $\rightarrow$ Score = 1

Sites with a second rail carrier are downgraded if a major river must be crossed to access a second rail carrier or has an unfavorable economic or engineering constraint. Following is a description of the competitive rail access and associated scores for each site.

Forbes Site

The nearest rail line owned by a competing carrier is an existing Union Pacific (UP) line located approximately 10 miles to the west of the site in Nebraska. The total track length required for a connection to the UP line would be approximately 15 miles (including an approximately 3-mile long coal unloading loop). This connection would require a bridge over the Missouri River and would cross portions of the Iowa Sac and Fox Indian Reservation. This alternative would also require several at-grade road crossings and several river crossings, including Walnut Creek, Snake Creek, Big Nemaha River, and Mooney Creek. Figure 6-4 illustrates the location of the existing rail lines relative to the Forbes site. There are 10 residences within a quarter mile of the alternate rail route. The competitive rail access rating for this site is a score of one for having to construct a bridge over the Missouri River and crossing portions of an Indian Reservation.

Norborne Site

In addition to the BNSF located south of the site, there is also another BNSF line located approximately 7 miles to the north of the site that could be considered for competitive rail. Two alternate rail spur routes have been identified to connect the proposed power plant with the northern BNSF line.

Alternate 1 would roughly follow north of the West Fork of the Wakenda Creek. This alternate would require approximately 7.2 miles of new track, plus an additional 1.5-mile rail spur and coal unloading loop. The proposed rail spur route would require three at-grade road crossings, including County Road (CR) 636, CR 634 and State Road AA. Additionally, the rail spur would cross the West Fork of the Wakenda Creek and approximately five smaller drainages. Approximately 14 residences are located within a quarter mile of this alternate route.

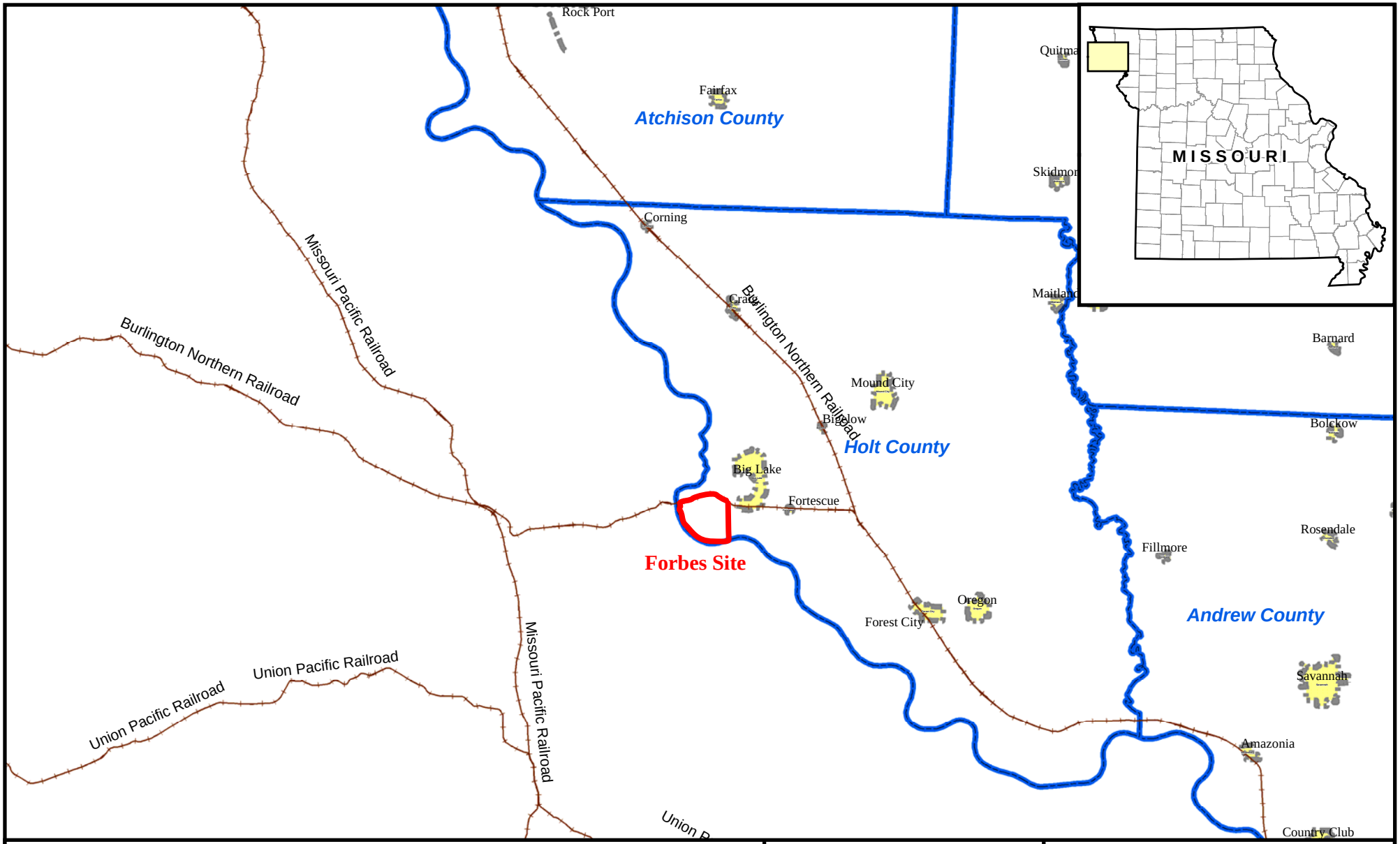


Figure 6-4

Mainline Railroads in Vicinity of Forbes Site

Alternate 2 would roughly follow a route south of Wakenda Creek and would require approximately 6.8 miles of new track, plus an additional 1.5-mile rail spur and coal unloading loop. The proposed rail spur would require seven at-grade road crossings, including CR 636, CR 630, CR 605, CR 624, CR 620, CR 603, and State Road JJ. Additionally, the rail spur would cross the West Fork of the Wakenda Creek and approximately seven smaller drainages. Approximately three residences are within a quarter mile of this alternate route. Figure 6-5 shows the location of the existing rail lines relative to the Norborne Site.

The competitive rail access rating for this site is a score of three since the closest BNSF rail is not feasible and the second BNSF rail is approximately 7 miles away.

6.3.2.2.3 Railroad Considerations

Following the determination to use railway delivery for the fuel supply, construction of a railroad spur to connect with a mainline railroad would be required for either of the proposed power plant sites. After identification of the railroads within the proximity of the proposed sites, a more defined pathway for the railroad spur alternatives, or macro-corridors, were developed. The railroad macro-corridors relative to the Forbes site are located in Holt County, Missouri and Richardson County, Nebraska. Railroad corridors relative to the Norborne site include Ray and Carroll counties in Missouri. The railroad macro-corridors are approximately one-mile-wide corridors established for each alternative that will ultimately contain more specific railroad spur alignments.

The primary considerations in developing macro-corridors are:

- Presence of residences
- Terrain
- Crossings of the existing tracks, major roadways, or major rivers that would require construction of a bridge

In general, opportunities to connect with a mainline railroad with the shortest distance, with flat topography, avoidance of residences, and no major river crossings requiring bridges would be considered ideal. Terrain was a major consideration during the development of the macro-corridors. Abrupt changes in terrain would result in several constraints, including

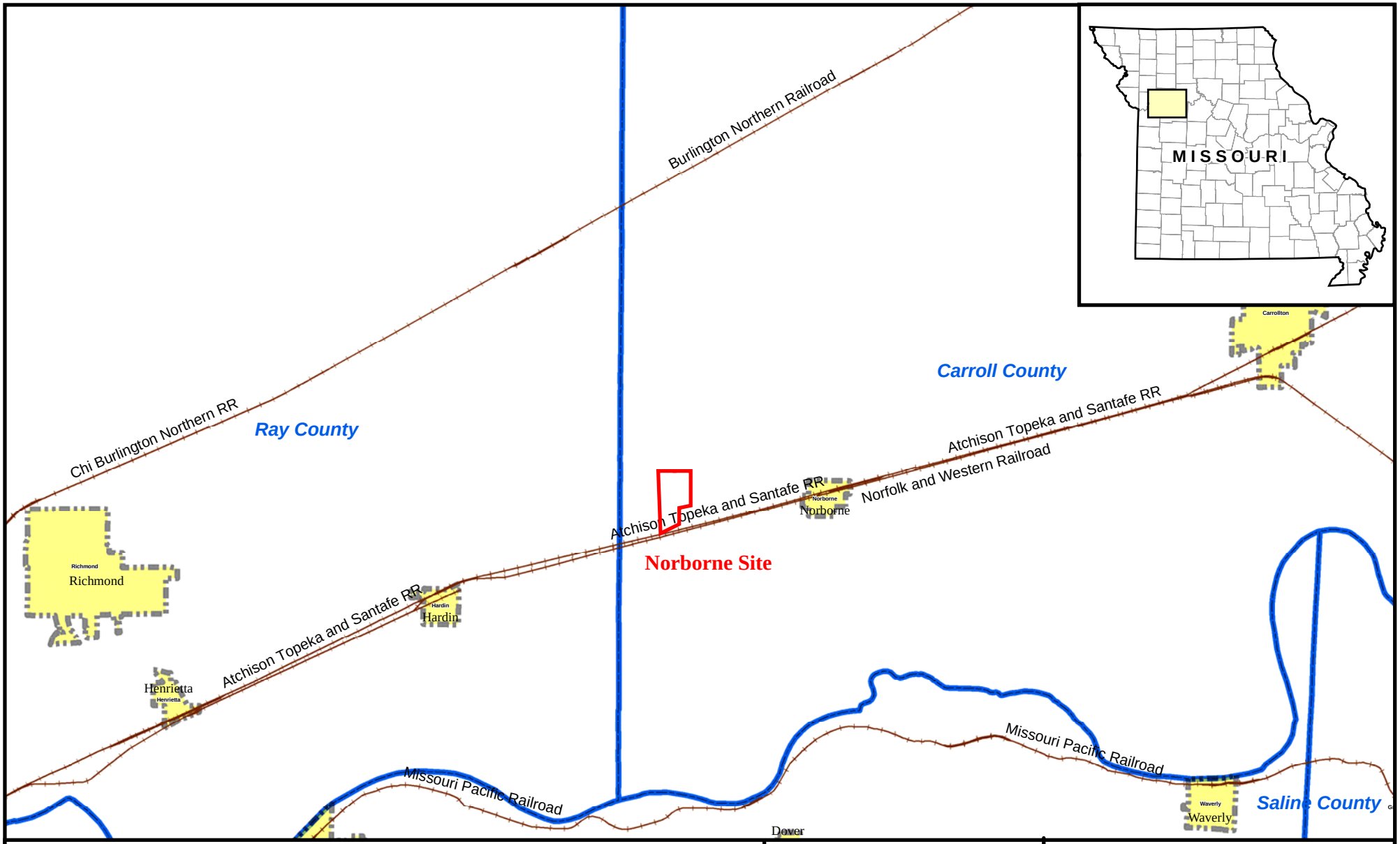


Figure 6-5

Mainline Railroads in Vicinity of Norborne Site

added length of the spur required to design a gradual slope, more land disturbance, and greater potential impacts to existing natural and human resources. Additionally, the macro-corridors were sited to minimize potential environmental impacts to existing natural and human resources, and make use of potential opportunity areas, where practicable.

Secondary considerations include:

- Presence of threatened and endangered species and their habitat
- Conservation areas, parks, and refuges
- Presence of wetlands
- Large transmission line right-of-ways

Impacts to a threatened, endangered or otherwise protected species would be considered very serious and probably represent a fatal flaw to route development. A list of Federal and state threatened and endangered species located in the known range of the macro-corridors was obtained specific to the county level in Missouri; however, only the federally listed species specific to the county level is available in Nebraska. The state listed species list for Nebraska was evaluated for species that could potentially be located in Richardson County. Of the total 29 Federal and state threatened and endangered species known to occur in the state of Nebraska, 19 could potentially be found in Richardson County. Table 6-3 summarizes the lists for each of the counties where the corridors are located.

For the Norborne site (Ray and Carroll counties in Missouri), there are four threatened and no endangered species within the known range of the macro-corridors. For the Forbes site (Holt County, Missouri and Richardson County, Nebraska), there are seven threatened and nineteen endangered species within the known range of the macro-corridors. In order to verify the presence of any potential habitat for any of the species at the site, a habitat survey would need to be conducted.

Typically, railroads are not considered compatible uses within conservation areas, parks, and refuges managed for resource conservation. Routing the railroad spur through these lands would create adverse impacts, additional permitting

Table 6-3 Threatened and Endangered Species – Carroll, MO, Ray, MO, Holt, MO, and Richardson, NE Counties

Common Name	Scientific Name	State Status	Fed. Status	Counties			
				Carroll, MO	Ray, MO	Holt, MO	Richardson, NE
American bittern	*Botaurus lentiginosus*	E				✓	
American burying beetle	*Nicrophorus americanus*	E	E				✓
Bald eagle	*Haliaeetus leucocephalus*	T	T	✓		✓	✓
Blanding's turtle	*Emydoidea Blandingii*	E				✓	
Blacknose shiner	*Notropis heteropis*	E					✓
Eastern massasauga	*Sistrurus catenatus catenatus*	E				✓	
Finescale dace	*Phoxinus neogaeus*	T					✓
Flathead chub	*Platygobio gracilis*	E				✓	
Indiana bat	*Myotis sodalist*	E	E	✓	✓	✓	
Interior least tern	*Sterna antillarum athalassos*	E	E				✓
Ginseng	*Panax quinquefolium*	T					✓
Greater prairie-chicken	*Typmanuchus cupido*	E		✓			
Lake sturgeon	*Acipenser fulvescens*	E		✓			
Lake sturgeon	*Acipenser fulvescens*	T					✓
Massasauga	*Sistrurs catenatus*	T	T				✓
Northern harrier	*Circus cyaneus*	E	-	✓			
Northern redbelly dace	*Phoxinus eos*	T					✓
Pallid sturgeon	*Scaphirhynchus albus*	E	E			✓	✓
Piping plover	*Charadrius melodus*	T	T				✓
River otter	*Lutra canadensis*	T					✓
Scaleshell mussel	*Leptodea leptodon*	E	E				✓
Small white lady's slipper	*Cypripedium candidum*	T					✓
Southern flying squirrel	*Glaucomys volans*	T					✓
Sturgeon chub	*Macrhybopsis gelida*	E					✓
Topeka shiner	*Notropis topeka*	E	E				✓
Western fox snake	*Elaphe vulpina vulpina*	E				✓	
Western prairie fringed orchid	*Platanthera praeclara*	E	T			✓	
Western prairie fringed orchid	*Platanthera praeclara*	T	T				✓
Whooping crane	*Grus americana*	E	E				✓

Source: Missouri Department of Conservation, 2005, U.S. Fish & Wildlife Service, 2005, Nebraska Game and Parks Commission, 2005

E – Endangered; T – Threatened

requirements, and project delays. Construction of the railroad spur within the corridor could involve construction within wetlands, increasing environmental impacts, complexity, and cost of the project. In addition, locating the railroad spur across a large transmission line right-of-way could require major design considerations and should be avoided, if possible. A description of the railroad considerations for each site, followed by a summary of the associated scores for each site, is provided below.

Forbes Site

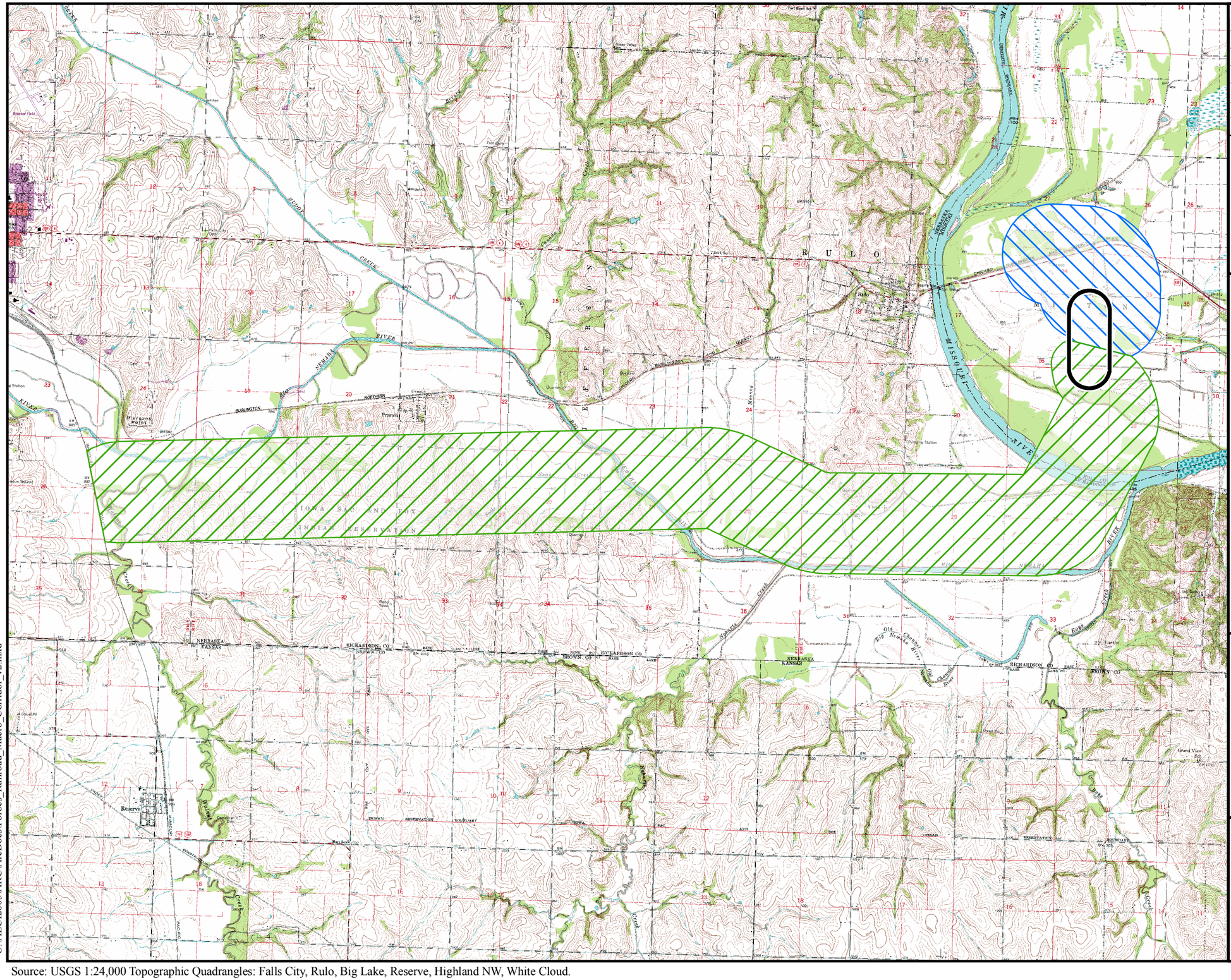
To facilitate the identification of feasible corridors for a new railroad spur to interconnect with the one of the two mainline railroad alternatives from the proposed Forbes Site, two corridors were established based on the environmental and engineering feasibility of constructing the route. There are two mainline railroads located in proximity to the Forbes site. The nearest rail access from the Forbes site is the existing BNSF railroad (Alternative 1) located directly north of the facility. The nearest competing rail access would be the Union Pacific (UP) (Alternative 2) located in Nebraska to the west (Figure 6-6). A description of the macro-corridors identified and the rationale for the development of these particular corridors are provided in the following sections.

Forbes to Burlington Northern Santa Fe Railroad (Alternative 1)

The macro-corridor identified between the proposed Forbes site and the BNSF railroad is approximately four miles in length (Figure 6-7) and would include the area directly north of the plant site to the railroad. The corridor would include portions of Sections 26, 27, 34, 35, in Township 61 North, Range 40 West and Section 16 in Township 1 North, Range 18 East in Holt County, Missouri.

While there are no towns located in the corridor, there are several rural residences in the area with most of the residences located along the county roads and U.S. Highway 159. There is one rural residence located within the one-mile corridor, located adjacent to the centerline of the corridor.

Topography within the corridor is relatively flat. Elevations range from 855 feet to 870 feet. The corridor would allow a direct route from the mainline to the plant site with minimal slope.



Locator Map

LEGEND

Coal Unloading Loop Track

1 Mile Railroad Corridors

Alternative 1

Alternative 2

NORTH

5,000 0 5,000

Feet

Figure 6-6
Associated Electric Cooperative, Inc.
650 MW Coal-Based Power Plant
Forbes Site
Railroad Macro-Corridors

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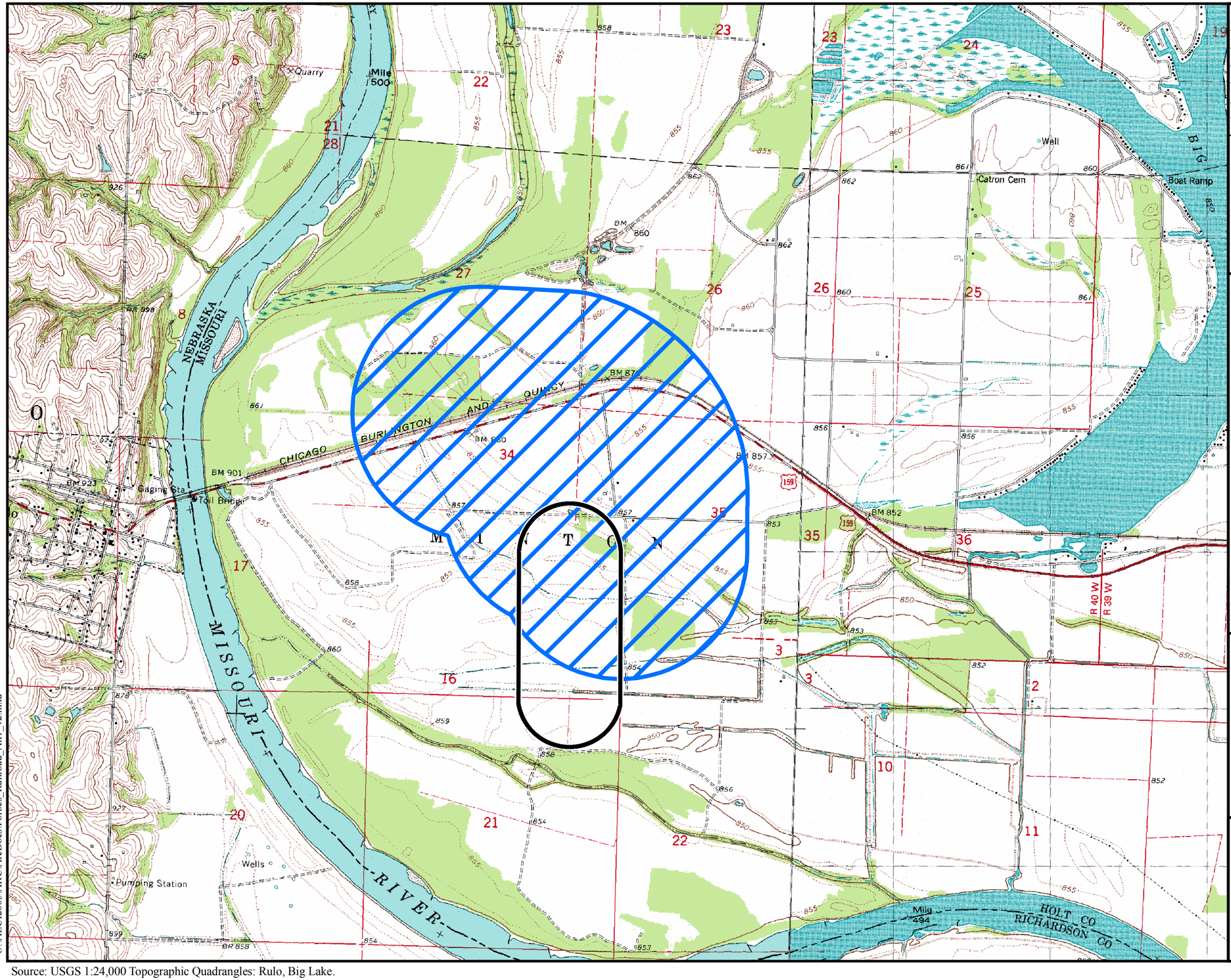
Source: USGS 1:24,000 Topographic Quadrangles: Falls City, Rulo, Big Lake, Reserve, Highland NW, White Cloud.

Revised June 23, 2005



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Source: USGS 1:24,000 Topographic Quadrangles: Rulo, Big Lake.

Figure 6-7
Associated Electric Cooperative, Inc.
650 MW Coal-Based Power Plant
Forbes Site
Railroad Alternative 1

Revised June 23, 2005

There are no major river crossings necessary to connect with the BNSF railroad. US Highway 159 parallels the BSNF on the south side of the railroad and is adjacent to the Forbes site. A rail spur connection to the BSNF would most likely require a bridge crossing over U.S. Highway 159.

There are no conservation areas, parks, and refuges located within or near the one-mile corridor.

There are 86 acres of wetlands consisting of (emergent (28 acres), forested (21 acres), scrub-shrub (36 acres), and palustrine unconsolidated bottom (1 acre) located within the macro-corridor (Figure 6-8). It is possible that construction of the spur within the corridor would involve construction within wetlands.

One transmission line (345 kV) crosses the macro-corridor and a crossing of the right-of-way would be unavoidable. The 2002 NESC and the RUS Bulletin, revised September 1992, would require specific design clearance of 31.5 feet over a railroad track. In conclusion, there are few major constraints between the Forbes site and the BNSF Railroad.

Forbes to Union Pacific Railroad Macro-Corridor (Alternative 2)

The macro-corridor identified between the proposed Forbes site and the UP railroad is approximately 15 miles in length (Figure 6-9). The corridor would follow a route south across the Missouri River then turn westerly, crossing the Nemaha River and towards the UP railroad. The corridor would include portions of Sections 21, 22, Township 1 North, Range 18 East in Holt County, Missouri; Sections 27, 28, 29, 30, 31, 32, and 33, Township 1 North, Range 18 East; Sections 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, and 30, Township 1 North, Range 17 East; and Sections 23, 24, 25, and 26, Township 1 North, Range 16 East in Richardson County, Nebraska.

There are no towns located in the corridor; however, there are 10 rural residences within the one-mile corridor. An effort was made to avoid residences; however, 7 are within one-quarter mile of the center line. Most rural residences in the area are located along the county roads.

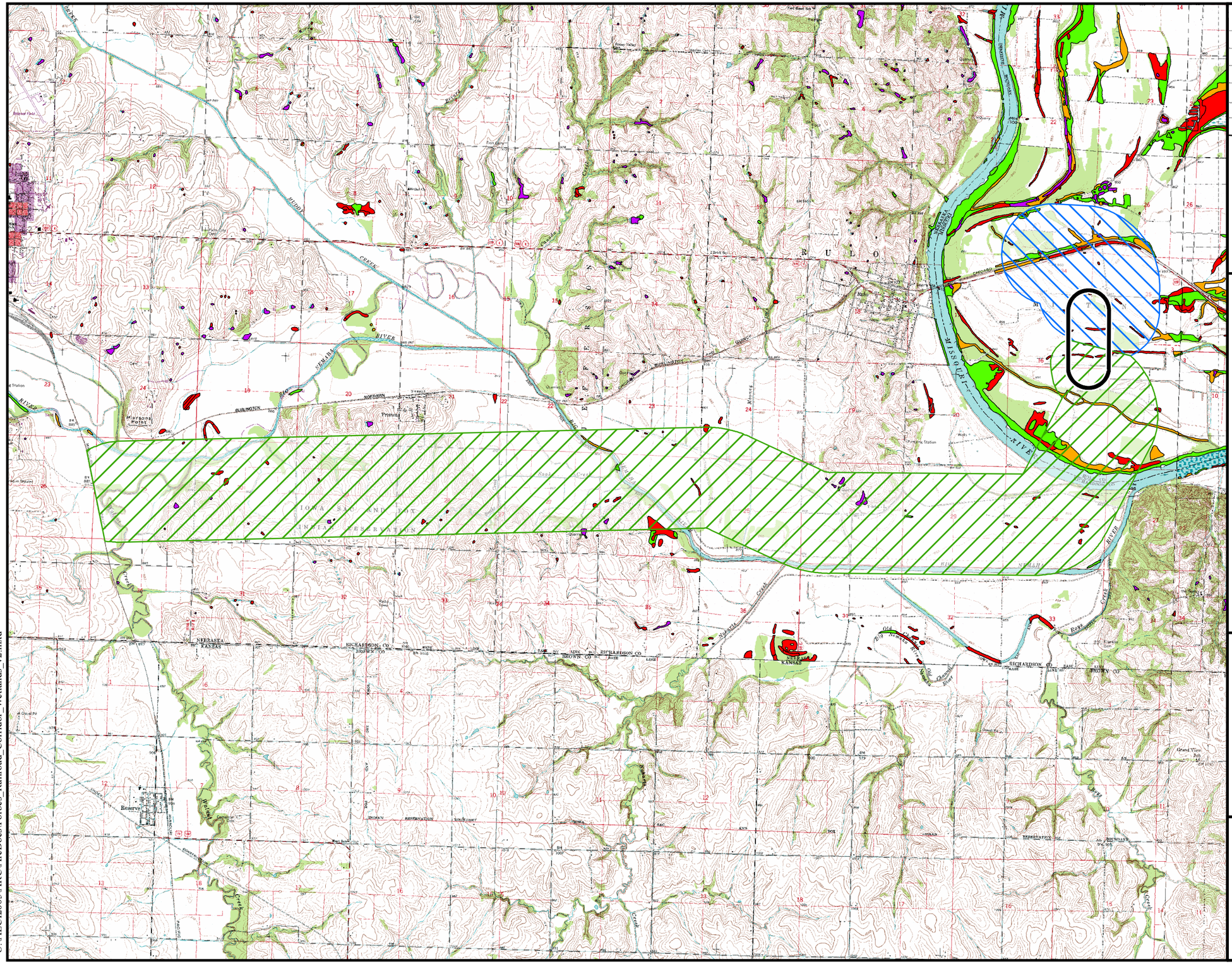

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Figure 6-8
Associated Electric Cooperative, Inc.
650 MW Coal-Based Power Plant
Forbes Site
Railroad Macro-Corridors
and NWI Wetlands

Source: USGS 1:24,000 Topographic Quadrangles: Falls City, Rulo, Big Lake, Reserve, Highland NW, White Cloud; USFWS NWI Wetlands.

Revised June 23, 2005

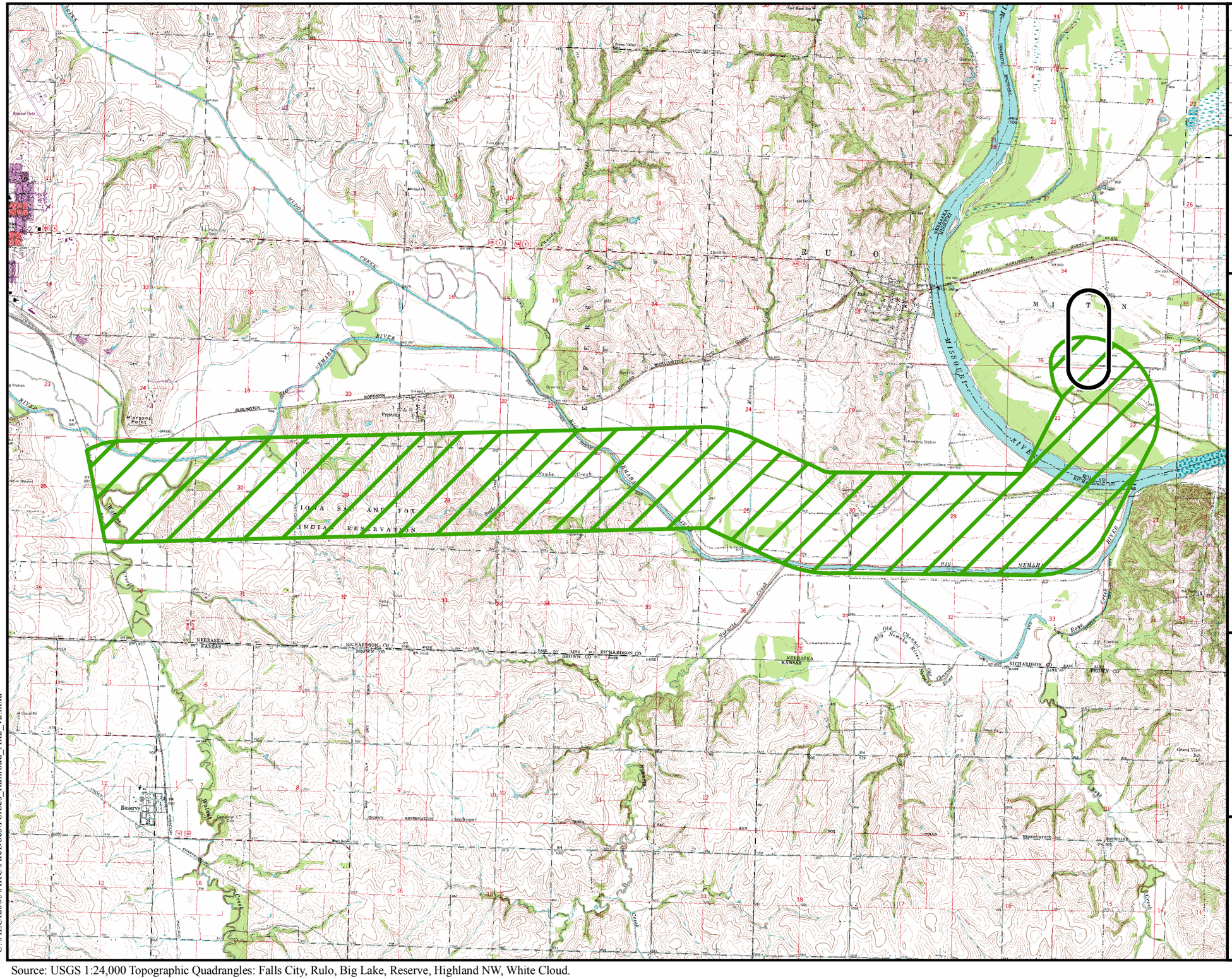

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Figure 6-9
Associated Electric Cooperative, Inc.
650 MW Coal-Based Power Plant
Forbes Site
Railroad Alternative 2

Source: USGS 1:24,000 Topographic Quadrangles: Falls City, Rulo, Big Lake, Reserve, Highland NW, White Cloud.

Revised June 23, 2005

Topography within the corridor is relatively flat, except for a narrow band with elevations ranging from 890 to 1000 feet. Elevations for the majority of the corridor are around 850 feet near the Missouri River and gradually slope up to around 880 feet near the railroad. The corridor would allow a direct route from the mainline railroad to the plant site with a gradual slope.

Major river crossings would present an obstacle to developing this corridor connecting to the Forbes site. There are two major rivers, the Missouri and Big Nemaha that would be crossed to connect with the UP railroad. The Missouri River crossing would be located just south of the Forbes site and the Big Nemaha River crossing would be located on the western portion of the railroad corridor in Nebraska. In addition, several smaller perennial and intermittent streams would be crossed, including Walnut Creek and Snake Creek in Nebraska.

Constructing a railroad bridge across the Missouri River would require Section 7 consultation with the U.S Department of Interior, Fish and Wildlife to identify measures to avoid or minimize adverse effects to federally listed endangered species.

According to NWI maps there are 148 acres of wetlands consisting of (emergent (52 acres), forested (37 acres), scrub-shrub (49 acres), and palustrine unconsolidated bottom (10 acres) located within the macro-corridor. It is possible that construction of the spur within the corridor would involve construction within wetlands, both of which would increase the adverse environmental impacts, complexity, and cost of the project.

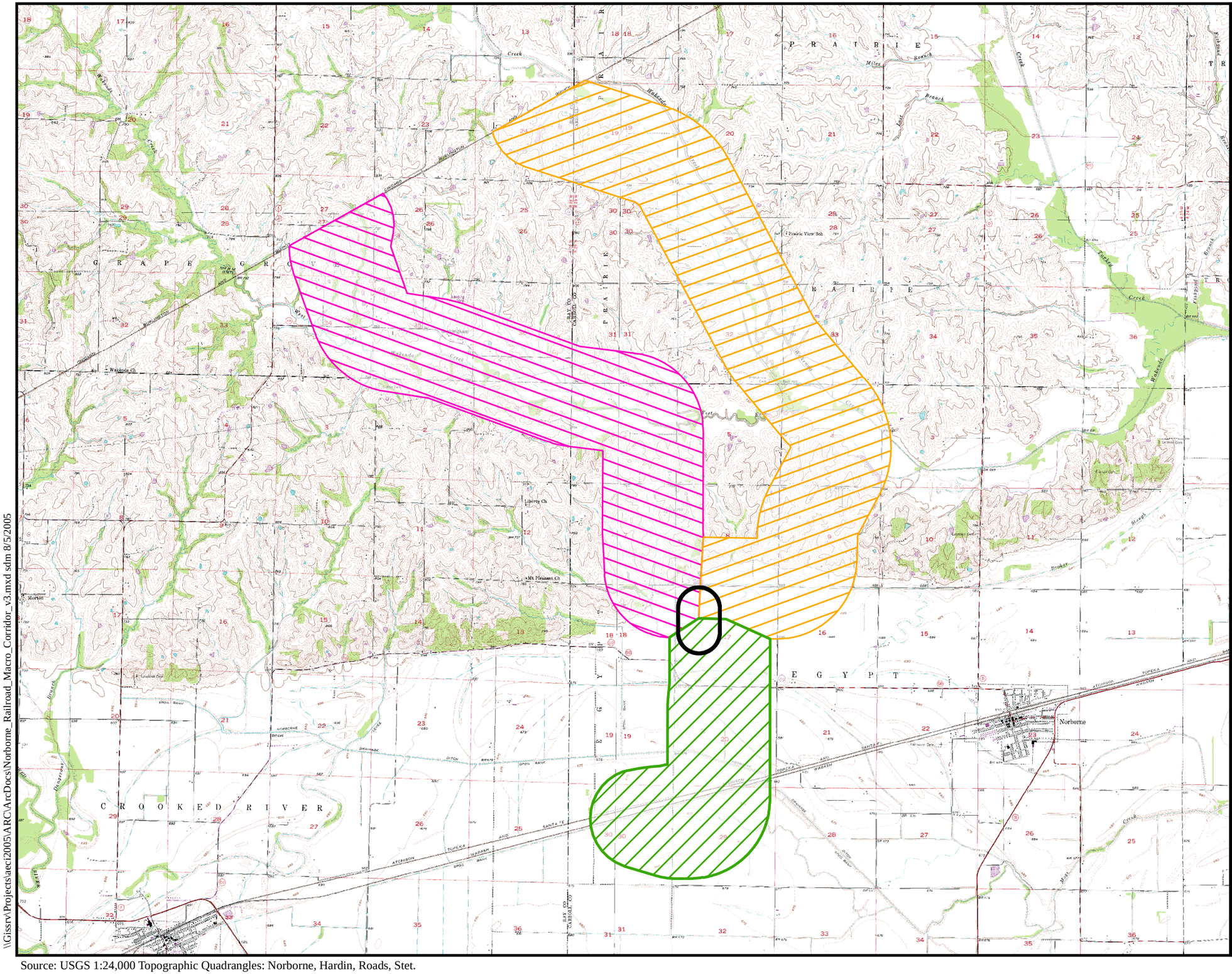
There are no conservation areas, parks, and refuges located within or near the one-mile corridor. However, the corridor does cross approximately 4 miles of the Iowa Sac and Fox Indian Reservation. The Reservation is located south of the Nemaha River on the west side of the Missouri River in the western portion of the corridor. Although this reservation is currently crossed by the BNSF line to which the plant could be connected (Alternative 1), it is unlikely that the Tribe would approve construction of a second rail line across the Reservation. AECI would be unable to acquire right-of-way for a rail line across the Reservation through eminent domain and would therefore be subject to the costs and conditions established by the Sac and Fox Tribe for permission to construct the rail line.

Currently, the BNSF rail line extends through the Nemaha River valley before crossing the Missouri River at Rulo, Nebraska. Construction of a second rail line to connect to the UP and avoid the Indian Reservation would likely require at least one, if not two or more, crossings of the BNSF rail line. It is unlikely that the BNSF would allow these crossing by a potential competitor. Such crossings could be forced through authorization from the Surface Transportation Board (formerly the Interstate Commerce Commission, the Federal agency responsible for regulating rail construction and commerce activities). However, such authority is not guaranteed. If approved, crossings of the BNSF could either be at grade with the existing rail line but would more likely require the new rail line to go over the existing line, creating grade-separated overpasses of the existing line. The topography of the Nemaha River valley would require extensive earthwork to create suitable grades and approaches for these grade-separated crosses.

There are no transmission lines crossing within the macro-corridor.

Norborne Site

Three railroads are located in proximity to the proposed Norborne site. The nearest rail access from the Norborne site is the existing Burlington Northern Santa Fe (BNSF) railroad located directly south of the facility and is a principal Intermodal/Automotive Business Units rail line and not a feasible alternative. The second nearest rail access would be the Norfolk Southern (NS) Railroad to the south. Additionally, a second BNSF line is located to the north of the site. To facilitate the identification of feasible corridors for a new railroad spur to connect with the two railroad alternatives from the proposed Norborne site, three corridors were established based on the environmental and engineering feasibility of constructing the railroad spur. The corridors include one option to the NS railroad (Alternative 1) and two options to the northern BNSF railroad. They include the Norborne to the northern BNSF railroad (east connection) (Alternative 2), and Norborne to the northern BNSF railroad (west connection) (Alternative 3). Following is a description of the macro-corridors identified for each alternative and the rationale for the development of these particular corridors (Figure 6-10).



Locator Map

LEGEND

Coal Unloading Loop Track

1 Mile Railroad Corridors

Alternative 1

Alternative 2

Alternative 3

NORTH

5,000 0 5,000

Feet

Figure 6-10
Associated Electric Cooperative, Inc.
650 MW Coal-Based Power Plant
Norborne Site
Railroad Macro-Corridors

\\Gissrv\Projects\aeci2005\ARC\ArcDocs\Norborne_Railroad_Macro_Corridor_v3.mxd sdm 8/5/2005

Source: USGS 1:24,000 Topographic Quadrangles: Norborne, Hardin, Roads, Stet.

Revised August 05, 2005

Norborne to Norfolk Southern Railroad Macro-Corridor (Alternative 1)

The macro-corridor identified between the proposed Norborne site and the NS railroad is approximately 2.5 miles in length (Figure 6-11). The Norborne to NS Railroad macro-corridor would include the area directly south of the plant site to the railroad, and would include portions of Sections 17, 18, 19, 20, 29, and 30, Township 52 North, Range 25 West in Carroll County.

There are no towns located in the corridor and only a few rural residences in the area. An effort was made to avoid residences. Most of the residences in the area are located along the county roads. There are no rural residences located within the one-mile corridor.

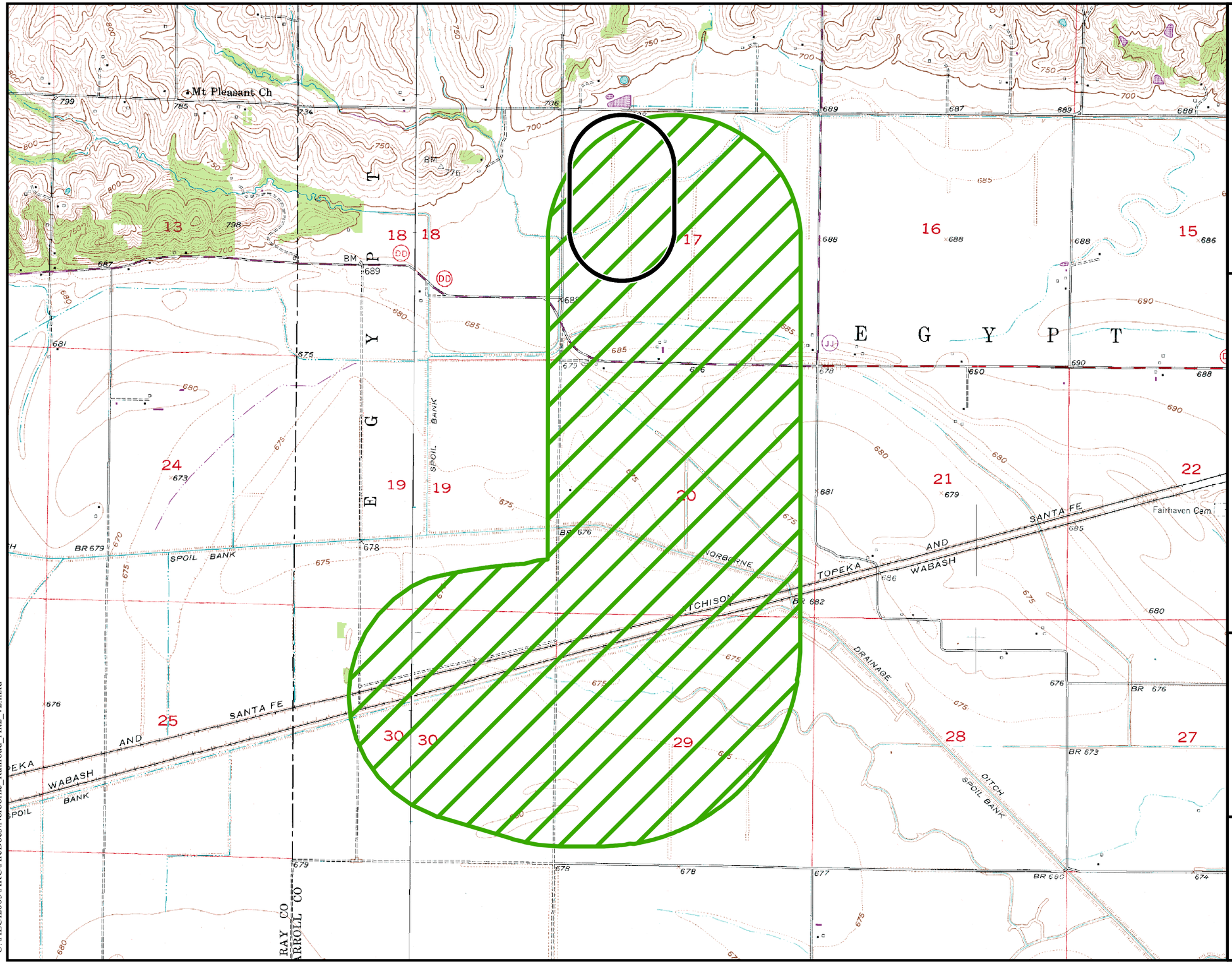
Topography within the corridor is flat. Elevations range from 675 feet to 685 feet. The corridor would allow a direct route from the BNSF mainline to the plant site with minimal slope.

There are no conservation areas, parks, and refuges located within or near the one-mile corridor. No major river crossings are necessary to connect with the southern BNSF railroad. However, a few smaller drainages, including the Norborne Drainage Ditch, would be crossed.

The railroad spur connecting with the NS Railroad would require one extra mile of track and one bridge, 400 feet in length, to cross both the existing NS Railroad track and the existing southern BNSF Railroad track. There are no Interstate or U.S. Highway crossings within the corridor; however, State Road DD does cross the corridor, and an at-grade crossing would most likely be required.

According to NWI maps there are approximately 31 acres of wetlands [(emergent (28 acres), forested (1 acre), scrub-shrub (1 acres), and palustrine unconsolidated bottom (1 acre)] are located within the macro-corridor (Figure 6-12). It is possible that construction of the spur within the corridor would involve construction within wetlands.

There are no transmission lines that cross or are within the macro-corridor.



Locator Map

LEGEND

Coal Unloading Loop Track

1 Mile Railroad Corridor

NORTH

2,000 0 2,000

Feet

Figure 6-11
Associated Electric Cooperative, Inc.
650 MW Coal-Based Power Plant
Norborne Site
Railroad Alternative 2

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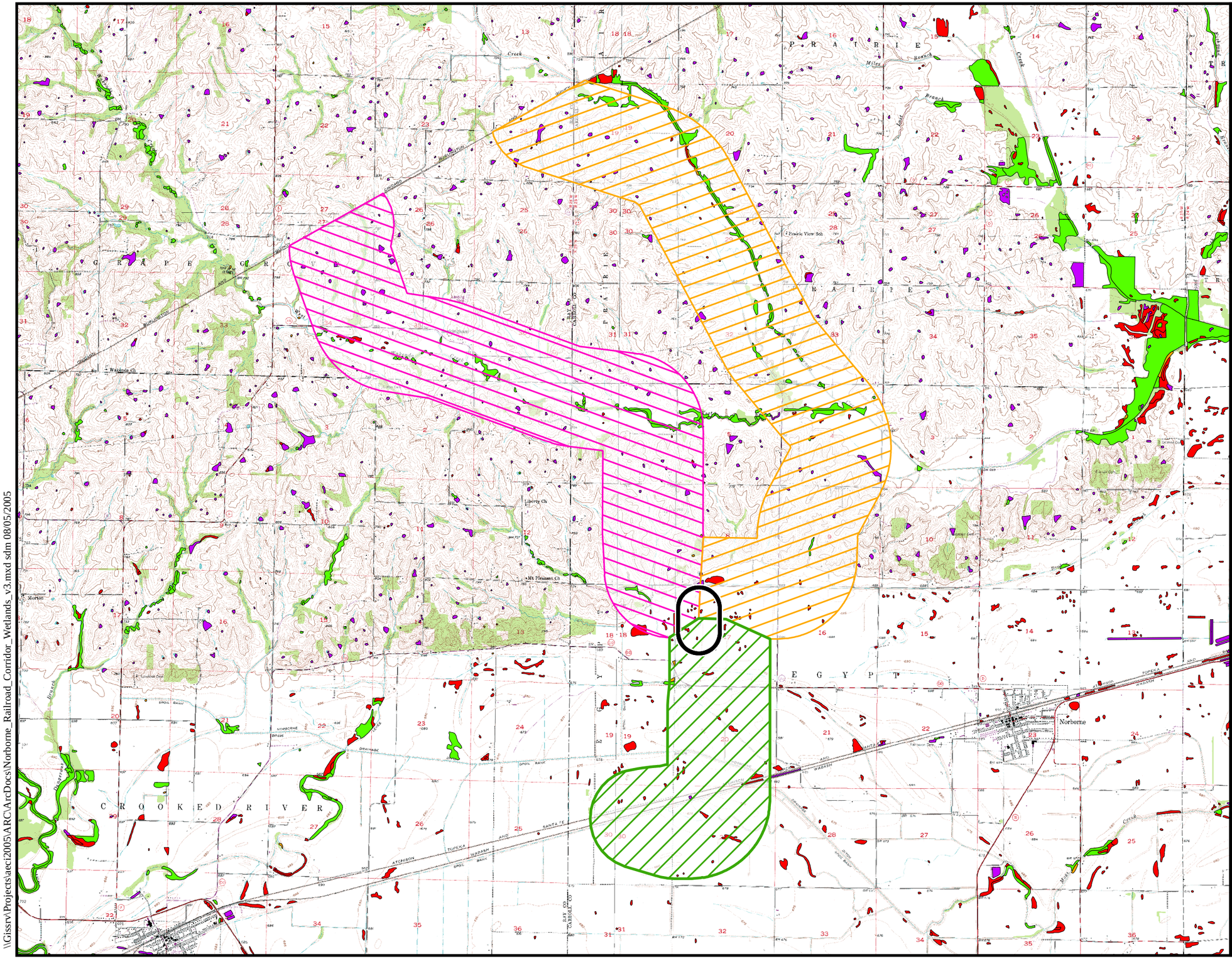
Source: USGS 1:24,000 Topographic Quadrangles: Norborne, Hardin.

Revised June 23, 2005



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Source: USGS 1:24,000 Topographic Quadrangles: Norborne, Hardin, Roads, Stet; USFWS NWI Wetlands.

Figure 6-12
Associated Electric Cooperative, Inc.
650 MW Coal-Based Power Plant
Norborne Site
Railroad Macro-Corridors
and NWI Wetlands

Revised August 05, 2005

In conclusion, the only constraint between Norborne and the NS Railroad would be the required construction of a railroad bridge to cross the two railroad mainlines.

Norborne to Northern Burlington Northern Santa Fe Railroad (East Connection) Macro-Corridor (Alternative 2)

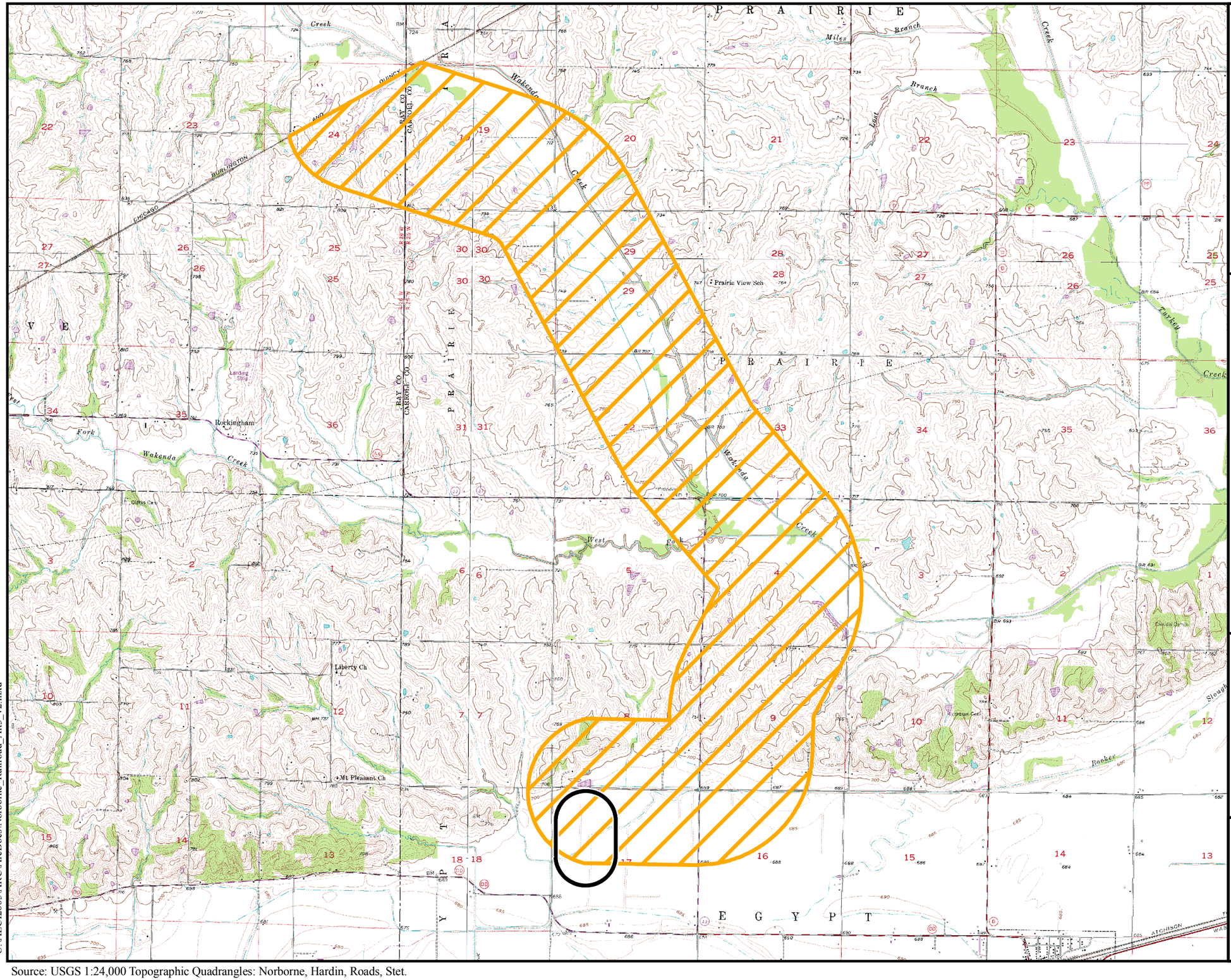
The macro-corridor identified between the proposed Norborne site and the northern BNSF railroad (east connection) is approximately 6.8 miles in length (Figure 6-13). The corridor would follow a route south of the Wakenda Creek from the plant site to the railroad and would include portions of Sections 3, 4, 5, 7, 8, 9, 16, 17, and 18, Township 52 North, Range 25 West, portions of Sections 19, 20, 28, 29, 30, 32, and 33, Township 53 North, Range 25 West in Carroll County, and portions of Section 24, Township 53 North, Range 26 West in Ray County.

The one-mile wide macro-corridor identified to connect with the northern BNSF railroad, described as the eastern connection, would allow for ample area should a deviation from the proposed alignment line be necessary.

There are no towns located in the corridor; however, there are several rural residences in the area. An effort was made to avoid residences. Most of the residences in the area are located along the county roads. There are 26 rural residences located within the one-mile corridor, with seven residences located within one-quarter of a mile from the centerline of the corridor. The one-mile corridor will allow for deviation in an effort to avoid impact to the rural residences in the area.

Topography within the corridor is predominately rolling hills; however, the majority of the route would be located in the relatively flat area of the Wakenda Creek floodplain. Elevations range from 689 feet to 760 feet, with elevations in the floodplain around 705 feet. The corridor would be more direct route by locating the spur in the floodplain, and would allow a moderately direct route from the mainline to the plant site with a gradual slope.

There are no conservation areas, parks, and refuges located within or near the one-mile corridor. However, private land in the area may be used for hunting, and if these hunting



Locator Map

LEGEND

Coal Unloading Loop Track

1 Mile Railroad Corridor

NORTH

3,500 0 3,500

Feet

Figure 6-13
Associated Electric Cooperative, Inc.
650 MW Coal-Based Power Plant
Norborne Site
Railroad Alternative 2

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Source: USGS 1:24,000 Topographic Quadrangles: Norborne, Hardin, Roads, Stet.

Revised June 23, 2005

areas are present within the one-mile corridor, they would be impacted with the construction of the railroad spur.

There are no major river crossings necessary to connect with the northern BNSF railroad. However, several smaller perennial and intermittent streams would be crossed, including the West Fork of the Wakenda Creek. In total, eight streams/creeks would require crossings.

No Interstate or U.S. Highway crossings are located within the corridor; however, the proposed rail spur route would require seven at-grade road crossings, including County Road (CR) 636, CR 630, CR 605, CR 624, CR 620, CR 603, and State Road JJ.

According to NWI maps there are approximately 166 acres of wetlands consisting of (emergent (23 acres), forested (110 acres), scrub-shrub (3 acres), and palustrine unconsolidated bottom (30 acres) located within the macro-corridor (Figure 6-12). It is possible that construction of the spur within the corridor would involve construction within wetlands.

One transmission line (161-kilovolt (kV)) crosses the macro-corridor and a crossing of the right-of-way would be unavoidable. The 2002 NESC and the RUS Bulletin, revised September 1992, would require a design clearance of 31.5 feet over a railroad track. In conclusion, there are minimal constraints between Norborne and the northern BNSF Railroad.

Norborne to Northern Burlington Northern Santa Fe Railroad (West Connection) Macro-Corridor (Alternative 3)

The macro-corridor identified between the proposed Norborne site and the northern BNSF railroad (west connection) is approximately 7.2 miles in length (Figure 6-14). The corridor would roughly follow north of the West Fork of the Wakenda Creek from the plant site to the railroad and would include portions of Sections 5, 6, 7, 8, 17, and 18, Township 52 North, Range 25 West, portions of Sections 31 and 32, Township 53 North, Range 25 West in Carroll County, portions of Sections 1, 2, and 3, Township 52 North, Range 26 West, and portions of Sections 26, 27, 34, 35, and 36, Township 53 North, Range 26 West in Ray County.

Locator Map

LEGEND

Coal Unloading Loop Track

1 Mile Railroad Corridor

NORTH

3,000 0 3,000

Feet

Figure 6-14
Associated Electric Cooperative, Inc.
650 MW Coal-Based Power Plant
Norborne Site
Railroad Alternative 3

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Source: USGS 1:24,000 Topographic Quadrangles: Norborne, Hardin, Roads, Stet.

Revised June 23, 2005

The one-mile wide macro-corridor identified to connect with the northern BNSF railroad, described as the western connection, would allow for ample area should a deviation from the proposed alignment line be necessary.

The small community of Rockingham is located in the corridor, along with several rural residences in the area. An effort was made to avoid residences. Most of the residences in the area are located within the community of Rockingham or along the county roads. The one-mile corridor would allow for deviation in an effort to avoid impact to the community and rural residences in the area. There are 34 rural residences located within the one-mile corridor, with 22 residences located within one-quarter of a mile from the centerline of the corridor.

Topography within the corridor is predominately rolling hills; however, the majority of the route would be located in the relatively flat area of the West Fork of the Wakenda Creek floodplain. Elevations range from 685 feet to 760 feet, with elevations in the floodplain around 720 feet. The corridor would be more direct route by locating the spur in the floodplain, and will allow a moderately direct route from the mainline to the plant site with a gradual slope.

There are no conservation areas, parks, and refuges located within or near the one-mile corridor. However, private land in the area may be used for hunting, and if these hunting areas are present within the one-mile corridor, they would be impacted with the construction of the railroad spur.

No major river crossings would be necessary to connect with the northern BNSF railroad. However, several smaller perennial and intermittent streams would be crossed, including the West Fork of the Wakenda Creek. In total, six streams/creeks would require crossings.

There are no Interstate or U.S. Highway crossings within the corridor; however, the proposed rail spur route would require three at-grade road crossings, including CR 636, CR 634 and State Road AA.

According to NWI maps there are approximately 102 acres of wetlands consisting of (emergent (21 acres), forested (57 acres), scrub-shrub (1 acres), and palustrine

unconsolidated bottom (23 acres) are located within the macro-corridor (Figure 6-12). It is possible that construction of the spur within the corridor would involve construction within wetlands.

Like Alternative 2, a 161 kV transmission line crosses the macro-corridor and a crossing of the right-of-way would be unavoidable. The 2002 NESC and the RUS Bulletin, revised September 1992, would require a design clearance of 31.5 feet over a railroad track. In conclusion, there are minimal constraints between Norborne and the northern BNSF Railroad.

Railroad Considerations Conclusions

The selection of the proposed railroad spur for this project largely depends on the power plant site selected, as well as specific route alignments identified within the corridors. Once the public has had an opportunity to comment on the proposed corridors, more detailed information will be collected and more specific route alignments will be identified. A more definitive comparison of impacts will be made for each route identified for each section. Table 6-4 summarizes each alternative and the constraints considered in the macro-corridor study. Since it is unlikely that a fuel transportation contract will be in place prior to completing the NEPA process, corridors for each competing carrier will be evaluated.

A comparison of the railroad alternatives for each site indicates there are differing types of constraints with each alternative. Forbes Alternative 1 would require a bridge over U.S. Highway 159. The major constraints for the Forbes Alternative 2 are the need for a railroad bridge across the Missouri River and the potential impacts to federally listed threatened and endangered species, the crossing of an Indian reservation, and/or potential crossing of another railroad (BNSF).

The major constraint for the Norborne Alternative 1 is a railroad bridge over two existing railroads. Norborne Alternatives 2 and 3 have uneven terrain and a greater number of residences that could be impacted when compared to Alternative 1.

Both the Forbes and Norborne sites have railroad alternatives with the potential to cross transmission lines. In addition, both have alternatives that are short and long in length and as

expected the longer length alternatives contain more constraints. All of the railroad alternatives could impact wetlands; however, the acres of wetlands that might be impacted can not be determined until the actual alignment is determined and wetland delineations have been identified jurisdictional wetlands. Generally, the design of the selected alignment would avoid wetlands as much as possible. Table 6-4 only provides an indication of what would need to be avoided if possible.

The railroad considerations rating for the Forbes site is a score of two; Alternative 1 is closer to the site and has minimal constraints, whereas, Alternative 2 would required considerable permitting and agency approval for the Missouri River and Indian reservation crossings.

The railroad considerations rating for the Norborne site is a score of three; Alternative 1 is closest to the site and has a bridge over two existing railroads, whereas, Alternatives 2 and 3 have longer corridors, uneven terrain, and would impact more residences.

6.3.2.3 Electric Transmission

The electric transmission category was assigned a total weight of 20 percent. (Additional information related to the electrical transmission corridors is located in Section 7) The transmission system required to deliver capacity and energy from a proposed power generating facility to the loads can be a substantial part of the total wholesale power cost and thus, must be considered in a siting study. The generating unit at the proposed power plant must be connected into a regional electrical transmission network. Therefore, a component of the search for prospective power plant sites is the location of existing transmission facilities and efforts to identify sites that can utilize these existing facilities while minimizing the need for new transmission line construction. Construction and operation of some new lines would be required to connect to the electrical grids. Consequently, the distance to these probable interconnection points is an important evaluation criterion. The sites were rated for this criterion using the scoring criteria listed below.

- Distance $\leq$ 50 miles $\rightarrow$ Score = 5
- 50 miles < Distance $\leq$ 100 miles $\rightarrow$ Score = 4
- 100 miles < Distance $\leq$ 150 miles $\rightarrow$ Score = 3

Table 6-4 Railroad Considerations Summary

Macro-Corridors	Railroad	Length (miles)	Number of Residences	Terrain	Public Uses	Bridges (major river, road, or rail crossings)	NWI Wetlands (acres)	Transmission Line Crossings	Number of Potential T&E Species in the Area
Norborne Site									
Alternative 1	NS	2.5	0	Flat	No	1 - (400’ over BNSF and NS mainline)	31	No	4
Alternative 2	BNSF	7	26	Rolling hills, floodplain flat	Possible private hunting	0	166	161 kV	4
Alternative 3	BNSF	7	34	Rolling hills, floodplain flat	Possible private hunting	0	102	161 kV	4
Forbes Site									
Alternative 1	BNSF	4	1	Relatively flat	No	1 – (400’ over U.S. Highway 159)	86	345 kV	7
Alternative 2	UP	15	10	Flat, rolling hills	No	1 or 2 - (2000’ over Missouri River) (could potentially require a bridge over the Big Nemaha River)	148	No	26

- 150 miles < Distance ≤ 200 miles → Score = 2
- Distance > 200 miles → Score = 1

The estimated length of a transmission line from the interconnection point to the site is discussed and the associated scores are provided in the following sections.

Forbes Site

The generating unit proposed at the Forbes site would be interconnected to the AECI electric transmission system. A new double circuit 345-kilovolt (kV) transmission line would be required to connect Forbes to the existing Fairport Substation (Figure 6-15), and then from the Fairport Substation south to a new substation location near Orrick, Missouri (Figure 6-16). From the new Orrick Substation, a 161 kV transmission line would extend to the existing Missouri City Substation and to the Eckles Substation. Total length of new transmission line construction required for the Forbes site would be approximately 125 miles. Figure 6-17 presents a map of the exiting transmission lines in the area of the Forbes site. The approximate distance between the endpoints is summarized in Table 6-5. The electric transmission rating for this site is a score of three. However, further consideration of the difficulty of routing a new transmission line through the built up area of Excelsior Springs from the Fairport Substation to a new Orrick Substation decreased the electric transmission rating for this site from a score of three to a score of one.

Table 6-5 Forbes Transmission Line Requirements

Endpoints	Approximate Mileage Between Endpoints (straight line)
Forbes to Fairport Substation	57
Fairport Substation to New Orrick Substation	53
New Orrick Substation to Missouri City Substation	8
New Orrick Substation to Eckles Road Substation	7
Total Mileage	**125**

Figure 6-15 Forbes to Fairport Substation

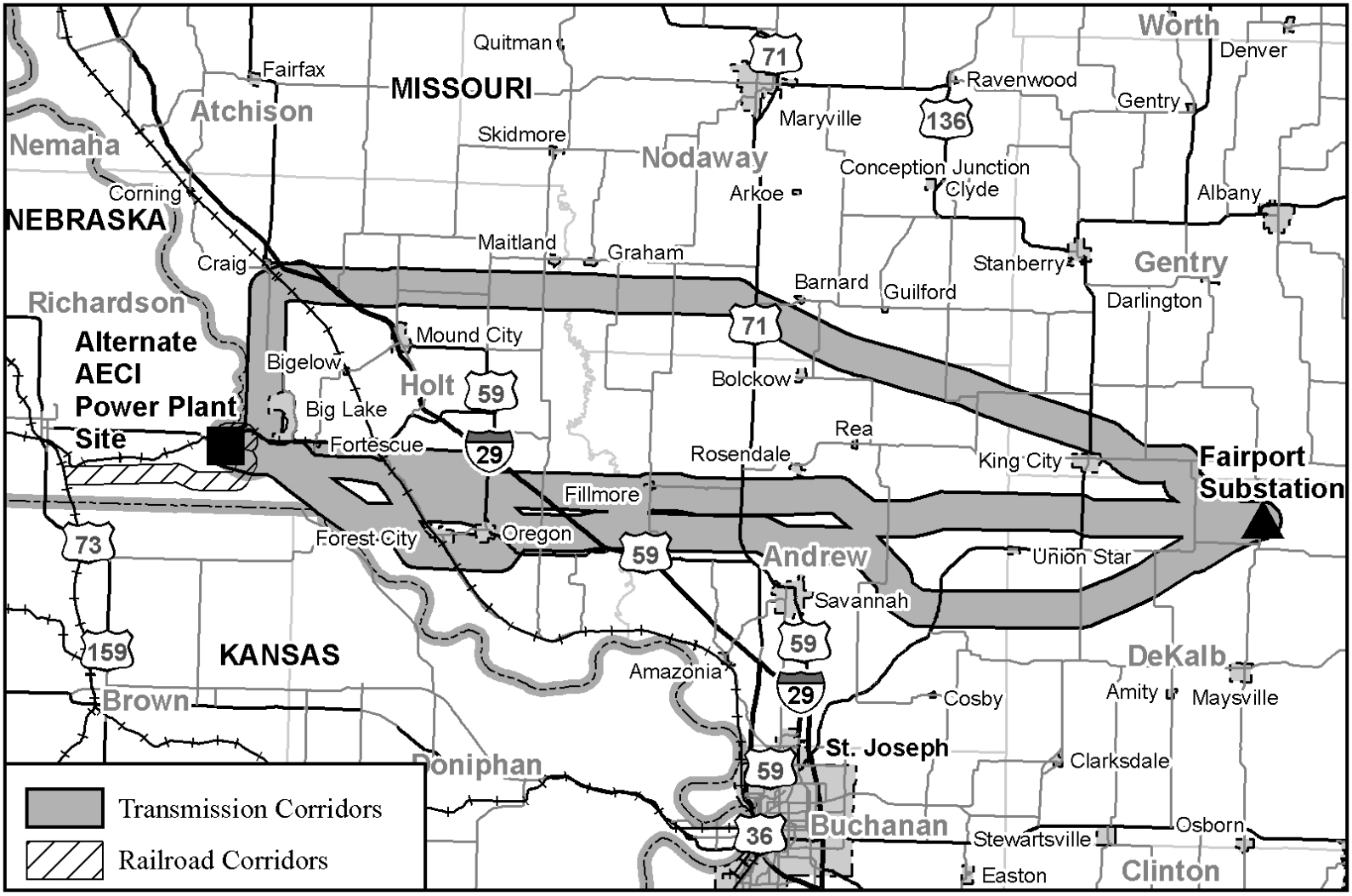
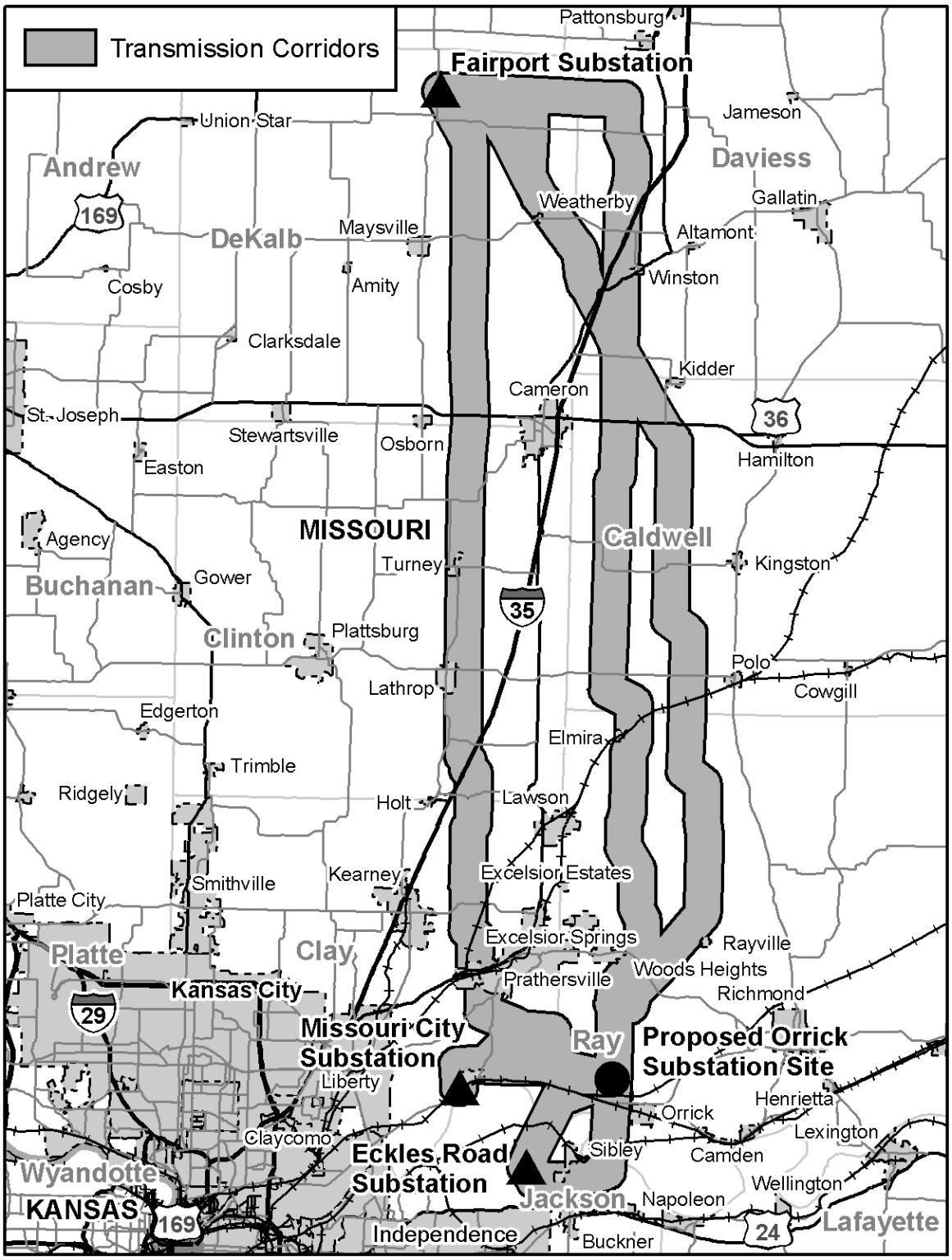


Figure 6-16 Fairport Substation to New Orrick Substation



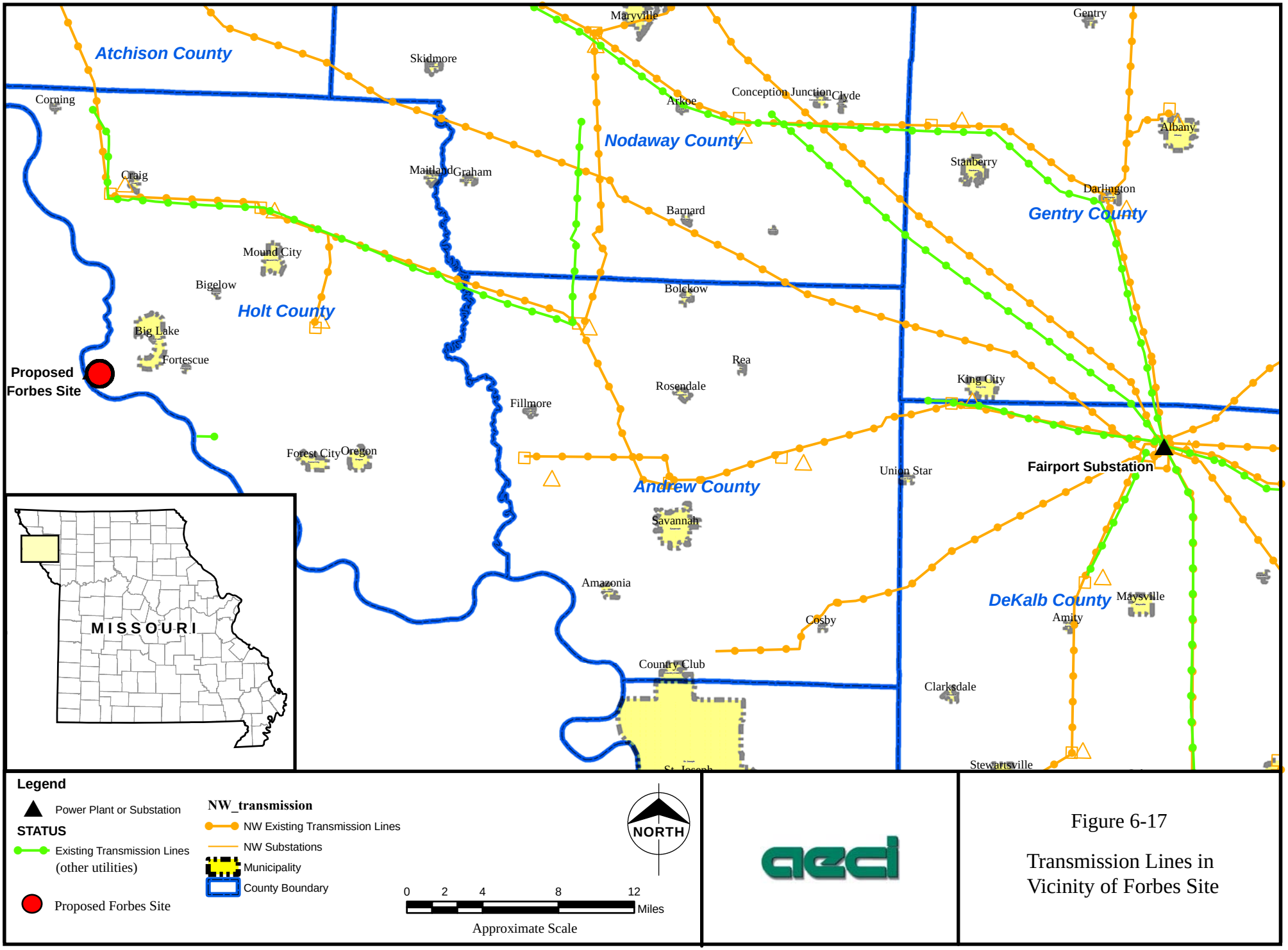


Figure 6-17

Transmission Lines in Vicinity of Forbes Site

Norborne Site

The generating unit located at the Norborne site would be interconnected to the AECI electric transmission system. A new 345 kV transmission line would be required to include a connection between Norborne and Thomas Hill Substation (Figure 6-18), and also from Norborne south to the Sedalia Substation and possibly continuing south from the Sedalia Substation to a new substation near Mt. Hulda (Figure 6-19). However, there is a possibility that the new line could stop at the Sedalia Substation. Total length of new transmission line construction required for the Norborne site would be approximately 134 miles if the line is extended to Mt. Hulda. The approximate mileage between the endpoints is depicted in Table 6-6. Figure 6-20 presents a map of the exiting transmission lines in the area of the Norborne site. The electric transmission rating for this site is a score of three.

Figure 6-18 Norborne to Thomas Hill Substation

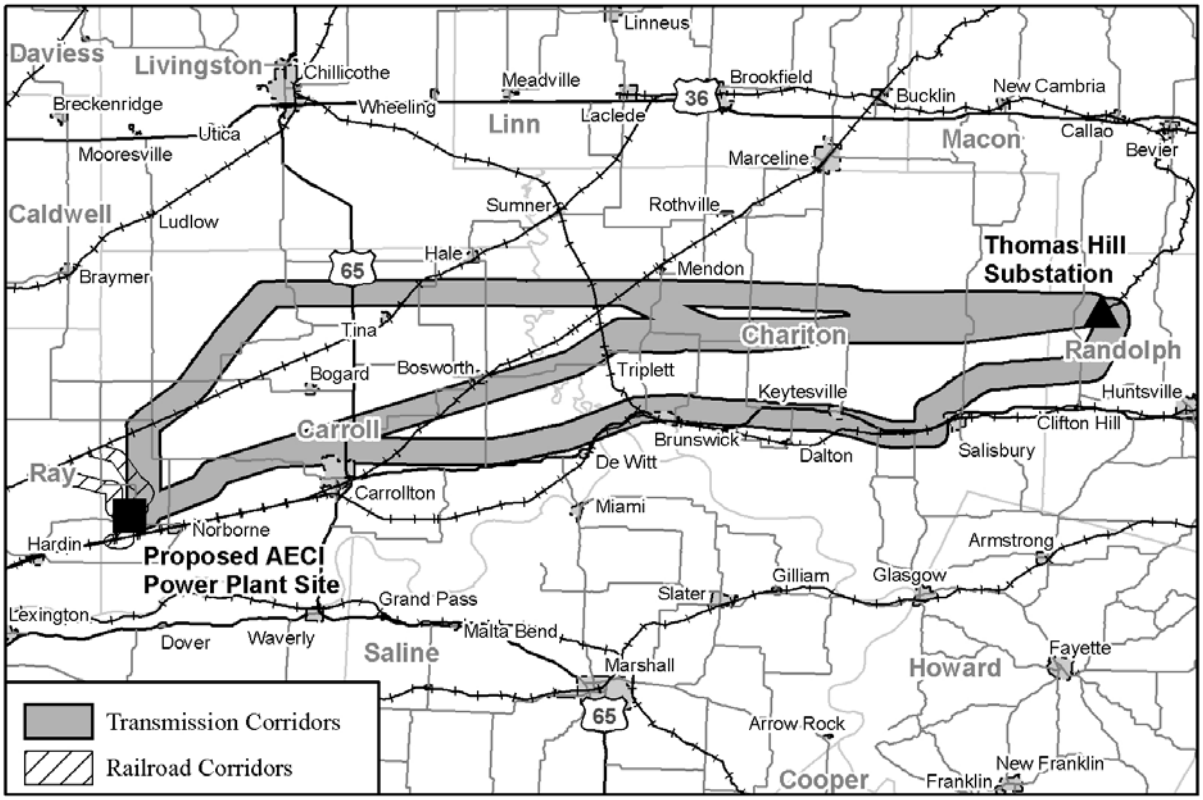


Figure 6-19 Norborne to Mt. Hulda Substation

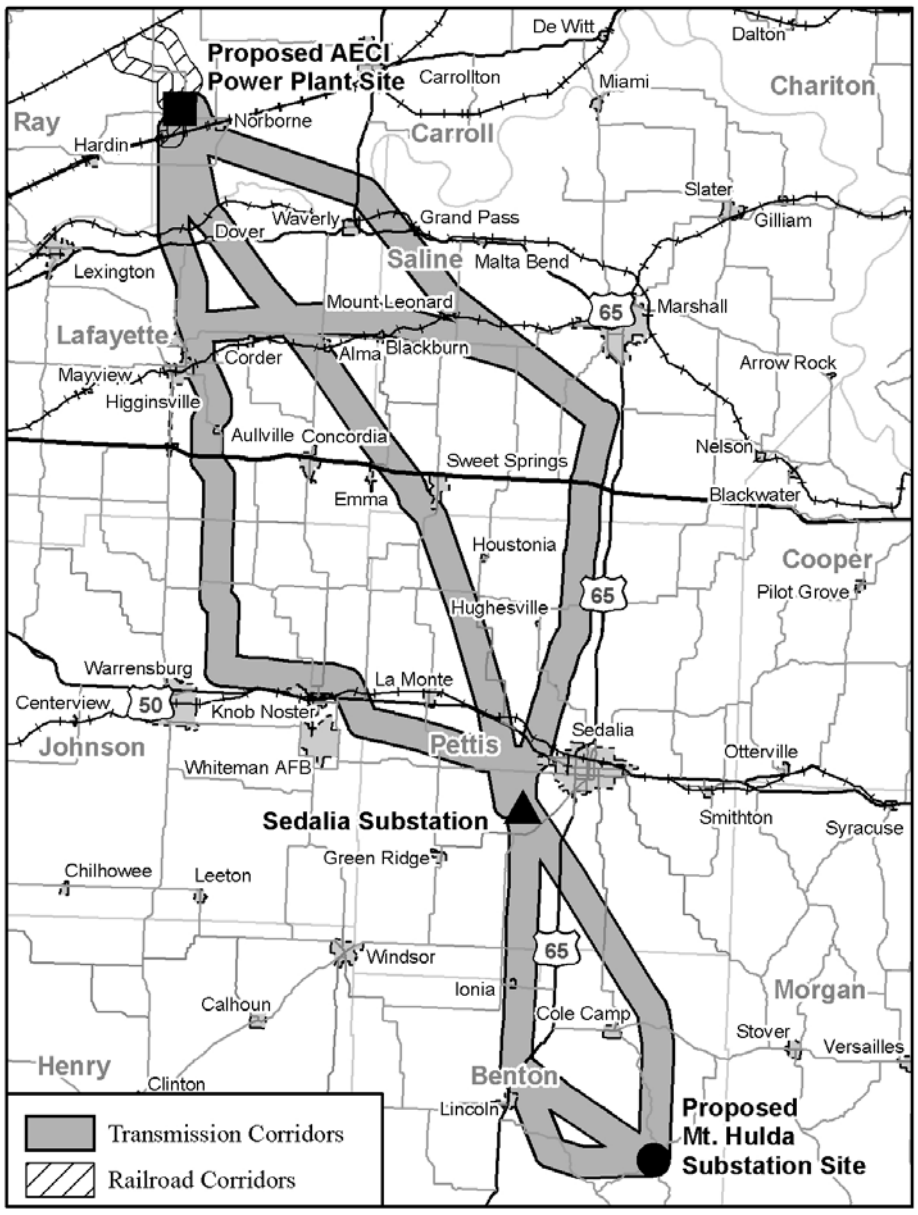
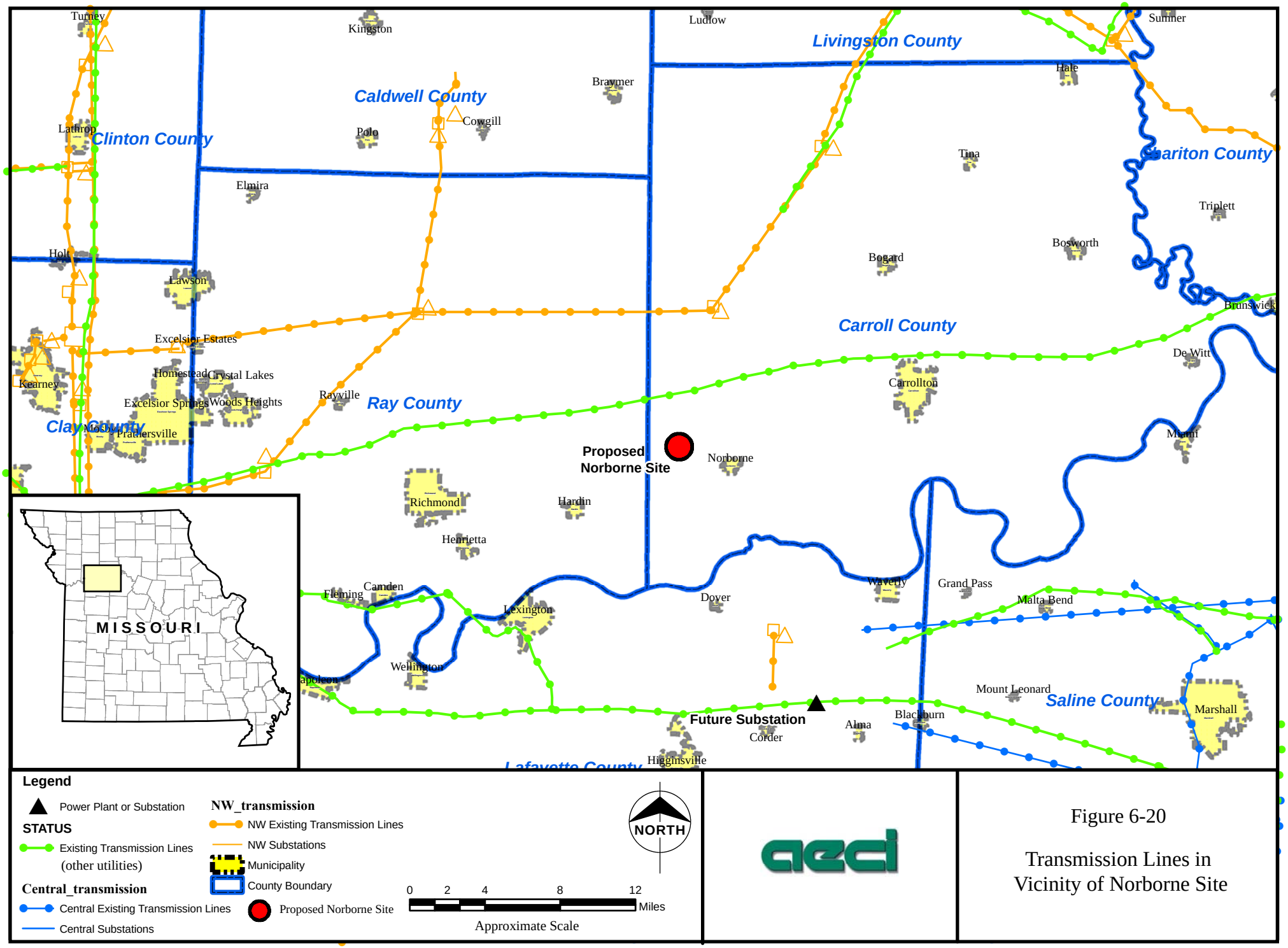


Table 6-6 Norborne Transmission Line Requirements

Endpoints	Approximate Mileage Between Endpoints (straight line)
Norborne to Thomas Hill Substation	60
Norborne to Sedalia Substation	50
Sedalia Substation to New Mt. Hulda Substation	24
Total Mileage	**134**


Turney
Kingston
Ludlow
Sumner
Livingston County
Hale
Braymer
Caldwell County
Cowgill
Polo
Lathrop
Clinton County
Tina
Chariton County
Elmira
Triplett
Bosworth
Holt
Bogard
Lawson
Brunswick
Carroll County
Excelsior Estates
De Witt
Homestead
Crystal Lakes
Kearney
Carrollton
Rayville
Ray County
Excelsior Springs
Woods Heights
Clay County
Pattersville
Miami
Proposed
Norborne Site
Norborne
Richmond
Hardin
Henrietta
MISSOURI
Fleming
Camden
Waverly
Grand Pass
Dover
Lexington
Malta Bend
Wellington
Mount Leonard
Saline County
Marshall
Future Substation
Blackburn
Alma
Corder
Higginsville
Lafayette County
Legend
Power Plant or Substation
STATUS
Existing Transmission Lines
(other utilities)
Central_transmission
Central Existing Transmission Lines
Central Substations
NW_transmission
NW Existing Transmission Lines
NW Substations
Municipality
County Boundary
Proposed Norborne Site
NORTH
0 2 4 8 12
Miles
Approximate Scale
aeci
Figure 6-20
Transmission Lines in
Vicinity of Norborne Site

6.3.2.4 Water Supply

The water supply category was assigned a total weight of 20 percent. The proposed facility will require a significant quantity of water (roughly 8 million gallons per day (mgd), approximately 5,600 gallons per minute (gpm) continuous average, or 12.4 cubic feet per second (cfs)); therefore, the sites must have access to a dependable and substantial water supply. The supply potential of area streams depends on several factors; including runoff, contributing watershed, and available storage. To integrate all of these factors, the supply potential for area streams was based on the estimated 7-day average, 10-year low flow (7Q10). On average, a weekly flow less than the 7Q10 should occur no more than once every ten years. Only those streams with a 7Q10 of at least 124 cfs (10 times the average makeup rate of 12.4 cfs) were considered to be potential water supply sources. The 7Q10 for area streams was estimated from historic streamflow records collected by the U.S. Geological Survey (USGS) at the gauging stations located nearest the sites.

Additionally, to reduce economical and environmental impacts from pipeline construction, the ratings for this criterion were assigned based on the distance from the site to a potential water source using the following scoring criteria:

- Distance < 1 miles $\rightarrow$ Score = 5
- 1 miles < Distance $\leq$ 5 miles $\rightarrow$ Score = 4
- 5 miles < Distance $\leq$ 10 miles $\rightarrow$ Score = 3
- 10 miles < Distance $\leq$ 15 miles $\rightarrow$ Score = 2
- 15 miles $\rightarrow$ Score = 1

Following is a description of the water supply proximity and associated scores for each site.

Forbes Site

The most likely water supply source for generating units located at the Forbes site would be a well field within the alluvial floodplain of the Missouri River, which is adjacent to the site. Available data from a stream gauge located adjacent to the site (USGS 06813500 at Rulo, Nebraska), the Missouri River indicated an estimated 7Q10 of 7,888 cfs with the drainage area of 418,859 square miles. However, the value calculated using all available data is not representative of existing conditions since the U.S. Army Corps of Engineers has built five mainstem dams on the upper Missouri River. Because of the dams, the river is much more

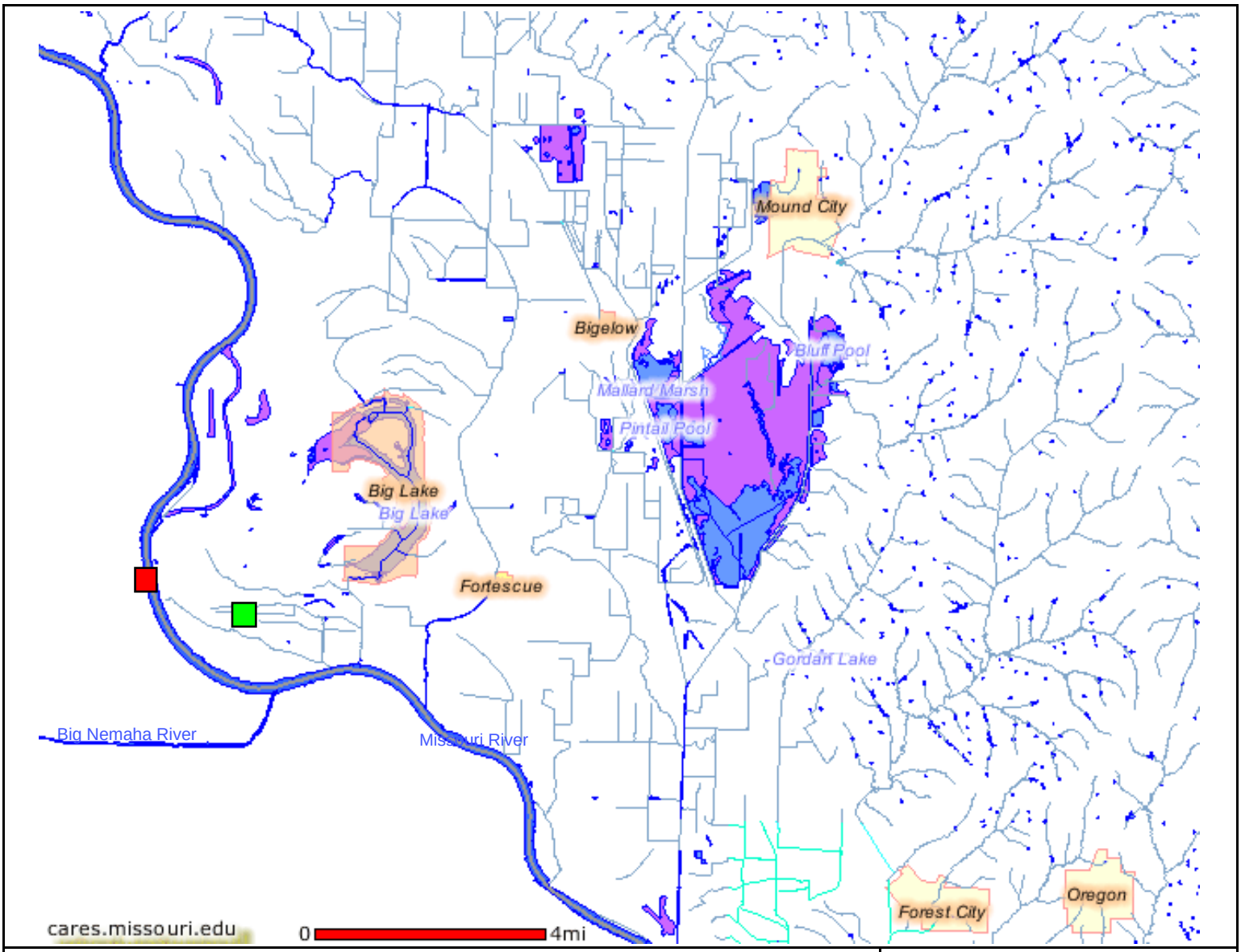
regulated. Therefore, the 7Q10 values were recalculated using data since 1965 only (these dams were completed in the mid-1960s). The resulting 7Q10 value for the Rulo gauge is 11,987 cfs.

Based on these calculations, the 7Q10 at this location on the Missouri River is sufficient to satisfy the major water use requirements of the generating unit. This dry-period flow is nearly 1,000 times larger than the average water requirements of the proposed generating unit. Further analysis of the proposed well field in the alluvial floodplain of the Missouri River will be completed to determine any potential impacts to the groundwater system during the EIS process. Figure 6-21 depicts the location of surface water nearest the Forbes Site and the stream gauge at Rulo, Nebraska. The water supply rating for this site is five.

Norborne Site

The most likely water supply source for generating units located at the Norborne Site would be a well field within the alluvial floodplain of the Missouri River, which is approximately seven miles south of the site. The well field would be located on-site or south of the site on land between the site and the Missouri River. Using all the available data from a stream gauge located approximately 14 miles downstream of the proposed well field location (USGS 06895500 at Waverly, Missouri), the Missouri River has an estimated 7Q10 of 6,301 cfs with the drainage area of 485,900 square miles. Based on the Waverly gauge's location downstream from the Rulo gauge, the expectation would be for Waverly to have a higher 7Q10. However, this discrepancy results because of the different periods of record available from the USGS. The Rulo gauge has data from October 1949 through Mar 2005 and the Waverly gauge from October 1928 through September 2004. The data for Waverly spans the 1930's "dust bowl" days; therefore, it has a lower 7Q10. However, as described above, neither of the values calculated using all available data are representative of the present time. Therefore, the 7Q10 values for Waverly were recalculated using data since 1965 only, and the resulting 7Q10 value for Waverly is 12,552 cfs.

Based on these calculations, the 7Q10 at this location on the Missouri River are sufficient to satisfy the major water use requirements of the generating unit. This dry-period flow is nearly 1,000 times larger than the average makeup water requirements of the proposed



Legend

County Boundaries

1:24,000 Rivers and Streams

- Perennial Stream/River
- Intermittent Stream/River
- Artificial Path (Approx. Centerline)
- Undifferentiated Stream/River
- Canal or Ditch
- Other Hydrologic Feature

Incorporated Areas

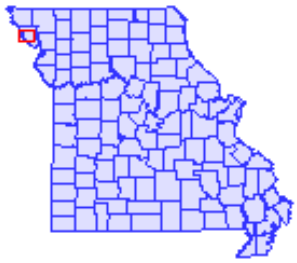
- City
- Town
- Village
- (cont)

- Census Designated Place
- Other

1:24,000 Water Bodies

- Lake or Pond
- Lake or Pond (Intermittent)
- Reservoir
- Stream or River
- Swamp or Marsh
- Canal or Ditch
- Other Water Body

Location Map



Map prepared by:
http://cares.missouri.edu, 4/5/2005.

- Forbes Site
- Stream Gauge (USGS 06813500)

N

aeci

Figure 6-21

Surface Water & Stream Gauge Locations Near Forbes Site

generating unit, and as a result, withdrawals from the Missouri River are not likely to adversely impact other downstream water users. Figure 6-22 depicts the location of surface water nearest the Norborne site and the stream gauge at Waverly, Missouri. The water supply rating for this site is a score of three.

6.3.2.5 Environmental

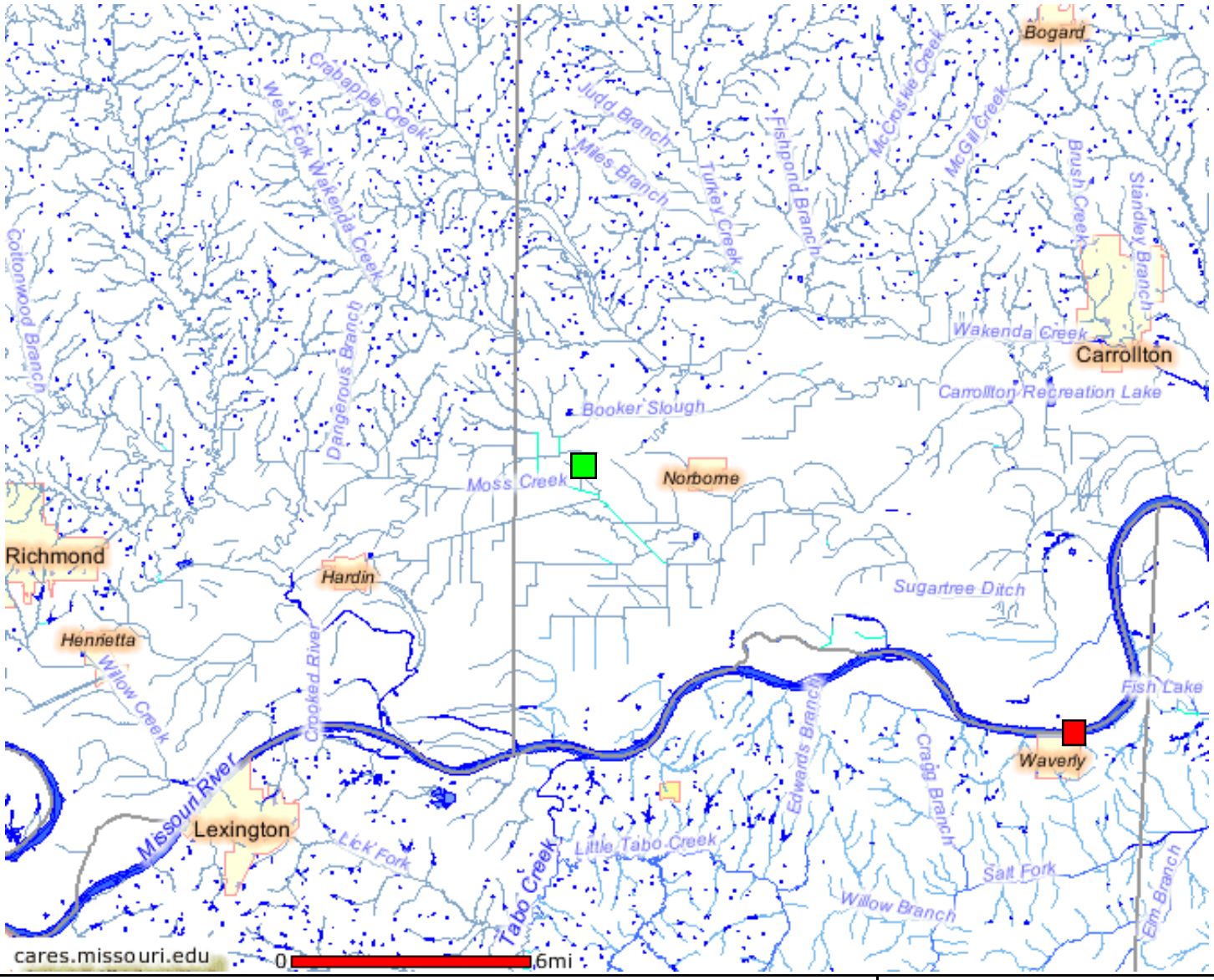
The environmental category, which was assigned a total weight of 20 percent, is comprised of six component evaluation criteria. These criteria are described in the following paragraphs.

6.3.2.5.1 Land Use Compatibility

Coal-based power plants require large, contiguous parcels of land for both the main power generating facility and ancillary facilities such as fuel handling/storage and ash disposal. Coal-based power plants create combustion waste products that must be disposed of either off-site, or in a landfill located onsite, to the extent beneficial reuse of the combustion waste product is not possible. Off-site disposal results in additional truck or rail traffic to haul the combustion waste product from the site to an approved landfill, as well as additional environmental impacts outside of the proposed facility's physical boundaries. This criterion assesses compatibility of a power plant with existing land use on and around each site. The ratings for this criterion were based on a subjective evaluation of compatibility within one mile the site.

- Highly compatible (brownfield land) → Score = 5
- Very compatible (mineral extraction) → Score = 4
- Compatible (agricultural or forestry) → Score = 3
- Somewhat incompatible (active industrial/commercial development) → Score = 2
- Highly incompatible (recreational, institutional or residential development) → Score = 1

A discussion of the predominant land use of each site and the resulting scores for the land use compatibility criterion is described next.



Legend

- County Boundaries
- 1:24,000 Rivers and Streams
  - Perennial Stream/River
  - Intermittent Stream/River
  - Artificial Path (Approx. Centerline)
  - Undifferentiated Stream/River
  - Canal or Ditch
  - Other Hydrologic Feature
- Incorporated Areas
  - City
  - Town
  - Village
  - (cont)
- Census Designated Place
- Other
- 1:24,000 Water Bodies
  - Lake or Pond
  - Lake or Pond (Intermittent)
  - Reservoir
  - Stream or River
  - Swamp or Marsh
  - Canal or Ditch
  - Other Water Body

Location Map

Map prepared by:
http://cares.missouri.edu, 4/5/2005.

Norborne Site

Stream Gauge (USGS 06895500)

N

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Figure 6-22

Surface Water & Stream Gauge Locations Near Norborne Site

Forbes Site

The Forbes site consists of approximately 2,000 acres. The nearest towns are the village of Rulo, Nebraska, which is located one mile to the west of the site, and the Village of Big Lake, Missouri, which is located approximately two miles to the east-northeast of the site. Based on the 2000 U.S. Census, the village of Rulo has a population of 226 persons and the Village of Big Lake has a population of 127 persons. The majority of the site area is relatively flat with a ground elevation around 854 feet. Land uses surrounding the site include scattered rural residential housing and agriculture, with approximately 95+ percent of the site used for agriculture. One farmstead is located within the site. Big Lake State Park is located east-northeast approximately 3 miles and Squaw Creek National Wildlife Refuge is located approximately 7.5 miles east of the Forbes site.

Visual characteristics of the Forbes site area are predominantly rural and are typical for this part of Missouri and Nebraska (See photographs in Appendix A). The proposed plant will be a distinctive element in the landscape particularly to residents living in Rulo. Residents living to the south of the site will be moderately shielded from the plant due to the vegetation along both sides of the Missouri River. The plant will be noticeable to people driving along U.S. Highway 159. For residents living in Big Lake the plant will be visible but not the dominant feature due to the distance from the site.

The area is described as mostly prime farmland, with a few scattered areas considered prime farmland if drained. As defined by the U.S. Department of Agriculture (USDA), prime farmland is land that is best suited to food, feed, forage, fiber, and oilseed crops. It may be cultivated land, pasture, woodland, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for to sustain high yield crop in an economic manner. Over 15,000 acres in Holt County (surveyed by the USDA) meets the soil requirements for prime farmland, or about five percent of the total acreage of the county. An additional 140,000 is available in areas where the soils are drained or are protected from flooding. Typical crops grown in the farmland include corn, soybeans, winter wheat, and grain sorghum. Existing vegetation on the site consists primarily of cropland, with remnants of native grass and a few scattered trees along the Missouri River.

This property is available for purchase. The land use compatibility rating for this site is a score of three. Site photos are included in Appendix A.

Norborne Site

The Norborne site is approximately 1,400 acres. The nearest town is Norborne, Missouri, which is located approximately three miles to the east-southeast of the site. Based on the 2000 U.S. Census, the city of Norborne has a population of 805 persons. The majority of the site area is relatively flat with ground elevation ranging from 675 to 690 feet. Land uses surrounding the site include scattered rural residential housing and agriculture, with approximately 95 percent of the site used for agriculture. Several farmsteads are located within or adjacent to the site; three are located in the northern portion of the site, two are adjacent to the northeast corner and one is located at the southeast corner of the site.

Visual characteristics of the Norborne site area are predominantly rural and are typical for this part of Missouri. (See photographs in Appendix B) The proposed plant will be a distinctive element in the landscape particularly to residents driving along State Highway DD. Residents living to the north and west of the site will be moderately shielded from the plant due to the rolling topography of the land. For residents living in Norborne, the plant will be visible but not the dominant feature due to the distance from the site and rolling hills in the background.

Most of the area is described as prime farmland if drained, with a few scattered areas considered prime farmland. Over 130,000 acres in Carroll County (surveyed by the USDA) meets the soil requirements for prime farmland, or about 29 percent of the total acreage of the county. An additional 112,500 is available in areas where the soils are drained or are protected from flooding. Typical crops grown in the farmland include corn, soybeans, winter wheat, and grain sorghum. Existing vegetation on the site consists primarily of cropland, with remnants of native grass and scattered stands of trees present in the northwestern corner of the property. This property is also available for purchase. The land use compatibility rating for this site is a score of three. Site photos are included in Appendix B.

6.3.2.5.2 Protected Species

Impacts to a threatened, endangered or otherwise protected species would be considered very serious and probably represent a fatal flaw to site development; however, such impacts are not likely at either of the sites so this criterion was assigned a low relative weighting. Potential impacts to protected species of plants and animals were estimated from county-wide information on species occurrence obtained from the Missouri Department of Conservation (MDC) Natural Heritage Database and review of the habitat available at each site. The scores for this criterion were then assigned based on a qualitative assessment of potential impacts.

- Low potential for protected species (existing disturbance) → Score = 5
- Moderate potential for protected species (existing vegetation may be potential habitat for protected species) → Score = 3
- High potential for protected species(documented occurrence of protects species in area and/or known habitat exists on or near site) → Score = 1

A discussion of potential protected species at each site area and the resulting scores for the protected species criterion are described below.

Forbes Site

According to the MDC Natural Heritage Database, the site is located within the known range of seven state or federally threatened or endangered species (Table 6-7). Potential habitat for two species may exist on the site based on its location, however there is very little natural habitat remaining on this farmed land. These species include the bald eagle and the eastern massasauga, a small, timid rattlesnake. The bald eagle requires large trees and deciduous mixed forest for perching, roosting, and nest sites, adjacent to rivers and lakes, where fish are abundant. The eastern massasauga requires marshy areas, wet prairies, sloughs, and floodplains of major rivers. As part of the alternative fuel delivery to the site there is the potential for a bridge across the Missouri River there is the potential to impact the pallid sturgeon. In order to verify the presence of any potential habitat for any of the species at the site, a habitat survey would need to be conducted. Additional coordination will occur with the U.S. Fish and Wildlife Service as part of the EIS process. The protected species potential impact rating for this site is a score of three.

Table 6-7 Holt County Threatened and Endangered Species

Common Name	Scientific Name	Status		Habitat Association	Habitat Likely Present on Site
		State Status	Federal Status		
American bittern	*Botaurus lentiginosus*	E		Marshes, wet meadows, and sloughs with emergent vegetation and permanent water one foot deep	No
Bald eagle	*Haliaeetus leucocephalus*	E	T	Requires large trees and deciduous mixed forest adjacent to rivers and lakes, where fish are abundant, for perching, roosting, and nest sites	Possibly
Blanding's turtle	*Emydoidea blanddingii*	E		Marshes, waterholes, sloughs, streams and pond with mud, with organic bottoms and dense vegetation, nests in grasslands	No
Eastern massasauga	*Sistrurus catenatus catenatus*	E		Marshy areas, wet prairies, sloughs, and floodplains of major rivers	Possibly
Flathead chub	*Platygobio gracilis*	E		Pools of small creeks with moderately clear water over gravel and bedrock or in large, turbid rivers with fine sand and gravel bottoms	No
Indiana bat	*Myotis sodalist*	E	E	Caves and mines; small stream corridors with well developed riparian woods; upland forests	No
Pallid sturgeon	*Scaphirhynchus albus*	E	E		No
Western fox snake	*Elaphe vulpina vulpina*	E		Native prairie adjoining marshland or cropland near streams or marshes	No
Western prairie fringed orchid	*Platanthera praeclara*	E	T	Tallgrass prairie, moist habitats, and sedge meadows	No

Source: Missouri Department of Conservation, 2005b. United States Fish and Wildlife Service, 2005b
E – Endangered; T - Threatened

Norborne Site

According to the MDC Natural Heritage Database, the site is located within the known range of five state or federally threatened or endangered species (Table 6-8). Potential habitat for the bald eagle may exist on the site. As described earlier, the bald eagle requires large trees and deciduous mixed forest for perching, roosting, and nest sites, adjacent to rivers and lakes, where fish are abundant. In order to verify the presence of any potential habitat for any of the species at the site, a habitat survey would need to be conducted. The protected species potential impact rating for this site is a score of three.

Table 6-8 Carroll County Threatened and Endangered Species

Common Name	Scientific Name	Status		Habitat Association	Habitat Likely Present on Site
		State Status	Federal Status		
Bald eagle	*Haliaeetus leucocephalus*	E	T	Requires large trees and deciduous mixed forest adjacent to rivers and lakes, where fish are abundant, for perching, roosting, and nest sites	Possibly
Greater prairie-chicken	*Tympanuchus cupido*	E		Large grassland tracts with herbaceous vegetation and dense stands of native grasses or shrubs and thickets for winter cover	No
Indiana bat	*Myotis sodalist*	E	E	Caves and mines; small stream corridors with well developed riparian woods; upland forests	No
Lake sturgeon	*Acipenser fulvescens*	E		Large rivers over sand, gravel, or rocky bottom	No
Northern harrier	*Circus cyaneus*	E		Open fields, prairies, native grass, and shallow marshes, and areas with dense vegetation nearly 100% canopy cover	No

Source: Missouri Department of Conservation, 2005b. United States Fish and Wildlife Service, 2005b
E – Endangered; T - Threatened

6.3.2.5.3 Noise Impacts

There are a number of factors that will determine whether the noise from construction or operation of the proposed generating station will impact any sensitive receptors in the vicinity, but the number of such receptors close by is one variable that can be easily measured. The ratings for this criterion were assigned based on an estimate of the number of sensitive receptors within one mile of each site using the scoring criteria listed below.

- Number of receptors $\leq 10 \rightarrow$ Score = 5
- $10 <$ Number of receptors $\leq 20 \rightarrow$ Score = 4
- $20 <$ Number of receptors $\leq 30 \rightarrow$ Score = 3
- $30 <$ Number of receptors $\leq 40 \rightarrow$ Score = 2
- Number of receptors $> 40 \rightarrow$ Score = 1

A discussion of the number of receptors at each site and located within a one-mile buffer of the site and the resulting scores for the noise impacts criterion are described below.

Forbes Site

The Forbes site is located approximately one mile to the east of Rulo, Nebraska and two miles west of Big Lake, Missouri. The village of Rulo is a small, rural community with a population of 226 and a housing count[2] of 132 units. The village of Big Lake is a small community with only about half of the households being full-time inhabitants (of the 60 households, 37 families reside in the village). The village of Big Lake has a population of 127 and a housing count of 376 units. The other houses are recreational homes used during peak summer months by part-time residents visiting the Big Lake State Park managed by the Missouri Department of Natural Resources (DNR). In addition to the summer homes, visitors to the park also utilize the Missouri DNR's campsite and cabin accommodations. The campgrounds contain 76 campsites, in addition to the two-story motel and eight cabins located on the lake. The campground and lodging accommodations are outside of the one-mile buffer area.

[2] A housing unit is defined by the U.S. Census Bureau as a house, an apartment, a mobile home, a group of rooms, or a single room that is occupied (or if vacant, is intended for occupancy) as separate living quarters.

Noise receptors at or within a one-mile buffer of the site include most of the village of Rulo, a small portion of the village of Big Lake, a small residential neighborhood south of the site and south of the Missouri River in Nebraska with approximately 12 residences, six scattered farmsteads south of the village of Rulo in Nebraska, six residences located within the limits of the Iowa Sac and Fox Indian Reservation south of the site and south of the Missouri River in Nebraska, two farmsteads located north of the site and north of U.S. Highway 159, and one farmstead located within the site. The estimated total (including the residential areas) of noise receptors at or within a one-mile buffer of the site is approximately 180 residences (Figure 6-23). The noise impact rating for this site is a score of one.

Norborne Site

The Norborne site is located approximately three miles west-northwest of Norborne, Missouri. The city of Norborne is a rural community with a population of 805 and a housing count of 404 units. However, the city of Norborne is located outside of the one-mile buffer area.

All of the noise receptors at or within a one-mile buffer of the site are rural residences. Within the site there are four residences. Most of the other noise receptors are in the northern half of the buffer area along CR 634 and CR 638 (22 rural residences). The rest of the noise receptors are located between the site and Norborne along State Highway DD and CR 505 (six rural residences), with one noise receptor identified on the southern edge of the buffer area along CR 508. The total number of noise receptors at or within a one-mile buffer of the site is 33 rural residences (Figure 6-24). The noise impact rating for this site is a score of two.

6.3.2.5.4 Wetlands Impacts

Wetlands are a protected resource and any impacts to wetlands must either be avoided or be mitigated by creation of a like or greater amount of wetlands at a nearby location. For this criterion, the sites were rated based on the number of acres of wetlands located within each site, as shown on USFWS National Wetland Inventory (NWI) maps. The rating criteria used to assign scores for the Wetlands criterion are detailed below.

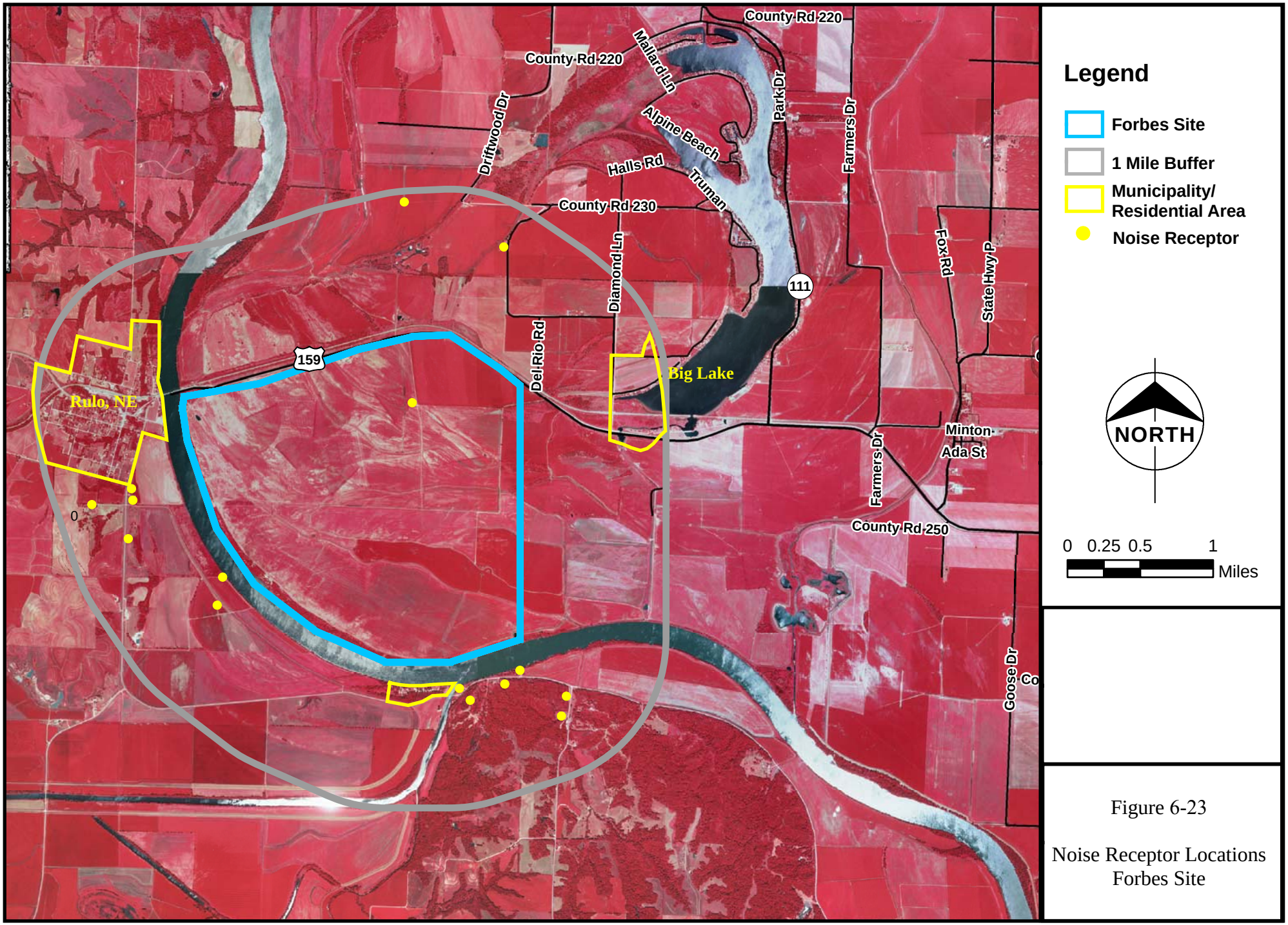


Figure 6-23

Noise Receptor Locations
Forbes Site

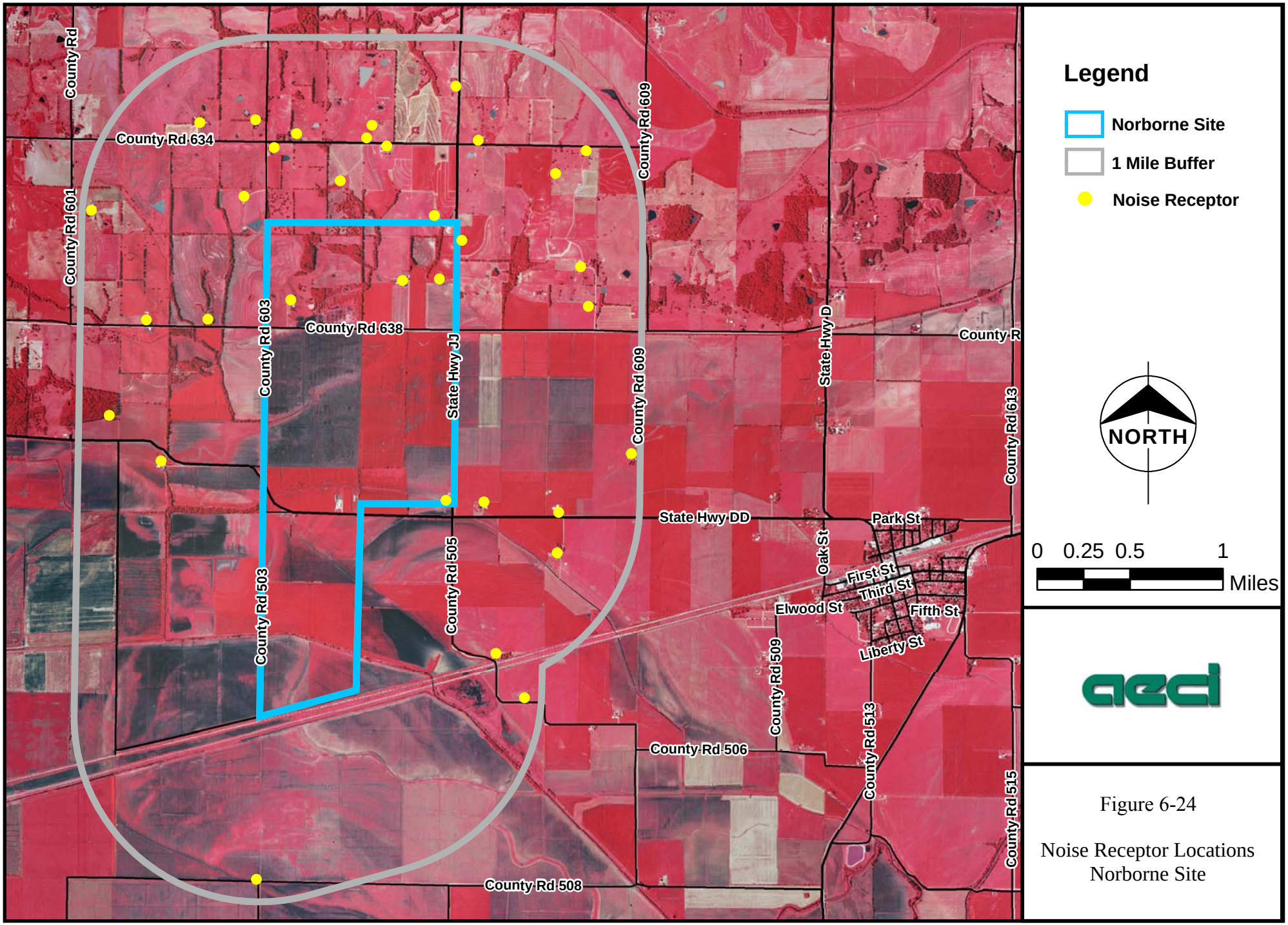


Figure 6-24

Noise Receptor Locations
Norborne Site

- No Wetlands → Score = 5
- Wetlands ≤ 25 acre → Score = 4
- 25 acre < Wetlands ≤ 50 acres → Score = 3
- 50 acres < Wetlands ≤ 75 acres → Score = 2
- Wetlands > 75 acres → Score = 1

A discussion of the wetlands at each site area and the resulting scores for the wetlands criterion are described below.

Forbes Site

The entire Forbes site drains into the Missouri River, which is located on the western boundary of the site. As determined by the Rulo, NEBR.-MO. NWI maps, there are wetlands present throughout the site. These areas consist of palustrine emergent (approximately 50 acres), palustrine forested (approximately130 acres), and palustrine scrub/shrub (approximately 70 acres) wetlands, totaling approximately 250 acres of wetlands present on the site (Figure 6-25). However, currently, many of these areas appear to be farmed. Development of the site may require mitigation for wetland losses. An on-site wetland determination would need to be conducted to verify the presence of jurisdictional wetlands within the site. The wetlands impact rating for this site is a score of one.

Norborne Site

The entire Norborne site drains into the Booker Slough and the Norborne Drainage Ditch, which are located in the center and on the southern edge of the site, respectively. As determined by the Norborne, MO. NWI maps, there are minimal wetlands present throughout the site. These areas consist of palustrine emergent (approximately 18 acres) and palustrine scrub/shrub (approximately 0.25 acres) wetlands, for a total of approximately 18.25 acres of wetlands present on the site (Figure 6-26). However, many of these areas appear as if they are currently being farmed. Development of the site may require mitigation for wetland losses. An on-site wetland determination would need to be conducted to verify the presence of jurisdictional wetlands within the site. The wetlands impact rating for this site is a score of four.

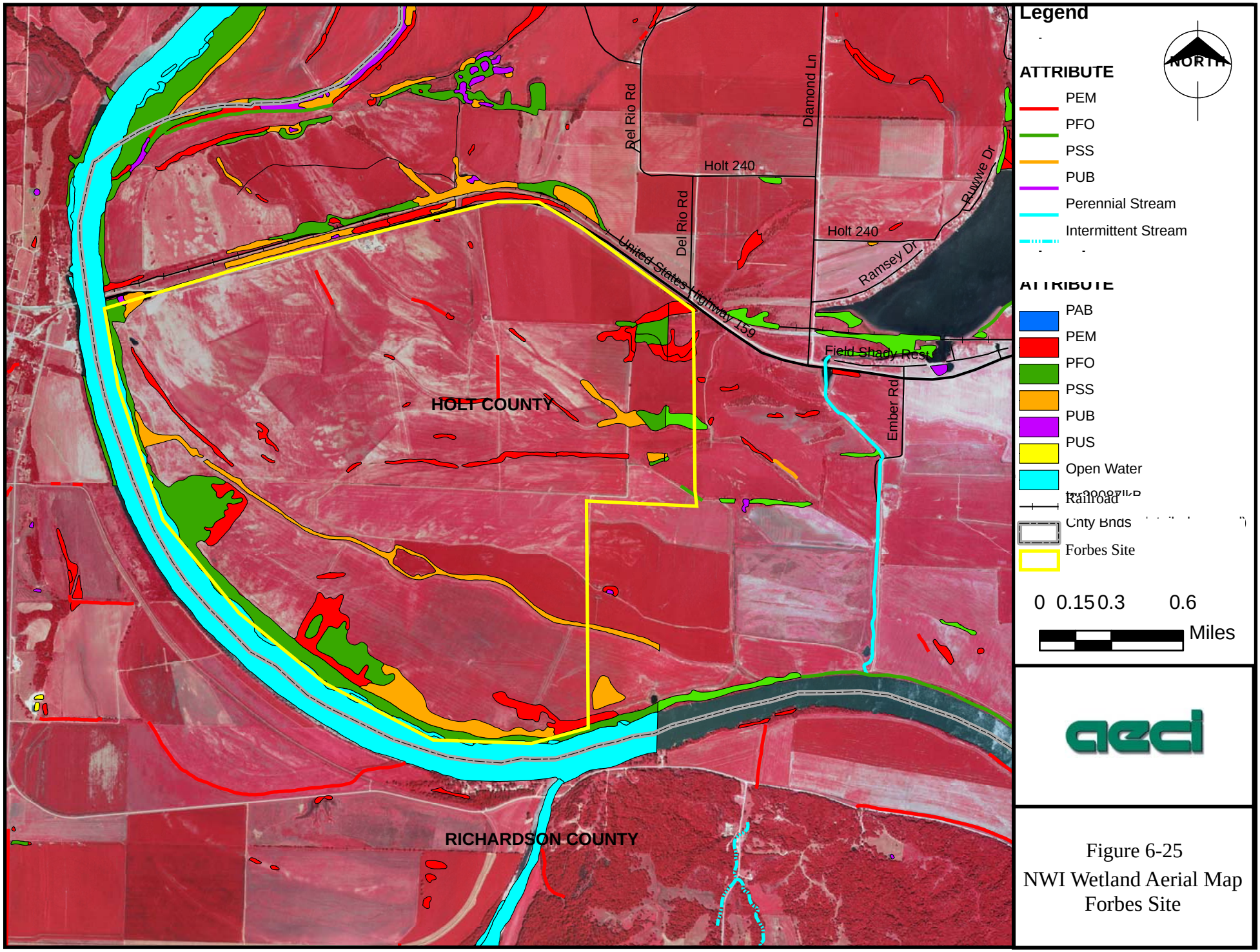


Figure 6-25
NWI Wetland Aerial Map
Forbes Site

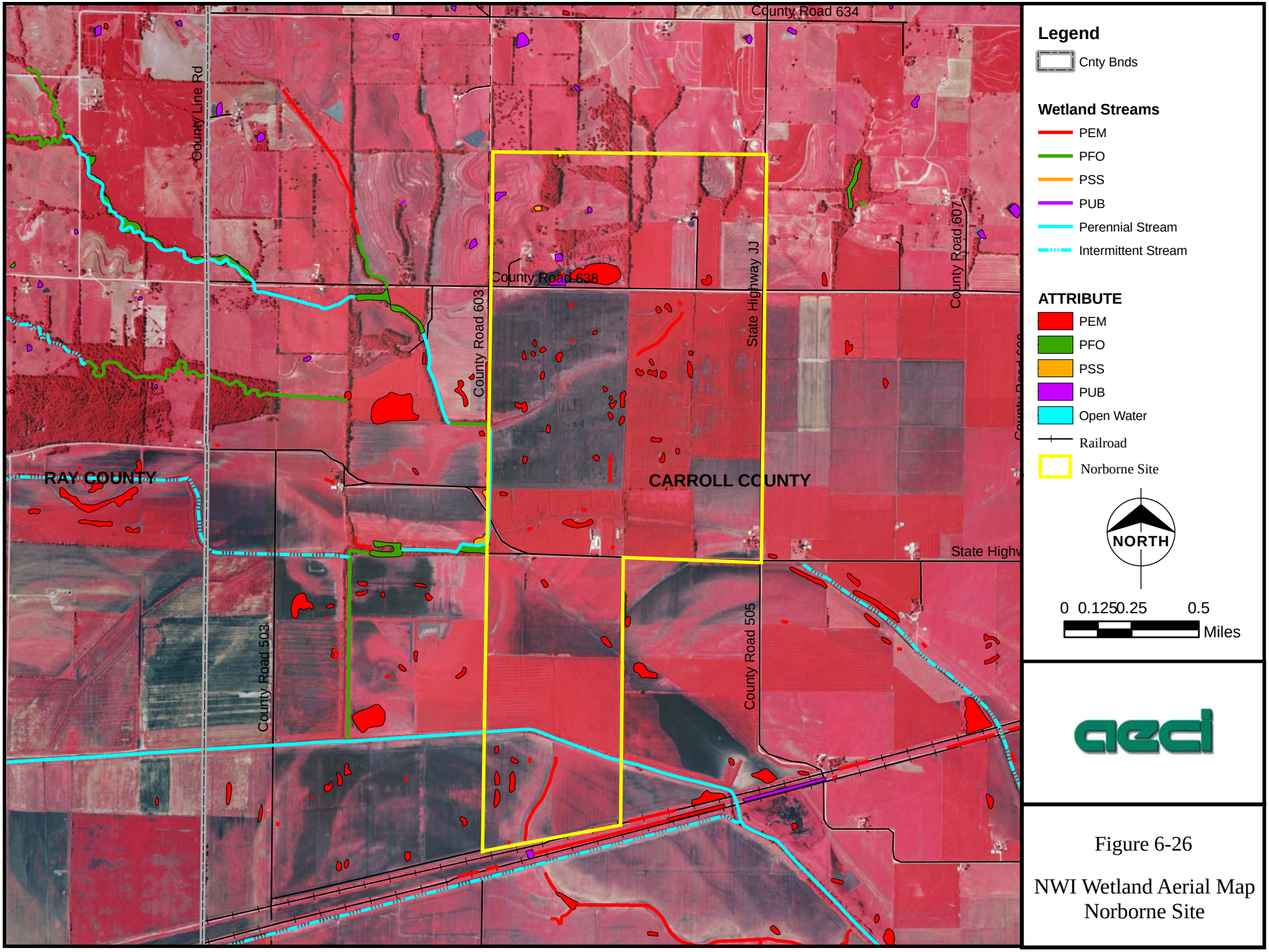


Figure 6-26

NWI Wetland Aerial Map
Norborne Site

6.3.2.5.5 Floodplains Impacts

The entire site must be above the 100-year flood level or it must be feasible to protect the site from a 100-year flood. This eliminates potential down time and loss of equipment in the event of a flood. The ratings criteria used to assign scores for the floodplains criterion are detailed below.

- Entire site above 100-year flood level or site behind a federal levee designed for the 100-year flood level → Score = 5
- Site within the 100-year flood level and not behind a federal levee designed for the 100-year flood level → Score = 3
- Site within the 100-year flood level and within a regulatory floodway area → Score = 1

A discussion of the floodplains at each site and the resulting scores for the floodplain criterion are described next.

Forbes Site

According to the 1988 Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Map (FIRM) (Holt County, Missouri and Incorporated Areas Map Number 29087C0095 B, panel 95 of 190), the Forbes site is located within a 100-year floodplain with approximately 30 percent of the site along the Missouri designated as a regulatory floodway. The site is large enough to accommodate the power plant facilities on fill material that would elevate the power plant out of the floodplain. No power plant facilities would be located in the floodway. The floodway would remain as a buffer between the power plant and the river. Detailed site evaluation and engineering plans will be prepared to minimize impacts to the floodplain if this site is selected. Where determined within the site, the base flood elevation line ranges between 858 to 862 feet. The floodplains impact rating for this site is a score of one.

Norborne Site

According to the 1986 FEMA's FIRM (Carroll County, Missouri Map Number 29057C0175 B, panel 175 of 225), the Norborne site is located within a 100-year floodplain with base flood elevations and flood hazards determined (Zone A7), with a small portion of the site designated as within the 100-year floodplain with no base elevations and flood hazards

determined (Zone A). Detailed site evaluation and engineering plans will be prepared to minimize impacts to the floodplain if this site is selected. Where determined within the site, the base flood elevation line is 688 feet. The floodplains impact rating for this site is a score of three.

6.3.2.5.6 Cultural Resources Impacts

Federal agencies are required to assess the impacts to historic properties prior to issuing permits (36 Code of Federal Regulations (CFR) 800). These include those properties listed in the National Register of Historic Places (NRHP) and those that are eligible for listing (known and unknown). Because not all areas have been surveyed for historic properties and the number is unknown in many areas, the ratings are based upon known and the probability of additional historic properties in any given location. The rating criteria used to assign scores for the cultural resources criterion are as follows.

- Low potential for Cultural Resources → Score = 5
- Moderate potential for Cultural Resources → Score = 3
- High potential for Cultural Resources → Score = 1

A discussion of the cultural resources at each site and the resulting scores for the cultural resources criterion are described below.

Forbes Site

Background research at the Archaeological Survey of Missouri (ASM) and an online search of the NRHP was conducted. The results of the background research at ASM showed a great disparity in site density along the Missouri River and its tributaries. This inconsistency in site density can be attributed to the fact that only a few formal archaeological surveys have been conducted over much of the area. Where professional and amateur archaeological surveys have been conducted the pattern of site density and significance can be summed up very easily.

The floodplains of the Missouri River and its tributaries do not contain large numbers of sites but the sites that are found tend to be significant. Prehistoric sites tend to be villages and many are mound sites. Historic sites in the floodplain tend to be farmsteads but some can be from very early in Missouri history. The meanders of the Missouri River and its tributaries

tend to limit the age of prehistoric sites to less than 3,000 years old. For historic sites, the flooding and meanders have, in many cases, destroyed the integrity of most of the historic sites. The few prehistoric and historic sites that remain intact tend to be evaluated as significant and eligible for listing in the NRHP.

Other topographically significant areas that in the past have produced large numbers of archaeological sites are the perimeters of meander lakes such as Big Lake, or the edges of large wetland areas such as Squaw Creek NWR (located approximately seven miles to the east). Only one small area on the east side of Squaw Creek NWR has been the subject of archaeological surveys. The majority of the sites that were recorded were on the bluffs overlooking the floodplain, but at least one site was recorded in the floodplain. It is highly likely that the terrace remnants and other relatively high points near these areas will produce a high density of archaeological sites, some of which may be buried.

Specifically for the proposed location of the Forbes site, there are no known or recorded significant archaeological sites listed in the ASM site records that are not on the NRHP. However, there are NRHP listed sites in the area. One is just north of the site, and is identified as the Rulo Bridge (U.S. Highway 159 over the Missouri River), which is a significant architecture/engineering structure. Any potential impacts will be addressed in the EIS West of the Missouri River in Nebraska is the Leary Site (25RH1), which is a prehistoric Oneonta site described as a village. The Leary Site contains Native American burials. Finally, a site known as No. JF00-062, located southeast of Rulo, Nebraska, is listed as a historic site significant because of its association with the exploration and settlement of the United States. While there are no recorded sites on the Forbes site this can be attributed to the lack of archaeological investigations in the area. In similar settings the site density near the Missouri River or its tributaries has been moderate and on the floodplain there may be buried sites. Where archaeological surveys have been conducted on the bluffs overlooking the Missouri River or its tributaries, the site density can be considered high. In addition, the proximity of the Iowa Sac and Fox Indian Reservation raises the possibility of Traditional Cultural Properties (TCPs). Consultation with the Iowa Sac and Fox will be undertaken to ensure no TCPs will be affected by the proposed project. The impact rating for this site is two, because of moderate to high potential for cultural resources.

Norborne Site

Background research at the ASM and an online search of the NRHP was conducted. The results of the background research at ASM showed a great disparity in site density along the Missouri River and its tributaries. This inconsistency in site density can be attributed to the fact that only a few formal archaeological surveys have been conducted over much of the area.

One NRHP site is located in the city of Norborne. It is the Farmers Bank Building and should not be affected by the proposed project. Two archaeological sites are known to exist within one mile of the Norborne site, but neither is considered eligible for the NRHP.

Few archaeological investigations have been conducted near Norborne. However, one archaeological survey for the construction of U.S. Highway 65 in Carroll County was conducted and the site density in the floodplain for this narrow corridor was high, averaging 3 to 5 sites per linear mile. Considering the narrow width of this corridor it can be expected that the site density per square mile in this portion of the Missouri River floodplain could be as high as 15 to 20 sites. The impact rating for this site is three, for moderate potential for cultural resources.

6.3.2.6 Other Evaluations

The other category, which was assigned a total weight of 10 percent, is comprised of three component evaluation criteria. These criteria are described in the following paragraphs.

6.3.2.6.1 Site Accessibility

The proposed power plant site must be accessible from an all-weather road for construction and operating personnel and for delivery of materials and equipment. These roads must also be capable of supporting heavy truck traffic for delivery of equipment during construction.

The distance of the site from a major highway is an important evaluation factor. The condition of local roads which connect the site to a major highway is another transportation-related evaluation factor. Therefore, the ratings for this criterion were based on the distance to a major highway, which is defined as either a U.S. or Interstate highway. The criteria for site accessibility are listed below.

- Distance ≤ 1 miles → Score = 5
- 1 miles < Distance ≤ 5 miles → Score = 4
- 5 miles < Distance ≤ 10 miles → Score = 3
- 10 miles < Distance ≤ 15 miles → Score = 2
- Distance > 15 miles → Score = 1

The distance of the site to the nearest U.S. or Interstate highway is discussed and the associated scores are provided below.

Forbes Site

Construction access for heavy hauling to the Forbes Site would be available from the BNSF railroad to the railroad spur and on U.S. Highway 159 located off of Interstate 29. The Forbes site is located approximately 14 road miles (along U.S. Highway 159) west of the nearest interchange exit from Interstate 29. The proposed construction traffic route would be to exit Interstate 29 at U.S. Highway 159, and proceed west on U.S. Highway 159 to the proposed site. The site accessibility rating for this site is a score of five.

Norborne Site

Construction access for heavy hauling to the Norborne Site would be available from the BNSF railroad to the railroad spur and on State Highway 10 located off of U.S. Highway 24. The Norborne site is located approximately four road miles (along State Road DD) west of the nearest intersection from State Highway 10. The nearest intersection from U.S. Highway 24 from the intersection of State Highway 10 and State Road DD is located approximately 10 road miles (along State Highway 10) to the east. The proposed construction traffic route would be to exit Interstate 70 onto State Highway 13/State Highway 213 through Higginsville to U.S. Highway 24 towards Waverly. At Waverly, U.S. Highway 24 will head north across the Missouri River and travel towards Carrollton. The exit onto State Highway 10 is just south of Carrollton. At State Highway 10, the route would continue to Norborne and exit at State Road DD, and then proceed west on State Road DD to the proposed site. The site accessibility rating for this site is a score of four.

6.3.2.6.2 Land Availability

Favorable land acquisition conditions at a given potential site area are those where the size of the property provides for possible future expansion and is available for acquisition. The relative attractiveness of the sites with regard to land availability is generally based on the size of the property and ease of purchase from willing sellers.

Both of the sites are appropriate in size and are available for acquisition. Therefore, for this evaluation, both sites were assigned a score of five.

6.3.2.6.3 Constructability

Constructability can be assessed by evaluating various criteria such as topography and drainage that determine the amount of site preparation and grading necessary at the site. Site areas with significant variations in ground surface elevations would require more grading and other site preparation effort to level an area for plant development. Therefore, the ratings for this criterion were based on the amount that the site must be raised, in order to minimize costs for earthwork, retaining walls, erosion control, drainage, roadwork, and track work. The criteria for constructability are listed below.

- Site grading $\leq$ 3 feet $\rightarrow$ Score = 5
- 3 feet < Site grading $\leq$ 6 feet $\rightarrow$ Score = 4
- 6 feet < Site grading $\leq$ 10 feet $\rightarrow$ Score = 3
- 10 feet < Site grading $\leq$ 15 feet $\rightarrow$ Score = 2
- Site grading > 15 feet $\rightarrow$ Score = 1

Following is a description of each alternative site in terms of constructability.

Forbes Site

The majority of the site area is relatively flat with ground elevation around 854 feet. Land uses surrounding the site include scattered rural residential housing and agriculture, mainly cropland. The majority of the site (95+ percent) is presently used for cropland. It is anticipated that the amount of grading and other site preparation at this site would be moderate, based on the potential that the entire site would need to be raised out of the 100-year floodplain and regulatory floodway (base flood elevation lines ranges between 858 to

862 feet) or construction of a levee to protect the site would be necessary. The constructability rating for this site is a score of three.

Norborne Site

The majority of the site area is relatively flat with ground elevation ranging from 675 to 689 feet, with the majority of the site at elevation 688 feet. The majority of the site is presently used for rural residential housing and agriculture, mainly cropland. There are drainage courses present throughout the site. It is anticipated that the amount of grading and other site preparation at this site within the actual footprint to be determined would be minimal; however, potentially the entire site would need to be slightly raised out of the 100-year floodplain or construction of a levee to protect the site would be necessary. The constructability rating for this site is a score of two.

6.3.2.7 Evaluation Summary

The individual scores for each site and criterion are summarized in Table 6-9. These scores were used along with the corresponding weights to calculate a weighted composite score for each site. These composite scores are calculated as the sum of the products of each individual score and criterion weight. To further illustrate how the composite scores are calculated, the Forbes site is used as an example. This site received a score of four for the rail line proximity criterion, which has a weight of 10 percent. Multiplying these two values gives a product of 40. A similar calculation is then made for each of the 13 remaining criteria. The 15 score-weight products that result are then summed yielding a total composite score for the Forbes site of 297. Since the individual criterion scores range from one to five and the criteria weights total 100 percent, the minimum possible composite score is 100 and the maximum possible composite score is 500. The higher the site's composite score, the most favorable the site based on all of the criteria.

From the site evaluation summary, the results demonstrate that both of the sites appear to be environmentally acceptable; however, the Norborne site scores higher than the Forbes site overall in terms of the evaluation criteria.

Table 6-9 Site Evaluation Summary

Major Category/Criterion	Weight	Forbes	Norborne
Air Impacts	**10%**	5	5
Fuel Supply	**20%**		
Rail Line Proximity	10%	4	4
Competitive Rail Access	6%	1	3
Railroad Considerations	4%	2	3
Transmission	**20%**	1	3
Water Supply	**20%**	5	3
Environmental	**20%**		
Land Use Compatibility	2%	3	3
Protected Species Impacts	3%	3	3
Noise Impacts	6%	1	2
Wetlands Impacts	3%	1	4
Floodplains Impacts	3%	1	3
Cultural Resources Impacts	3%	2	3
Other	**10%**		
Site Accessibility	2%	5	4
Land Availability	4%	5	5
Constructability	4%	3	2
Weighted Total Score	**100%**	**297**	**336**

6.3.3 Differential Site Development Costs

The current estimate for site development costs at the Norborne and Forbes sites is $269,000,000 and $333,000,000 in 2011 dollars, respectively. These costs include coal transportation, transmission, site fill, water supply, primary and secondary rail connection, and plant infrastructure.

6.3.4 Selection of Proposed and Alternative Sites

The siting review indicated that construction at the Norborne site was the most cost-effective and less environmentally impacting of the two options. It has sufficient land to accommodate all of the components on site, adequate water supply, and two rail lines to provide competitive access for coal delivery.

Norborne was selected as the proposed site and the Forbes as the alternative site. Table 6-10 summarizes the evaluation results.

Table 6-10 Evaluation Results

Criteria	Constraints	
	Forbes	**Norborne**
Water Supply	On-site wells	Requires construction of supply pipeline
Transmission Capability	TBD	TBD
Fuel Delivery	Construction of 4- mile rail spur to site (alternate rail spur 15 miles crossing over of major river	Construction of 3.5-mile rail spur to site with bridge over two existing rail tracks (alternate rail spur options 8-9 miles)
Air Quality	None	None
Site Accessibility	Upgrade construction of access road	Upgrade construction of access road
Land Use and Availability	Requires property purchase	Requires property purchase
Constructability	Moderate to high grading	Moderate to minimal grading
Site Permitting Constraints	High to moderate potential for archaeological sites Moderate potential for T&E species High potential for wetlands	Moderate potential for archaeological sites. Moderate potential for T&E species Moderate potential for wetlands
Existing Development & Noise Receptors	High number of potential noise receptors	Moderate to high number of potential noise receptors

6.4 SITE DESCRIPTION

The Norborne Site is located in Carroll County, Missouri, just north of the Missouri River. The site consists of approximately 1,400 acres located 4 miles west of Norborne, Missouri on the north side of Highway DD. Access to the plant is from State Highway 10. Norborne lies approximately 58 miles east from Kansas City, Missouri; 70 miles north of Sedalia, Missouri; and 225 miles west of St. Louis, Missouri. Figure 6-27 shows the site location.

Class I rail connections for coal and equipment delivery would be made via railroad spurs off of the Burlington Northern-Santa Fe or the Norfolk Southern Railroads, providing competitive rail access. The area surrounding the plant is primarily agricultural with sparse residential use.

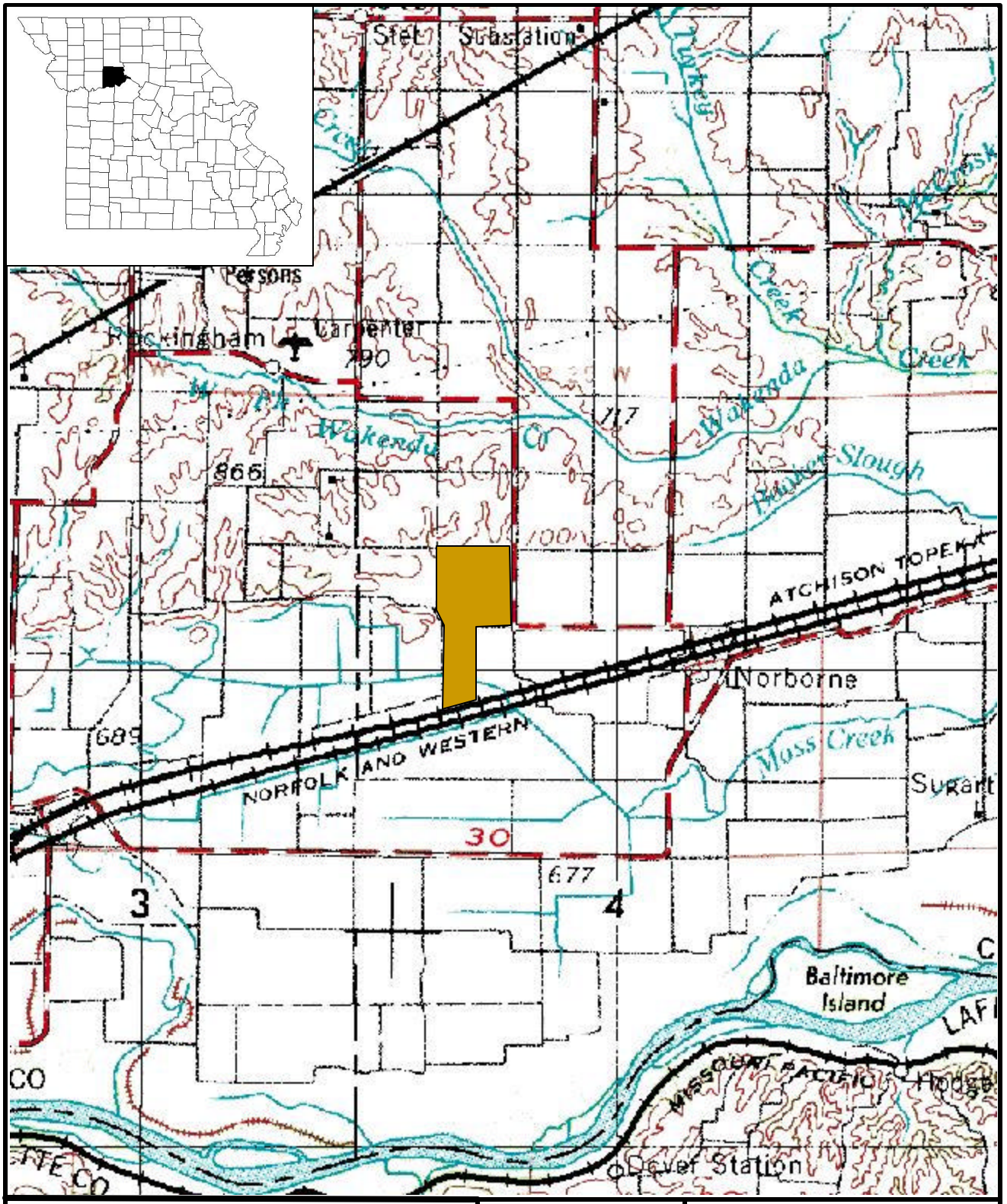


Figure 6-27
Norborne Site Location

The water supply source at the Norborne Site would be a well field located within the alluvial floodplain of the Missouri River, which is approximately seven miles south of the site. The water will be used in the cooling tower, for service water needs such as fire protection and equipment cooling, for drinking water and treated further to achieve ultra-pure water for the boiler.

6.5 PROJECT DESCRIPTION

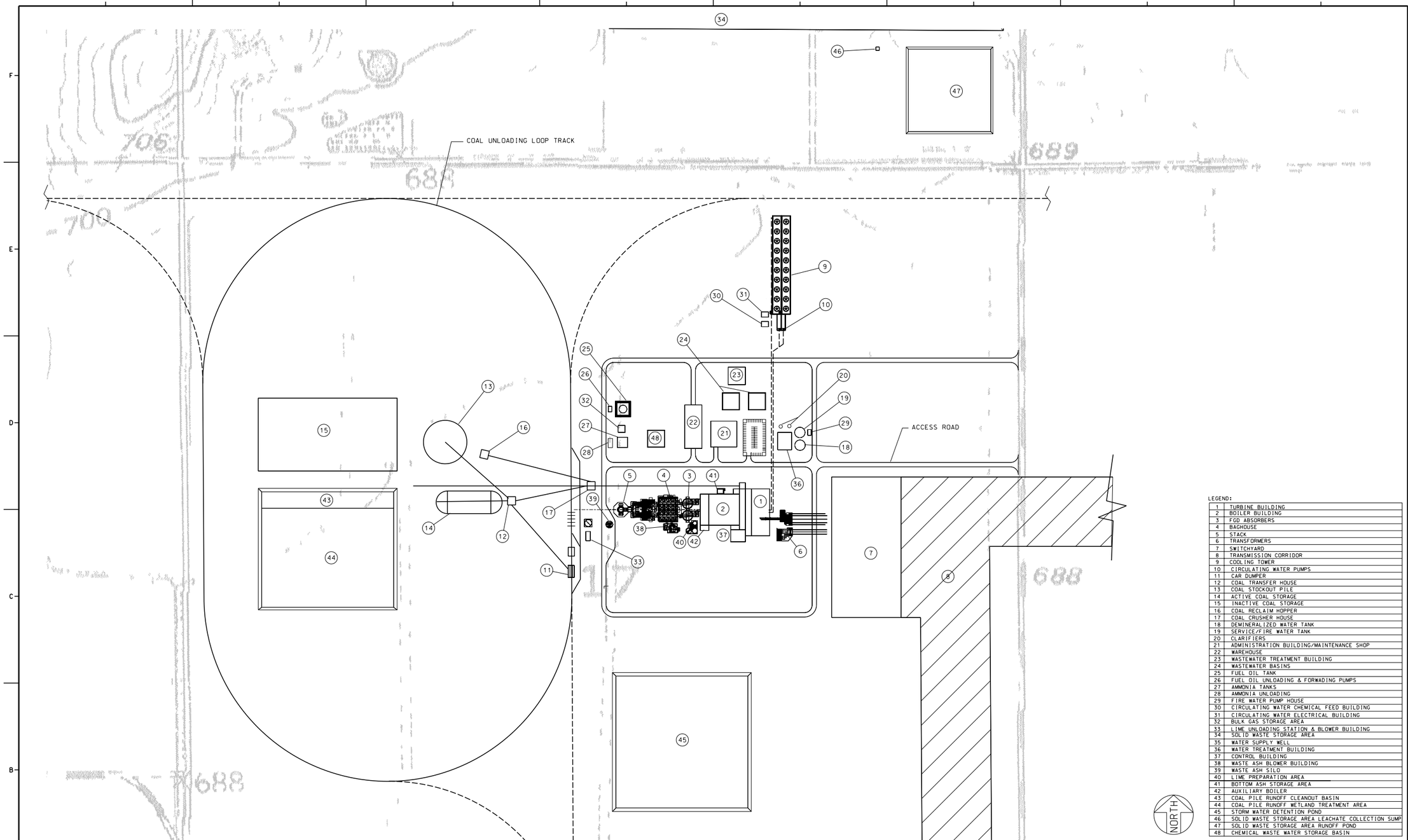
Design of the project has not been completed. The following sections generically describe the major components of the proposed electric generating facility, proposed air quality emission controls, transmission requirements, fuel use and waste disposal, water supply and wastewater disposal, operating characteristics of the proposed unit, expected noise levels construction and operation, transportation system to be utilized during construction and operation, the project schedule, project costs and employment requirements.

6.5.1 Facility Equipment and Layout

The proposed electric generating facility will consist of a single new, 660 MW base-load pulverized coal electric generating unit. The Project's major components will include a pulverized coal-fired boiler, steam turbine generator, cooling tower, emission control equipment, and stack. Figure 6-28 illustrates a generic site layout of the facility. This is a modern coal plant design that uses the most recent commercially available boiler, turbine generator, air emission control, and cooling tower equipment.

Coal delivered to the plant by rail will be unloaded via a rotary railcar dumper and transported by conveyor to either the coal yard for storage or to the power block area where it is placed in storage bunkers adjacent to the boiler. Combustion will take place in the boiler furnace where water is converted to steam. The forced draft fans provide combustion air.

Steam is produced in the boiler area and heated in both the furnace and convection sections of the boiler. Steam at high pressure and temperature from the boiler enters the steam turbine. Steam from the high-pressure turbine section is reheated in the boiler for improved cycle efficiency. Steam continues to flow through the turbine converting steam pressure and



LEGEND:

1	TURBINE BUILDING
2	BOILER BUILDING
3	FGD ABSORBERS
4	BAGHOUSE
5	STACK
6	TRANSFORMERS
7	SWITCHYARD
8	TRANSMISSION CORRIDOR
9	COOLING TOWER
10	CIRCULATING WATER PUMPS
11	CAR DUMPER
12	COAL TRANSFER HOUSE
13	COAL STOCKOUT PILE
14	ACTIVE COAL STORAGE
15	INACTIVE COAL STORAGE
16	COAL RECLAIM HOPPER
17	COAL CRUSHER HOUSE
18	DEMINERALIZED WATER TANK
19	SERVICE/FIRE WATER TANK
20	CLARIFIERS
21	ADMINISTRATION BUILDING/MAINTENANCE SHOP
22	WAREHOUSE
23	WASTEWATER TREATMENT BUILDING
24	WASTEWATER BASINS
25	FUEL OIL TANK
26	FUEL OIL UNLOADING & FORWADING PUMPS
27	AMMONIA TANKS
28	AMMONIA UNLOADING
29	FIRE WATER PUMP HOUSE
30	CIRCULATING WATER CHEMICAL FEED BUILDING
31	CIRCULATING WATER ELECTRICAL BUILDING
32	BULK GAS STORAGE AREA
33	LIME UNLOADING STATION & BLOWER BUILDING
34	SOLID WASTE STORAGE AREA
35	WATER SUPPLY WELL
36	WATER TREATMENT BUILDING
37	CONTROL BUILDING
38	WASTE ASH BLOWER BUILDING
39	WASTE ASH SILO
40	LIME PREPARATION AREA
41	BOTTOM ASH STORAGE AREA
42	AUXILIARY BOILER
43	COAL PILE RUNOFF CLEANOUT BASIN
44	COAL PILE RUNOFF WETLAND TREATMENT AREA
45	STORM WATER DETENTION POND
46	SOLID WASTE STORAGE AREA LEACHATE COLLECTION SUMP
47	SOLID WASTE STORAGE AREA RUNOFF POND
48	CHEMICAL WASTE WATER STORAGE BASIN

NORTH

-200 -100 0 200 400 600 800 1000

PRELIMINARY

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUBCONTRACTOR(S)) PERFORMING THE WORK.

DRAWING RELEASE RECORD

REV.	DATE REL'D.	PREPARED	REVIEWED	APPROVED	PURPOSE	FILM

DRAWING RELEASE RECORD

REV.	DATE REL'D.	PREPARED	REVIEWED	APPROVED	PURPOSE	FILM
0	03-16-2005	A. KHAN	S.L.WAHLERT		FOR INFORMATION	
1	03-25-2005	A. KHAN	S.L.WAHLERT		FOR INFORMATION	

SCALE 1"=200'

PROJECT NUMBER 11630-001

Figure 6-28
Preliminary Site Plan

Sargent & Lundy LLC

DRAWING NO. GA-02A REV. 1

SHEET OF

(FORM GDS 2.6.1 REV. 1 (05/93))

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temperature energy to mechanical energy turning the generator to produce electricity. When the steam reaches the lowest practical pressure (i.e., significantly below atmospheric pressure, which results in higher cycle efficiency), it leaves the turbine and enters the

condenser. The condenser functions to remove heat from the low pressure steam and condense it for return to the condensate system.

Heat entering the condenser is transferred through the condenser tubes into the cooler circulating water system which is returned to the cooling towers where the heat is rejected to the atmosphere.

After the steam is condensed, condensate and boiler feed pumps return the water to the boiler through the feed water heaters. The feed water heaters improve the cycle efficiency by heating the water before it enters the boiler. This often-used regenerative design is called the advanced Rankine Cycle.

Makeup water (new water added to the boiler circuit) is needed because some water and steam is lost in the boiler, turbine, and other equipment and systems and because it is necessary to periodically drain (blow down) a portion of the boiler water to maintain the needed water chemistry. The makeup water is pumped from the service water storage and treated in a demineralizing system.

6.5.2 Emissions Controls

Activities are underway to ultimately secure an air (Prevention of Significant Deterioration (PSD)) permit for construction of the project. The plant is planned to have state-of-the-art environmental controls that correspond to current Best Available Control Technology for criteria pollutants and Maximum Achievable Control Technology for hazardous air pollutants. Control technologies and predicted emissions rates will be such that Norborne will be one of the cleanest coal-fired plants in the country. Table 6-11 provides the expected estimated annual emissions of the project based on recent permits and average annual conditions and typical fuel analyses. These emissions are not dependent on the capacity factor and are dictated by the Best Achievable Control Technology (BACT).

The boiler is expected to use low nitrogen oxide (NO_x) burners, which have staged fuel and air mixing and over-fire air. These burners reduce the flame temperature, which results in lower NO_x concentrations in the boiler exhaust flue gas. Equipment for control of boiler emissions is expected to include a selective catalytic reduction (SCR) system, to provide very efficient NO_x emission control.

Low-NO_x burner designs are currently available that generate less than 50 percent NO_x compared to burner designs available 10 to 15 years ago. This reduction is accomplished mainly with staged combustion and with over-fire air. Over-fire air provides the oxygen needed to complete the combustion of the mixture of air and fuel gradually so burner flame temperatures are lower, resulting in lower NO_x.

Table 6-11 Estimate of Potential Annual Emissions

Pollutant	Facility Total (tons per year (tpy))
CO*	3,800
NO_x†	2,000
PM_{10}‡	400
SO_2§	2,500
VOC¶	100
Pb**	0.59

*CO emissions estimates are based on manufacturer's specifications at 0.15 lb/million British thermal units (MMBtu)
†NO_x emissions estimates are based on a typical permit limit of 0.08 lb/MMBtu
‡PM_{10} emissions estimates are based on a typical permit limit of 0.015 for the coal-fired unit. All particulate emissions are assumed to be PM_{10}, and represent both filterable and condensable particulates.
§SO_2 emissions estimates are based on a typical permit limit of 0.10 lb/MMBtu
¶VOC emissions estimates are based on a typical permit limit of 0.0036 lb/MMBtu for the coal-fired unit
**Lead emissions estimates are based on a typical permit limit of 0.60 tpy

The boiler flue gas (i.e., combustion exhaust) enters the SCR unit for conversion of NO_x to water and nitrogen. SCR equipment in combination with low-NO_x burners treats the boiler exit gas to reduce NO_x by approximately 80 percent. NO_x is converted by injecting ammonia upstream of a catalyst. In the presence of the catalyst, NO_x reacts with ammonia and produces water and nitrogen. The catalyst is located downstream of the boiler economizer and before the air heater where boiler exit gas temperature is at an optimum. Installation of SCRs on coal plants is a relatively new development, but sufficient experience has been

established to have a high confidence in proper operation of this equipment. This equipment is being employed to meet the anticipated emission limits.

The delivered coal, which has a low-sulfur content, in combination with a flue gas desulfurization (FGD) (likely a spray dryer (dry scrubber) and fabric filter baghouse) will provide the required sulfur dioxide (SO_2) control. FGD systems can generally be classified as either wet or dry processes. In both the wet and dry process alkaline slurry contacts the flue gas in an absorber module resulting in the removal of sulfur dioxide from the gas. In the wet FGD process (wet scrubber), large quantities of alkaline slurry are sprayed into the flue gas so the gas temperature is reduced to the adiabatic saturation temperature. In the dry FGD process (dry scrubber), the quantity of water introduced is carefully controlled so the flue gas remains well above the saturation temperature.

With a wet scrubber, dry fly ash is removed upstream of the FGD vessel by a fabric filter baghouse and either sold as an alternative for cement or transported to the landfill by either truck or overland conveyor. A limestone and water slurry is sprayed into the FGD vessel. This limestone slurry, consisting mainly of calcium oxide, is atomized in the wet scrubber chamber. Calcium oxide reacts with sulfur in the boiler exhaust gas to produce a calcium sulfur compound that is subsequently dewatered and removed from the absorber recycle slurry. Dewatered wet scrubber waste, gypsum, will discharge to a concrete bunker. Gypsum would be transferred by truck for off-site sales or disposal in the landfill.

With a dry scrubber, a lime and water slurry is sprayed into the FGD vessel. This lime slurry, consisting mainly of calcium oxide, is atomized in the spray dryer chamber. Calcium oxide reacts with sulfur in the boiler exhaust gas to produce calcium sulfur compounds and oxygen. The downstream fabric filter collects the calcium sulfur compound waste product.

The combination of low sulfur fuel and SO_2 removal equipment results in low SO_2 emissions. Existing commercial sources are available to supply the needed lime, which are delivered to the Project by rail or truck.

The fly ash particulates generated during the combustion process will be removed by a fabric filter (baghouse) system or an electrostatic precipitator (ESP) unit. Most of the boiler fly ash

particulate and calcium sulfate from the FGD system entrained in the boiler exhaust gas are also removed in the fabric filter baghouse or ESP unit. The air permit that will be issued for this power plant will set emission limits for various air pollutants. The FGD system that will be used for this power plant will be determined during the air permitting process.

Ash from the bottom of the boiler and baghouse accumulates in separate hoppers and is carried by truck or conveyor to the disposal area. Induced draft fans aid in moving the combustion gases through the boiler and emission control equipment with subsequent exhaust to the stack.

The SCR system will use a catalyst for NO_x control. In a SCR system, NO_x reacts in the presence of a catalyst to form nitrogen gas and water. A SCR system must be operated within a narrow temperature range (about 600-800 degrees Fahrenheit (^oF)) to achieve efficient NO_x removal. The SCR system will be located between the economizer and air heaters where gas temperature will typically fall within this range.

If aqueous ammonia will be used as the catalyst in the SCR system, it will be stored in a closed tank to minimize release of odors. The ammonia storage tank will be equipped with safety relief valves that may be a source of odors in the event of over-pressurization of the storage tank. During loading and unloading a vent back to the delivery truck is used; therefore, no odors are expected. A Risk Management Plan is not required for the aqueous ammonia at the 19 percent concentration irrespective of the quantity stored on site.

Low NOx burners and SCR produces the best cost NOx control per ton of ash removed. Because the potential site locations are in air quality attainment areas for all criteria, no further controls are necessary.

Fabric filters provide better PM_{10} removal than cyclones or electrostatic precipitators. The cost to remove PM_{10} with a fabric filter system would be considered on a per ton basis of PM_{10} removed. Selection of control technology will occur as part of the permitting process.

6.5.3 Transmission Requirements

A new 345 kV transmission line would be required to connect into the AECI electric transmission system. For the proposed site, a connection between Norborne and Thomas Hill Substation, and also from Norborne south to the Sedalia Substation and south from the Sedalia Substation to a new substation near Mt. Hulda would be needed. Total length of new transmission line construction required for the Norborne site would be approximately 134 miles. For the alternative site, a connection between Forbes and Fairport, then from Fairport to Orrick, and also from Orrick to Missouri City and Eckles would be required. Total length of new transmission line construction required for the alternative site would be approximately 125 miles. See Section 7.0, Transmission Line Macro-Corridor Analysis, for further information.

Power needs during construction would require a 69 kV connection to the transmission system. This temporary 69 kV transmission line would be sited within the proposed 345 kV transmission line corridor.

6.5.4 Fuel Use and Waste Disposal

Sub-bituminous coal will be the primary fuel for the generating unit. For planning and air permitting purposes, Powder River Basin coal mined in Wyoming and Montana is the coal of choice. The generating unit is estimated to have a coal consumption of 8,800 tons per day, or roughly 3.2 million tons per year.

Coal will be delivered to the power plant site by rail in unit trains consisting of approximately 130 to 150 rail cars averaging 15,000 to 18,000 tons per train. Rail cars will be unloaded with a rotary car dumper. A unit train positioner may be provided to accommodate the 150-car unit trains.

Total on-site storage capacity is approximately 90 days of storage or about 789,000 tons of coal. Coal will be stored in uncovered outdoor piles. Storm water runoff from the coal storage area will be collected in stormwater ponds that detain the runoff to settle suspended solids and reduce downstream flooding. All storm water discharges will meet the requirements of the facility's storm water NPDES permit.

Coal belt conveyors handling crushed coal will be located inside enclosed galleries; conveyors handling uncrushed coal will be covered. Galleries will be provided with service water for washdown, compressed air, welding outlets, lighting, fire protection, and ventilation. Transfer buildings will include the same ancillary features for clean-up as the coal conveyor galleries.

Solid waste will consist primarily of bottom ash and combustion waste material. Bottom ash would consist of noncombustible coal material that settles to the bottom of the boiler, where it is cooled and collected in a hopper. Combustion waste material consists of noncombustible coal material entrained in the flue gas exhaust (fly ash) and is collected in the fabric filter baghouse. Solid wastes will be disposed onsite in accordance with the State of Missouri permitting requirements.

6.5.5 Water Supply and Wastewater Disposal

Water for the Project systems will be supplied by a ground water or alluvial well system at a location somewhere between the plant site and the Missouri River. During the EIS process, an analysis of potential impacts to existing nearby wells would be performed and any issues or concerns would be resolved.

Expected water usage for the operating unit is approximately 5,600 gpm based on annual average consumption. The size of the surge and storage tanks will be determined during the detailed design phase of the Project. Nearly all makeup water for the Project will be required in cooling towers, with the remaining water likely going to the FGD system, service water supply and the supply of demineralized water to the boiler systems.

A softener may be used to treat the raw water supply. Treated water is used for preparation of the lime slaking slurry used in the spray dryer FGD system. All of this water is evaporated and discharged to the atmosphere with the boiler flue gas from the stack.

The proposed Project design includes a wet cooling system which condenses steam in a tube-and-shell heat exchanger (a condenser) with water. Cool water enters the condenser where it is warmed by the steam. The warm water is circulated from the condenser through a wet

mechanical draft-cooling tower, cooled and returned to circulate again through the condenser.

The majority of the water entering the cooling tower will be consumed by evaporation and drift. The remaining cooling tower blowdown will be sent to the FGD system.

Water for fire protection would be drawn directly from the service water storage tank by dedicated fire pumps. Potable water may be obtained from a public water supply or by treating well water with a carbon filter and chlorinator system.

Sanitary waste may be treated in a packaged waste water treatment system with treated effluent discharging to the process water holding pond. Plant equipment and floor drains that may be potentially contaminated with oil are routed through an oil/water separator prior to disposal. Filter backwash wastewater, coal storage area runoff, oil/water separator overflow, and treated sanitary wastewater may be combined in a common process water holding pond before disposal. A portion of the wastewater from the process water holding pond may be used for combustion waste product handling needs.

All wastewater leaving the site will be treated and discharged in accordance with the appropriate National Pollution Discharge Elimination System (NPDES) permit conditions. This will be determined during the preliminary design phase of the project and the water requirements will be finalized.

6.5.6 Operating Characteristics

The plant is expected to operate 7,884 hours per year at a capacity factor of approximately 90 percent. Plant operations are monitored for staff safety, meeting environmental requirements, and providing reliable and efficient operations while striving to achieve power output objectives, limiting emissions and minimizing fuel and other consumables.

Planned maintenance will be coordinated to reduce the impact of having the unit shut down for maintenance and overhauls. Normally, this work is planned during spring when the need for electricity is reduced. Short maintenance periods of one to two weeks will likely occur

once each year or two. Longer maintenance periods of 6 to 8 weeks for major steam turbine overhauls probably will occur once every 6 to 9 years.

6.5.7 Noise

During construction of the power plant and associated facilities, short-term noise sources would include heavy mobile equipment (e.g., bulldozers, backhoes, cranes, rock drills, heavy trucks, pumps, generators, compressors, loaders, and compactors). Construction equipment operation would vary considerably during the Project and during any given day. During the construction periods, the heavy mobile equipment is typically not run continuously and construction noise would generally occur only during the daytime hours.

Near the end of the Project construction, it would be necessary to generate steam in the boiler and release it to the atmosphere to clean the steam piping. This operation is usually a one-time event and would be done during the day, one operation per day generally over a two-week period. The steam blow silencer will be used to reduce the steam discharge noise which would result in moderate noise levels. Notices providing the schedule for these operations will be given to nearby residents and others in the community.

Although the construction noise levels could be audible at nearby receptors and may be considered an annoyance during the various construction phases, the construction noise impacts are predicted to be low. Construction noise would normally only occur during the day and residents are typically less sensitive to noise during the day than they are at night.

The major noise producing equipment associated with power plant operations includes fans, cooling towers, pulverizers, pumps, air compressors, valves and turbine generators. Table 6-12 lists the potential project noise sources. Other periodic noises of short duration are produced by boiler blowdowns, pressure reliefs and other venting processes. Noise frequencies generated by these sources run the entire range of audible sound from 20 hertz to 16,000 hertz.

Noise attenuating equipment and materials will be incorporated into the equipment design to reduce sound impacts of the facility on the surrounding area.

Table 6-12 Project Noise Sources

Exposed Plant Equipment	Associated Facility/Coal Handling Equipment
Air-cooled condensing units	Coal pile bulldozers
Main transformers	Enclosed Transfer Tower
Induced-draft (ID) fans	Crushers in crusher house-enclosed
	Forced-draft fans
	Primary-air fans

6.5.8 Transportation

Existing roads will be used for construction access to the site. No upgrades to off-site roads are anticipated. Construction traffic will include all craft labor, construction management staff, contractors, contractor equipment, vendors, and material and equipment deliveries. In addition to road vehicular traffic, the existing rail facilities will be utilized occasionally for delivery of large equipment. The frequency of the daily auto traffic will be proportionate to on-site labor projections.

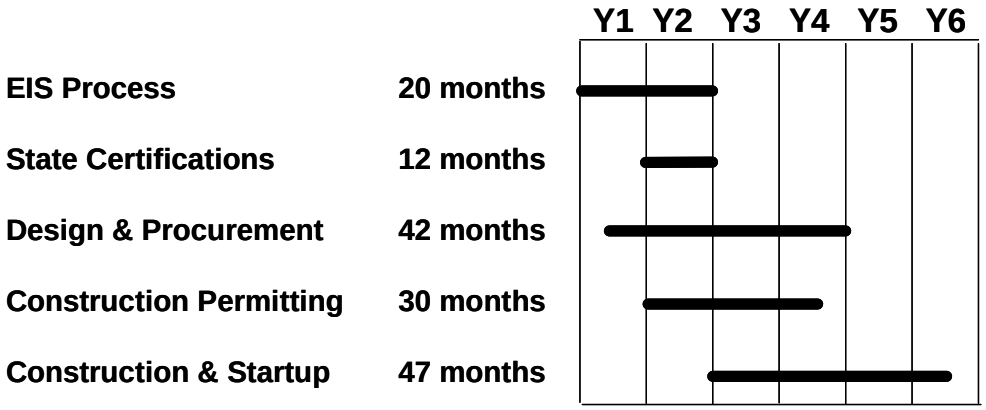
In addition to the auto traffic, deliveries of construction materials, primarily by large truck, can average between 15 and 25 a day. Special deliveries, for such items as structural steel and concrete, may occasionally exceed 50 on a given day. However under normal conditions, truck deliveries during the day should not coincide with the early morning, late afternoon labor traffic.

Traffic impacts associated with the additional site construction traffic will most likely occur around the starting and quitting times of the construction craft labor when auto traffic will be at its peak. The amount of added traffic will also be dependent on the phase of construction. It will start moderately and continue to increase until the peak period of construction. Additional traffic caused by material deliveries will have a lesser impact as they are typically intermittently spread throughout the day. There will be exceptions when truck traffic will significantly increase for a given day due to a special construction process. Permits and/or fees may be required for driveways or access roads off of county roads, impacts to arterial roads, and for upgrading portions of county road rock-gravel to pavement.

6.5.9 Project Schedule

Early permitting coordination was initiated in early 2005. Table 6-13 provides a list of the potential federal, state, and local permits and/or approvals this project may require. A schedule outline for permitting and construction activities is provided in Figure 6-29. A 20-month time span is available from September 2005 until April 2007 to receive EIS and PSD permit approvals and to begin construction. RUS financing will also be contingent on environmental approvals. Award of a steam-generator, emissions control equipment and steam turbine-generator is planned by May1, 2006, which would then lead to a start of construction a year later by May 1, 2007 pending environmental release to construct. A 47-month construction period is required to meet a commercial operation date of April 2011.

Figure 6-29 Project Schedule



The following sequence provides the anticipated order of construction:

- site preparation
- underground utilities installation
- start foundation installation
- start building steel erection
- start boiler erection
- start air quality control equipment erection
- start turbine erection
- start balance of plant mechanical erection

Table 6-13 Federal, State, Local Permits, Approvals, and Authorizing Actions

ISSUING AGENCY	PERMIT/APPROVAL NAME	NATURE OF PERMIT	AUTHORITY
Federal Government			
Federal Aviation Administration	Notice of Proposed Construction or Alteration	Structure location and height relative to air traffic corridors	49 United States Code (U.S.C.) 1501; 13 Code of Federal Regulations (CFR) §77, Objects affecting navigable air space
Environmental Protection Agency (EPA)/Missouri Department of Natural Resources (MDNR)	Title IV Acid Rain Permit	This permit requires monitoring and reporting so as to comply with Sulfur Dioxide allowances	40 CFR §72
US Army Corps of Engineers (USCOE)	Section 404 Permit (Clean Water Act) Nationwide Permit/Individual Permit	Controls discharge of dredged or fill materials in wetlands and other waters of the US	Section 404 of the Clean Water Act (33 CFR §323.1)
	Section 10 Permit of the Rivers and Harbors Act	Included with Section 404 Permit submittal. Regulates the construction of all structures that could impact functioning of navigable waterways, such as an outfall or intake structure.	Section 10 of the rivers and Harbors Act (33 USC. § 403)
US Fish and Wildlife Service (FWS)	Threatened and Endangered Species Clearance	Clearance to ensure that federal listed protected species and/or their habitat will not be impacted	Endangered Species Act (16 USC §1531 et seq.)
State Government			
Missouri Department of Natural Resources (MDNR)	Wetland or Dredge and Fill Approval (Section 401 Water Quality Certification)	Review of potential adverse water quality impacts potentially associated with discharges of dredged or fill materials in wetlands and other waters of the US	Section 401 of the clean Water Act and 10 Code of State Regulations (CSR) §20-6.060
MDNR, Water Pollution Control Program	National Pollutant Discharge System (NPDES) Storm Water Discharges associated with Construction Activities and Storm Water Pollution Prevention Plan	Apply for coverage under General Permit in order to authorize storm water discharges to surface waters of the state associated with the construction of the Project	Section 402 of the Clean Water Act and 10 CSR §20-6.200

ISSUING AGENCY	PERMIT/APPROVAL NAME	NATURE OF PERMIT	AUTHORITY
MDNR, Water Pollution Control Program	NPDES Storm Water Discharges associated with Facility Operation and SWPPP	Apply for coverage under General Permit in order to authorize stormwater discharges to surface waters of the state associated with the operation of the Project	Section 402 of the Clean Water Act and 10 CSR §20-6.200
MDNR, Water Pollution Control Program	NPDES Missouri State Construction and Operating Permit	Apply for coverage under Individual Permit in order to authorize construction of treatment works and industrial and storm water discharges to surface waters of the state associated with the Project	Section 402 of the Clean Water Act and 10 CSR §20-6.010(1)(A), 20-6.200
MDNR, Water Pollution Control Program	Missouri Water Pollution Control Form P – Notification of Hydrostatic Testing under Permit by Rule – MO780-1874	Permit for discharging waters associated with hydrostatic testing of pipelines and storage tanks	Section 402 of the Clean Water Act and 10 CSR §20-6.200
MDNR, Air Pollution Control Program	Prevention of Significant Deterioration (PSD) Permit	Permit to construct, install and operate a major emission source in Missouri. Typically consist of BACT, Air Dispersion Analysis, and Air Quality Related Values Analysis.	40 CFR §52.21, 10 CSR §10-6.060
MDNR, Air Pollution Control Program	Title V Operating Permit	Permit for operation of major equipment or major facilities that may directly or indirectly cause or contribute to air pollution	10 CSR §10-6.060
MDNR, Solid Waste Management Program	Solid Waste Disposal Area Construction Permit	Permit for construction of solid waste disposal facilities	10 CSR §80-1.010 through 80-4.010 and 10 CSR §80-11.010
MDNR, Solid Waste Management Program	Solid Waste Disposal Area Operating Permit	Permit for operation of solid waste disposal facilities	10 CSR §80-2.020
MDNR, Geological Survey and Resources Assessment Division	Major Water Users Registration	A major water user, defined as withdrawing or diverting 100,000 gallons or more per day from any stream, river, lake, well, or other source, must register their water use annually.	Revised Statutes of Missouri (RSMo) §256.400 to 256.430

ISSUING AGENCY	PERMIT/APPROVAL NAME	NATURE OF PERMIT	AUTHORITY
MDNR, Geological Survey and Resources Assessment Division	Water Well Registration and Certification	Registration and certification for construction of any water well, monitoring well, mineral exploratory well or ground source heat pump system.	Certification: 10 CSR §23-3.010, 23-3.060, 23-4.020 and 23-5.020. Registration: 10 CSR §23-3.025, 23-3.060, 23-3.110, 23-4.080, 23-5.080 and 23-6.050.
Missouri Department of Conservation (MDC)	Threatened & Endangered Species Clearance	Clearance to ensure that state listed protected species and/or their habitat will not be impacted by the project	State Endangered Species Program
Missouri State Historic Preservation Office (SHPO)	Section 106 of the National Historic Preservation Act	Consult with project applicants and state agencies regarding impacts on cultural resources that are either listed or eligible for listing on the National Register of Historic Places	National Historic Preservation Act
Local Government			
Carroll County Planning & Zoning Office	Special Use Permit/Rezone from agricultural to industrial Building Permit Floodplain Development Permit Entrance Permit Transportation Fee Road Improvement Fee	Obtain county rezoning approval prior to construction Permit to construction buildings Permit to construct in a flood zone Permit for driveway or access road off of county road Fee for impacts to arterial roads Fee for upgrading portions of county road rock-gravel to pavement.	To Be Determine (TBD)

- start electrical construction
- perform plant startup and initial operation activities
- commercial operation

The construction activities will be sequenced according to an overall project schedule using industry proven techniques augmented by current technology.

6.5.10 Project Cost

The current capital cost estimate (for the plant only) without transmission or interest during construction is $1,000,000,000. The initial project engineering will occur in 2005 and procurement and construction would span from January 2007 to April 2011.

6.5.11 Employment

Based on similar type projects, the Project employment begins with approximately 50 construction workers in the first year and rises to a peak of approximately 1,000 in year three. All construction activity is completed by year four. The operational staff will be approximately 135 employees.