

ALNRC 00025  
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**Enclosure A**

Red-line strikeout changes to Section 9.3 of the ER

### 9.3 ALTERNATIVE SITES

This section identifies and evaluates a set of alternative site locations to the Callaway site. The objective of this evaluation is to verify that there are no “obviously superior” sites on which to build and operate the Callaway Plant Unit 2 nuclear power facility.

Siting new units at existing nuclear sites (“co-locating”) has provided another option to the way alternatives were originally reviewed and selected. Existing sites offer decades of environmental and operational information about the impact of a nuclear plant on the environment. Because these sites are licensed nuclear facilities, the Nuclear Regulatory Commission (NRC) has already found them to be acceptable relative to other undeveloped sites in the region of interest. The NRC recognizes (in NUREG-1555, (NRC, 2007a), Section 9.3(III)) that proposed sites may not be selected as a result of a systematic review:

Recognize that there will be special cases in which the proposed site was not selected on the basis of a systematic site-selection process. Examples include plants proposed to be constructed on the site of an existing nuclear power plant previously found acceptable on the basis of a (NEPA) review and/or demonstrated to be environmentally satisfactory on the basis of operating experience, and sites assigned or allocated to an applicant by a State government from a list of State-approved power-plant sites. For such cases, the reviewer should analyze the applicant’s site-selection process only as it applies to candidate sites other than the proposed site, and the site-comparison process may be restricted to a site-by-site comparison of these candidates with the proposed site. The site selection process is the same for this case except for the fact that the proposed site is not selected from among the candidate sites based on a site by site comparison. (NRC, 2007a)

The information provided in this section is consistent with the special case noted in NUREG-1555, (NRC, 2007a), Section 9.3(III). This section identifies and discusses the evaluation of a set of alternative locations for the proposed plant and compares the suitability of these alternative sites with the suitability of the proposed site. The objective of this assessment is to verify that no site is “environmentally preferable” (and thus, no site is “obviously superior”) for the siting of a new nuclear plant.

The nuclear site evaluated is the Callaway site. The site was chosen because it is owned by AmerenUE and is known to have been selected originally to be the site for more than one power plant. As will be demonstrated in this section, this site has many features that result in it being ranked very favorably for construction and operation of a second unit. There are no other nuclear power plant sites located within the Region of Interest (ROI). The ROI is discussed in Section 9.3.1.

An extensive investigation was conducted to identify other sites within the ROI that could serve as the location for a nuclear power plant. Additionally, within Missouri, the state in which power from the Plant will be sold, the search for potential sites was expanded to include sites close to water bodies containing sufficient water for Plant needs but outside population centers. Details of this process are explained further in this section. The process resulted in the identification and subsequent detailed evaluation of two non-nuclear brownfield and two specific greenfield candidate sites.

Callaway Plant Unit 1 is the only licensed nuclear power plant located within AmerenUE’s service area or in the State of Missouri.

### 9.3.1 SITE SELECTION PROCESS

The site selection process focuses on identifying and evaluating locations that represent a range of reasonable alternative sites for the proposed project. The primary objective of the site-selection process is to determine if any alternative site is “obviously superior” to the proposed site for eventual construction and operation of the nuclear power plant unit. The proposed site is then compared with the alternate candidate sites to determine if any are “environmentally preferable.” The basic constraints and limitations applicable to the site-selection process are the currently implemented rules, regulations, and laws within the federal, state, and local agency levels. These provide a comprehensive basis and an objective rationale under which this selection process is performed.

In addition to applicable federal, state, and local rules, regulations, and laws, the following documents were used as both reference and guidance for this alternative siting study and the development and implementation of the selection process for the ROI and candidate areas:

- ◆ Electric Power Research Institute (EPRI) “Siting Guide: Site Selection and Evaluation Criteria for an Early Site Permit Application, 1006878, 2002” (EPRI, 2002),
- ◆ NRC Regulatory Guide 4.2, Revision 2 “Preparation of Environmental Reports For Nuclear Power Stations, Chapter 9 Alternative Sources and Sites,” 1976 (NRC, 1976),
- ◆ NRC Regulatory Guide 4.7 Revision 2 – “General Site Suitability Criteria for Nuclear Power Stations,” April, 1998 (NRC, 1998),
- ◆ NRC NUREG-1555, “Environmental Standard Review Plan, Office of Nuclear Reactor Regulation, Section 9.3 Site Selection Process,” July, 2007 (NRC, 2007a).

#### 9.3.1.1 Region of Interest and Candidate Areas

Callaway Plant Unit 2’s purpose is to serve the AmerenUE customer base as a dedicated baseload power generation asset. This is required in order to meet existing and future load requirements necessary to ensure that AmerenUE will continue to provide reliable, quality, least-cost energy to its customers. AmerenUE’s service area includes most of the St. Louis metropolitan area and portions of central, northwest, northeast, eastern and southeast Missouri (Figure 9.3-1 Potential Alternatives Region of Interest depicts AmerenUE’s service area, the ROI, and other pertinent siting criteria).

AmerenUE evaluated the predicted future electric power regulatory and institutional restrictions and market conditions in the State of Missouri, along with the siting criteria specified in 10 CFR 100 to determine the need for power and the objective of the Plant. Chapter 8 discusses the need for power in this region.

Based on this review and analysis, it was determined that AmerenUE’s service area is the most appropriate Region of Interest (ROI) for the selection of candidate areas to fulfill the stated purpose for the new plant. The ROI was selected because it contains areas that meet the threshold criteria of being (1) remote from population centers and population dense regions, (2) in close proximity to power demand load centers, (3) reasonably close to existing transmission lines, and (4) suitable for providing sufficient cooling water sources. Figure 9.3-1 depicts a scale map of the site study area and siting study features including the AmerenUE service area, candidate areas, population, and existing transmission and generation system assets.

A review of the ROI was conducted to ensure that an appropriately ecologically diverse area of study was selected for defining appropriate candidate areas for siting a nuclear power generating facility. The review included an evaluation of environmental diversity and threshold siting criteria. A variety of landform provinces are present in the ROI including the Dissected Till Plain to the north, the Ozark Highland in central Missouri, and the Coastal Plain province in the southeast. Each of the three landform provinces contain a diversity of landforms including mountains, hills, knobs, uplands, plains, lowlands, scarplands, and cuestas. A wide variety of topography, geology, soils, hydrology, land use, land cover and vegetation, and ecological regions are present (MDC, 2002).

After review of the available candidate areas within the ROI, AmerenUE determined that there were few sites that met the threshold criteria (as discussed in Section 9.3.1.1.1) for construction and operation of a Plant. Therefore, in order to determine conclusively whether the proposed site was among the best available in areas that could be linked through transmission lines to AmerenUE's service area, AmerenUE expanded its search area to any area in Missouri that met the minimal exclusionary criteria (as defined in EPRI 2002) of being outside of population centers while close to sufficient water to meet cooling needs. This resulted in the expansion of the candidate areas to additional locations along the Missouri and Mississippi rivers, as shown on Figure 9.3-1. There is no other water body within Missouri that is available for industrial uses (i.e., not reserved for conservation purposes) that has sufficient water for its current needs as well as the demands that the Plant would place on it.

The search area was limited to the state of Missouri because AmerenUE services customers only in Missouri. The construction of a nuclear power plant results in the generation of significant tax revenue to the host political bodies, additional employment, and some environmental costs. AmerenUE believes that the state of Missouri would have concerns if the Plant were to be built in, and thus deliver its tax benefits to, another state.

The initial phase of the Site Selection Study involved determining the methodology for defining the ROI and candidate site areas. The methodology developed by EPRI (2002) under the auspices of the NRC was selected with some modification to conform to the needs of selecting alternate sites to an existing proposed site. Briefly, the following steps were implemented:

- ◆ A limited number of exclusionary criteria, those criteria sufficient to eliminate an area from further consideration, were applied to the Region of Interest to develop candidate areas (Section 9.3.1.1.2).
- ◆ A number of data bases and other sources of information were consulted to identify potential sites within the candidate areas that could be a site for a nuclear power plant (Section 9.3.1.2.1). Two brownfield sites and nine greenfield sites were identified as potential sites.
- ◆ A number of avoidance and suitability criteria were selected to provide a basis for the evaluation of the potential sites (Section 9.3.1.1.3). Avoidance criteria are those that degrade the suitability of a site but are not sufficiently onerous to *prima facie* eliminate a site from consideration. Suitability criteria are those that describe the potential environmental or safety impact of a site, but for which the negative aspects can be mitigated.
- ◆ Values were applied to each of the avoidance and suitability criteria (Section 9.3.1.3). The values provided a way to differentiate whether the criteria were favorable or

unfavorable to each site. The higher the value, the more the site displays a favorable attribute of the criterion.

- ◆ A weighting was applied to each of the avoidance and suitability criteria (Section 9.3.1.3). The weighting factor reflected how important each of the avoidance suitability criteria is to the suitability of a site. The higher the number, the more important the criterion is to the decision making process.
- ◆ Available data were obtained about the identified potential candidate sites. Values and weightings were applied to each of the avoidance and suitability criteria for each site and four candidate sites were selected for more detailed evaluation (Section 9.3.1.3).

#### 9.3.1.1.1 Threshold Criteria

Various major site characteristics (including initial threshold site criteria in 10 CFR 100) were evaluated on a regional basis across the candidate areas. The siting requirements in 10 CFR 100 include those relating to the proposed reactor design and the characteristics specific to the site. Factors relating to site characteristics include the following:

- ◆ Population density and use characteristics of the site environs, including the exclusion area, low population zone, and population center distance; and
- ◆ Physical characteristics of the site, including seismology, meteorology, geology, and hydrology.

Non-seismic siting criteria specified in 10 CFR 100 include the following (among others):

- ◆ Presence of an exclusion area and a low population area as defined in 10 CFR 100;
- ◆ Population center distance of at least one and one-third times the distance from the reactor to the outer boundary of the low population zone;
- ◆ Suitable site atmospheric dispersion characteristics;
- ◆ Threats from physical characteristics of the site must pose no undue risk to the facility being considered;
- ◆ Potential hazards associated with nearby transportation routes, industrial and military facilities will pose no undue risk to the facility being considered; and
- ◆ Sites should be located away from very densely populated centers.

NRC Regulatory Guide 4.2, Rev. 2 (1998) also contains general site suitability criteria for nuclear power stations. This Regulatory Guide recognizes that

“the information needed to evaluate potential sites at this initial stage of site selection is assumed to be limited to information that is obtainable from published reports, public records, public and private agencies, and individuals knowledgeable about the locality of a potential site. Although in some cases the applicants may have conducted on-the-spot investigations, it is assumed here that these investigations would be limited to reconnaissance-type surveys at this stage in the site selection process.”

Relevant safety issues noted in Regulatory Guide 4.2, Rev. 2 include the following:

- ◆ Geologic/seismic, hydrologic, and meteorologic characteristics of proposed sites;
- ◆ Exclusion area and low population zone;
- ◆ Population considerations;
- ◆ Accidents associated with nearby industrial, transportation and military facilities;
- ◆ Emergency planning and security plans.

Environmental issues include consideration of construction and operation of the nuclear power station on the following:

- ◆ Ecological systems;
- ◆ Water use;
- ◆ Land use;
- ◆ The atmosphere;
- ◆ Aesthetics; and
- ◆ Socioeconomics.

NUREG-1555 (July 2007 draft) establishes a methodology for NRC to use in reviewing the applicant's process for identifying candidate areas. Among the reasons that may be sufficient to exclude areas from the ROI as unsuitable are the following:

- ◆ Proximity to major centers of population density;
- ◆ Lack of existing infrastructure (e.g., roads, railroads);
- ◆ Lack of a suitable cooling water source;
- ◆ Distance to transmission lines, substations, or load centers;
- ◆ Unsuitable topographic features;
- ◆ Potential to impact valuable agricultural, residential, or industrial areas;
- ◆ Potential to impact dedicated land-use areas (e.g., parks, historical sites, wilderness areas, testing grounds); and
- ◆ Conflict with land-use planning programs or other restrictions.

In accordance with these regulatory and guidance documents, the following siting exclusionary, avoidance, and suitability factors were evaluated in selecting candidate areas.

#### **9.3.1.1.2 Exclusionary Criteria**

Siting exclusionary criteria utilized in the review were:

- ◆ Distance from major population centers, high population density areas, cities and towns;
- ◆ Distance from and static head to water bodies with suitable supplies of cooling water;
- ◆ Distance from areas with significant flood potential;
- ◆ Distance from areas with geological hazards such as active faults and seismic activity;

### 9.3.1.1.3 Avoidance and Suitability Criteria

Avoidance and suitability criteria used in the review were:

- ◆ Distance from existing stable transmission system connection and areas predicted to be deficient in power;
- ◆ Distance from significant public resources such as national parks, wilderness areas, monuments, forests and other areas of special national or cultural significance, state parks, conservation areas and nature preserves, wetlands, scenic areas, historical and archeological resources, special land use and zoning, and other natural habitats; and
- ◆ Distance from airports, airstrips, military installations, industrial hazards, major highways and rail corridors; and (NRC, 2007b).

The ROI was evaluated with respect to the exclusionary criteria. In particular, the following three criteria were used to identify portions of the ROI to be excluded from consideration as a candidate area:

- ◆ A 10-mile buffer zone was established around population centers (metropolitan statistical units) of 25,000 or greater, to account for the guidance in Regulatory Guide 4.7 Rev. 2 that the low population zone be such that the distance to the nearest boundary of a densely populated center containing more than about 25,000 residents must be at least one and one-third times the distance from the reactor to the outer boundary of the LPZ. The buffer zone was selected to account for population growth and residential expansion over the years of the life of the plant.
- ◆ A zone of 15 miles from the selected water bodies was established as the outer limit of a candidate area, in recognition that with increasing distance the environmental impacts of establishing both a water intake pipeline and a discharge line become greater.
- ◆ Regions of unsuitable potential seismic activity were established.

All other criteria that were noted in the NUREG 1555 as potentially identifying a candidate area as unsuitable were either deemed not relevant for the ROI or were considered to be factors that could be mitigated through engineering designs. Therefore, the candidate areas may contain some of these criteria.

Figure 9.3-1 and Figure 9.3-2 depict the ROI and candidate areas along with relevant information pertaining to the siting study exclusionary, avoidance, and suitability criteria outlined above.

The EPRI Siting Guide (2002) geologic and seismic hazards assessment approach was used to perform a step one Geologic and Seismic Alternative Site Analysis. This was conducted to eliminate unfavorable areas for the selection of candidate areas and to identify reasonably available geologic and seismologic literature, maps, and other sources of information in order to compare the candidate sites to the proposed site.

A general site ranking was provided for each candidate site as well as the proposed site for each of five categories:

1. Vibratory Ground Motion
2. Capable Tectonic Sources
3. Surface Faulting and Deformation
4. Geologic Hazards
5. Soil Stability (EPRI, 2002).

A review of available geological, seismological, and geophysical data was performed for the ROI and candidate areas. The review encompassed both the proposed site and alternate sites from a regional perspective.

The tectonic sources that could potentially result in seismic-induced, vibratory ground motions at the proposed site and alternate sites are mainly the New Madrid Fault Seismic Zone and the Wabash Valley Seismic Zone (Frankel, 2002). The review of background seismicity zones may only be performed within a Step 3 or Step 4 EPRI analysis. NRC Regulatory Guide 1.165, Regulatory Positions 1 and 2 require that investigations of seismic sources be performed within a 200 mile (322 km) radius of the sites. (NRC, 1997) Two major sources of potential seismic activity are located within this radial distance:

- ◆ The New Madrid Seismic Zone (NMSZ) in southeastern Missouri and southwestern Illinois; and
- ◆ The Wabash Valley Seismic Zone (WVSZ) in southern Illinois and southern Indiana.

The New Madrid region was the location of three earthquakes in 1811-1812, which are the largest earthquakes recorded in the Central and Eastern United States (CEUS) (EGC, 2006). The Wabash Valley region is a zone of elevated seismicity in which a number of paleo-earthquakes have been identified (Frankel, 2002). Figure 9.3-3 through Figure 9.3-6 depict geologic and seismic hazard sources, surface faulting, surface deformation, and geologic and soils information, respectively, used for the alternative site study. A summary of the results of the geologic and seismic hazards analyses and ranking of the candidate and proposed sites is presented in Section 9.3.1.2.

### 9.3.1.2 Candidate Sites

An initial review of potential sites within both the ROI and the expanded study area was conducted. To be considered as a candidate site, a location must meet the following criteria as outlined in NUREG-1555, (NRC, 2007a), Section 9.3 (III):

- ◆ Consumptive use of water should not cause significant adverse effects on other users.

- ◆ The proposed action should not jeopardize Federal, State, and affected Native American tribal listed threatened, endangered, or candidate species or result in the destruction or adverse modification of critical habitat.
- ◆ There should not be any potential significant impacts to spawning grounds or nursery areas of populations of important aquatic species on Federal, State, and affected Native American tribal lists.
- ◆ Discharges of effluents into waterways should be in accordance with Federal, State, regional, local, and affected Native American tribal regulations and would not adversely impact efforts to meet water-quality objectives.
- ◆ There should be no preemption of or adverse impacts on land specially designated for environmental, recreational, or other special purposes.
- ◆ There would not be any potential significant impact on terrestrial and aquatic ecosystems, including wetlands, which are unique to the resource area.
- ◆ There are no other significant issues that preclude the use of the site.

In addition to meeting all applicable regulations and guidelines, the following factors influenced the decision to select and review sites.

- ◆ The site would be suitable for the design parameters contemplated for the new plant design.
- ◆ The location would be compatible with the applicant's current system and transmission capabilities.
- ◆ The site's expected licensing and regulatory potential must minimize the schedule and financial risk for establishing new baseload generation.

Urban land uses occupy an ever-increasing portion of Missouri's land area. The urbanized land of the St. Louis and Kansas City metropolitan areas extend into eight and five Missouri counties, respectively. Other officially designated metropolitan areas in the ROI include Cape Girardeau, Columbia, and Jefferson City, and cover eight additional counties. The State of Missouri Department of Economic Development Economic Research and Information Center utilizes a "Core-Based Statistical Areas system to identify larger areas that surround a specific population core that is defined as either a metropolitan statistical area (at least 50,000 persons) or a micropolitan statistical area (at least 10,000 persons).

Smaller cities and towns cover significant areas, although fragmented and dispersed. Large lake areas such as the Lake of the Ozarks and the Table Rock Lake-Branson area are economically developed areas that become the equivalent of small metropolitan areas during summers. Eighteen micropolitan statistical areas have been defined around Missouri population cores having an urban population cluster of between 10,000 and 50,000 persons. Most of these consist of only one county. Based on 2002 population estimates, 71% of Missouri residents lived in metropolitan areas (MERIC, 2003).

#### **9.3.1.2.1 Databases and Sources Consulted**

To identify candidate sites, a number of resources were researched, including the following:

1. Original Siting Study – A broad siting study conducted in 1971 (Callaway Plant Unit 1 and 2 Site Selection Study, Dames & Moore, 1971), referred to in this document as the original siting study;
2. Federal Properties in Missouri;
3. AmerenUE's list of generating facilities and owned real estate;
4. Missouri Department of Natural Resources (MDNR) Brownfield/Voluntary Cleanup Program's List of Brownfield sites (MDNR, 2007a);
5. MDNR Division of Environmental Quality's Registry of Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal Sites in Missouri (MDNR, 2006);
6. Location One, a web-based commercial siting tool with an inventory of available commercial and industrial sites listed for sale within the State of Missouri that is sponsored and maintained by the Missouri Department of Economic Development (LOIS, 2007 and 2008);
7. LoopNet, a subscription-based database of available real estate properties, accessed through a query made by AmerenUE to a commercial real estate agent (LoopNet, 2007 and 2008);
8. An inventory of electric generating facilities in the state of Missouri (Platts, 2005); and
9. Independent review of the candidate areas.

A description of each database as well as the results of the queries is described below.

#### Original Siting Study

A broad siting study was conducted on behalf of Union Electric Company (now d/b/a AmerenUE) in 1971 (Callaway Plant Unit 1 and 2 Site Selection Study, Dames & Moore, 1971), referred to in this document as the original siting study, which resulted in the selection of a greenfield site known as Reform, Missouri, for the construction of from one to four co-located nuclear power plants. An Application to Construct was submitted to NRC for the construction of two plants, resulting in the NRC issuing a Final Environmental Impact Statement (FEIS) related to the then proposed Callaway Plant Units 1 and 2 (NRC, 1975). The NRC licensed the applicant to construct two units. The original license to construct was for a maximum capacity of 4,400-MegaWatts (MWe) of power generation capacity. While Callaway Plant Unit 1 was constructed and licensed by the NRC to operate, AmerenUE elected not to complete a second unit.

The original study was an exhaustive two phase siting study which, along with the original Environmental Report, and FEIS, concluded that there were no obviously superior sites to the selected Reform site located in Missouri. Phase one of the original siting study began with an unidentified number of potential sites which were further evaluated and an unidentified number of sites were eliminated after review of siting criteria. ~~There were 19 potential sites that were identified for further study, of which nine sites were designated as primary sites and the remaining were designated as secondary sites.~~

The project study area included the entire state of Missouri and adjoining areas in southern Iowa, western Illinois, and northern Arkansas. The original siting study considered the

following environmental factors: (1) present and future population and land use characteristics in the area; (2) physical site characteristics including meteorology, geology, hydrology, seismology, and foundation conditions; and (3) environmental effects of waste-heat disposal, chemical and radioactive discharges, changes in land and water use on man's environment including important plant, fish, and animal species (Dames & Moore, 1971). The original siting study also included other criteria that were established to minimize the potential environmental impact, to conform to State and Federal regulations. The criteria used are as follows:

1. Land requirements
  - a. Generating plant and switchyard – 200 to 300 acres
  - b. Cooling Facilities
    - i. Pond, effective surface area – 1.5 acres/MW
    - ii. Towers – 0.2 acres/ MW
  - c. Exclusion area – 500 to 1,000 acres
2. Population and Land Use Criteria
  - a. Potential sites should be located in low population density areas.
  - b. The following types of areas and cultural features should be avoided, to the extent possible:
    - i. Airports
    - ii. Cemeteries
    - iii. Historical Sites
    - iv. Public Parks and Forests
    - v. Wildlife refuges
    - vi. Scenic streams and wild rivers
    - vii. Unique or valuable wildlife or fishing, breeding, or habitat areas
    - viii. High quality farmland.
3. Water Supply Criteria
  - a. General Criteria
    - i. Full-load condenser heat rate –  $6.75 \times 10^6$  BTU/MWH
    - ii. Condenser cooling water temperature rise – Approx. 20°F

- iii. Circulating water flow rate – 1.50 CFS/MW
  - iv. Blowdown of the cooling system – Continuous
  - v. Total dissolved solids concentration – Limit increase by a factor of 2
  - b. Cooling Tower Criteria
    - i. Make-up water requirement – 45 cfs/1,000 MW
    - ii. Make-up water requirements for mechanical-draft towers – Equal water requirements
  - c. Cooling Pond Criteria
    - i. Mean surface water temperature (August) – Approx. 90°F
    - ii. Mean wind speed – Approx. 9 mph
    - iii. Effective surface area – 1.5 acres/MW
    - iv. Make-up water requirements – 70 cfs/1,000 MW

Contribution from run-off not considered  
Seepage losses from pond not included
4. Geologic Criteria
- a. Potential sites should not be located in areas of known mineral deposits which have a limited geologic distribution. Sand and gravel deposits and rock quarries are not considered under this criterion because of their general wide geologic distribution.
  - b. Potential sites should not be located within the immediate proximity of known faults.
5. Seismology Criteria
- a. Areas considered to have historically experienced Intensity VIII ground motion were excluded from further consideration.
  - b. Areas of historical Intensity VII ground motion would require seismic design criteria which would impose significant construction costs, particularly if close to the estimated outer limits of historical Intensity VIII ground motion.
6. Meteorologic Criteria
- a. The diffusion characteristics of the primary and secondary sites were roughly compared to the AEC diffusion model. The diffusion model is described in Safe Guards 4 (Atomic Energy Commission, Nov. 2, 1970). It is based on a thermal stability condition which develops at a given wind speed. The comparison indicates if the site is: a) better than the diffusion model 95 percent of the time, b)

equivalent to or better than the diffusion model 95 percent of the time, c) equivalent to the diffusion model 95 percent of the time, d) equivalent to or worse than the diffusion model 95 percent of the time, or e) worse than the diffusion model 95 percent of the time. Additional engineered safeguards may be required if the site should be classified in categories c, d, or e.

- b. To describe the worst possible case, it was assumed that a stackless plant would be built because an accidental release from this type of plant presents one of the most critical conditions to be evaluated from a meteorological viewpoint.

The methods utilized in Phase I of the original siting study consisted of: (1) collection and evaluation of basic published and unpublished data, pertaining to the site selection parameters, which were obtained from state and federal agencies, (2) regional evaluations of the basic environmental factors, (3) identification of suitable siting areas, (4) selection of specific potential sites in the suitable siting areas, (5) evaluation of the various environmental factors for the selected sites, (6) grouping of selected sites into primary sites and secondary sites, and (7) development of preliminary cost estimates for certain elements of site development and utilization. There were 9 potential sites that were designated as primary sites and identified for further study. Eight of the nine primary sites were located in Missouri and one was located in Illinois. Six of the primary sites were located near the Missouri River, two were located along the Mississippi River, and the site in Illinois was located near the Illinois River.

Generally, the primary sites in the original siting study represented the apparent optimum siting conditions as of 1971. The secondary sites were either considered less desirable than the nearby primary site or had significant undesirable environmental factors or relatively high site development costs.

The nine primary sites identified in the original siting study are as follows:

- ◆ Site A-1 – Located in Montgomery County, Missouri
- ◆ Site A-4 – Located in Saline County, Missouri
- ◆ Site A-6 – Located in Carroll County, Missouri
- ◆ Site B-2 – Located in Scott County, Illinois
- ◆ Site C-2 – Located in Pike County, Missouri
- ◆ Site C-4 – Located in Lewis County, Missouri
- ◆ Site C-5 – Located in Callaway County, Missouri
- ◆ Site C-8 – Located in Cole County, Missouri
- ◆ Site C-9 – Located in Cooper County, Missouri

In Phase Two of the original study, the list of primary sites was reduced to six potential sites that were thoroughly evaluated. All of the sites identified in the original study were “greenfield” sites; i.e., previously undeveloped sites. All six potential sites were found to be acceptable from an environmental standpoint. The final proposed site (the current Callaway site) was selected as the preferred site based on a cost-effectiveness analysis.

For the current evaluation, the analyses and results of the original siting study were reviewed. ~~All of the nineteen sites that were evaluated in phase 2 of the original siting study were evaluated in the current process. After an analysis of the data from the original report, most of these sites were screened out for further consideration in the current siting study due to site-exclusionary, avoidance, and suitability factors such as the proximity to current and future population centers, population distribution and density, current land use and land use trends, or location outside of Missouri. Three sites, termed C2, C9 and C10 were retained for further analysis. These sites retain the nomenclature used in the original siting study. The 9 primary sites that were evaluated in phase 2 of the original siting study were evaluated in the current process. After an analysis of the data from the original siting study, the majority of these sites were excluded from further consideration due to various factors. Site B-2 was excluded because it is not located within the State of Missouri. Site C-8 was excluded because it is located within an urban cluster including 10-mile buffer zone. Site A-1 was excluded because locating a nuclear plant on this site would require the relocation of Highway 19. Sites A-4, A-6, and C-4 were excluded because they are located outside of the Region of Interest and the AmerenUE service area. Table 9.3-9 lists the sites that were excluded and their reason for exclusion. Two sites, termed C2 and C9 were retained for further analysis. These sites retain the nomenclature used in the original siting study. Additionally, site C-5 was retained as it is the location of the current Callaway Unit 1 nuclear power plant.~~

#### Federal Properties in Missouri

In accordance with the suitability factors outlined above, a search was conducted for federal lands located within Missouri. There are four federal lands in Missouri: Whiteman Air Force Base, Fort Leonard Wood, the Lake City Army Ammunition Plant, and Richards-Gebaur Air Force Base (closed). However, none of these are located within the ROI or the expanded candidate areas.

#### AmerenUE's list of generating facilities and owned real estate

~~AmerenUE has several properties which are operating generating facilities, as described in Section 8.3.2. AmerenUE has several properties which are operating generating facilities. These include Callaway Plant Unit 1, Rush Island, Labadie, Sioux, Meramec, and Keokuk as base capacity facilities; Osage as an intermediate capacity facility; and Taum Sauk as a peaking capacity facility. Each of these facilities is described in Section 8.3.2. None of these facilities, with the exception of the Callaway Plant, are located within the candidate site areas; all have been excluded on the basis of one or more criteria discussed in Section 9.3.1.1 above.~~

#### Missouri Department of Natural Resources (MDNR) Brownfield/Voluntary Cleanup Program's List of Brownfield sites (MDNR, 2007a)

#### MDNR Division of Environmental Quality's Registry of Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal Sites in Missouri (MDNR, 2006)

These two databases are discussed jointly below.

Brownfield sites are those that have previous industrial or commercial development and generally require removal of hazardous wastes before being suitable for another use. Reuse of a brownfield site offers less environmental impact than use of a greenfield site, and frequently provides a net environmental benefit through reduction of existing environmental impacts and replacement with an operation with fewer environmental impacts. The option of using a brownfield site rather than a greenfield site offered obvious environmental benefit possibilities. Therefore, a search and assessment was made of suitable brownfield sites located within the candidate areas from two databases maintained by MDNR, as identified above.

The MDNR maintains a statewide list of sites that have been formally entered into the MDNR's Voluntary Cleanup Program (VCP) for assessment and remediation of hazardous materials according to the MDNR VCP protocol. This program allows the use of innovative risk-based clean up levels and remediation actions such as administrative and engineering controls including restrictive covenants and deed restrictions. The MDNR VCP list includes sites that are mostly commercial or industrial brownfield properties that have been targeted for redevelopment. A search and assessment of this list was conducted for potential candidate sites. The search did not identify any brownfield sites that met the minimum threshold siting criteria (discussed above and as outlined in NUREG-1555, (NRC, 2007a), Section 9.3 (III)). None of the brownfield sites in the MDNR VCP list were located within the candidate areas described in Section 9.3.1.1.

The MDNR also maintains a Registry of Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal Sites in Missouri. The Registry includes state superfund sites, federal superfund sites in cooperation with the state, and confirmed or uncontrolled hazardous waste sites that have been assessed or cleaned up. The list includes former manufactured gas plants, formerly used defense sites, former US Department of Agriculture (USDA) Grain Bins, wood treatment facilities, and hazardous waste disposal sites. A search and assessment of this registry was conducted for potential candidate sites. The search did not identify any abandoned or uncontrolled hazardous waste sites that met the minimum threshold siting criteria (discussed above and as outlined in NUREG-1555, (NRC, 2007a), Section 9.3 (III)). None of the hazardous waste sites in the MDNR Registry were located within the candidate areas described in Section 9.3.1.1.

#### Location One

The Missouri Department of Economic Development, and two of Missouri's largest investor owned utilities, AmerenUE, and Aquila, Inc., sponsor Location One, a web-based searchable inventory of commercial and industrial real estate listed for sale (LOIS, 2007 and 2008). The real estate is searchable by town, county, parcel or building size, type, and location of real estate. A search and assessment of this database was conducted for potential candidate sites. The search did not identify any listed commercial or industrial sites that met the minimum threshold siting criteria (discussed above and as outlined in NUREG-1555, (NRC, 2007a), Section 9.3 (III)). None of the commercial or industrial sites in the Location One database were located within the candidate areas described in Section 9.3.1.1. None of the greenfield sites in the Location One database met the threshold criteria. Therefore, no sites from the Location One database were carried forward for further consideration.

#### LoopNet

LoopNet is a subscription-based database of available real estate properties, accessed through a query made by AmerenUE to a commercial real estate agent (LoopNet, 2007 and 2008). Through the query made by AmerenUE, the following counties in Missouri were searched: Northern Lincoln County, Pike County, Marion County, Osage County, Callaway County, Randolph County, and Eastern Howard County. The LoopNet database search identified a total of nine available properties that met the threshold criteria of proximity to water and distance from seismic zones and population centers. These nine available properties are titled for convenience as follows: Highway 94, 30543 Highway N, Pheasant Hunting Farm, Tower Road, Fayette, 14636 Z Highway, Highways 79 & 47, Eolia, and Paynesville. All are greenfield sites; most have some development in the form of a farm, residence, or commercial recreational facility. These sites are described in Table 9.3-7 and were carried forward for more detailed investigation as described in Section .

### Inventory of Electric Generating Facilities in the State of Missouri

A review was conducted of the Platts (2005) listing of generating facilities in Missouri to identify sites that may be appropriate for replacement by a nuclear power plant. No sites owned by AmerenUE met the threshold criteria. One site, the Chamois Power Plant, met the threshold criteria and was selected for further investigation as an alternative site. No discussions have been held between AmerenUE and the Chamois Power Plant owner regarding the potential for acquiring the property by AmerenUE for any purpose; this site was selected only because it has a similar industrial use and meets the threshold criteria with respect to proximity to water and distance from population centers. As the results of this alternative site evaluation indicate that this property is not significantly better than the Callaway site which is the proposed site, AmerenUE does not intend to investigate the Chamois Power Plant further or to enter into any discussions with the Chamois Power Plant owner for any purpose.

### Independent Review of Candidate Areas

The results of the surveys of the available databases indicated that there were fewer than three brownfield sites in the ROI that met the threshold criteria. Therefore, AmerenUE reviewed maps of the ROI to identify commercial or industrial properties that met the threshold criteria and were large enough to accommodate a nuclear power plant. One potential site was identified, the Fred Weber Quarry in Lincoln County, Missouri. This inactive quarry site was selected for further investigation as an alternative site. No discussions have been held between AmerenUE and Fred Weber, Inc. regarding the potential for acquiring the property by AmerenUE for any purpose; this site was selected only because it is an industrial site that meets the threshold criteria with respect to proximity to water and distance from population centers. As the results of this alternative site evaluation indicate that this property is not significantly better than the Callaway site which is the proposed site, AmerenUE does not intend to investigate the Fred Weber Quarry further or to enter into any discussions with Fred Weber, Inc. for any purpose.

In total, two brownfield sites and 9 greenfield sites meeting the threshold exclusionary criteria were identified within the candidate areas.

#### **9.3.1.3 Sites Meeting Threshold Exclusionary Criteria**

A separate evaluation was made of the 9 greenfield sites that met the threshold exclusionary criteria. These sites were compared with respect to the following avoidance and suitability criteria:

- ◆ Average population per square mile within a 10 mile radius and a 50 mile radius;
- ◆ Distance from major water body;
- ◆ Inside or outside of floodplain;
- ◆ Total length of transmission line needed;
- ◆ Distance from 345 kV transmission line;
- ◆ Distance to load center (St. Louis);
- ◆ Distance from significant public resources such as national parks, wilderness areas, conservation areas, etc.;
- ◆ Distance from major airports;

- ◆ Distance to major highways; and
- ◆ Presence of minimum acreage (500 acres, as described in 10 CFR 100) to avoid further land acquisition and converted land use concerns.
- ◆ Whether the site is a greenfield site or a brownfield site; and
- ◆ Diversity of environment and geomorphology with respect to Callaway.

The data that were developed to allow this comparison are presented in Table 9.3-8. The data for each criterion were then grouped into ranges so as to prevent needing to differentially rank essentially similar data for different sites. The selected value ranges for each criterion are presented in the right column of the table. Each site was given a rating of from 1 (most negative) to 5 (most beneficial) for each of the criteria. For example, the criterion addressing distance from a water body was given value ranges of 5 = 0-4 miles; 3 = 5-9 miles; and 1 = 10-15 miles. Each criterion was also given a ranking in recognition of its importance in defining an optimal site for a plant. Criteria were given rankings of either 8 (very important siting factor), 5 (neutral siting factor), or 3 (relatively unimportant siting factor). Finally, the site rating was multiplied by the criterion ranking to establish a weighted value for each criterion for each site. The results of these evaluations are presented in Table 9.3-8. ~~The results show that the greenfield site (C-9) in Lamine, Cooper County, near the Missouri River, and the greenfield site (R-9) near Paynesville, Lincoln County, near the Mississippi River, were most favorable with respect to the initial siting criteria. Site C-9 (Lamine) was identified in the original siting study (Dames & Moore, 1971). Site R-9 was identified from a search in the Location One database, as discussed in Section 9.3.1.2. These two sites were brought forward as Candidate Sites for further evaluation, as discussed in Section below.~~

The results show that the Fred Weber Quarry brownfield site; the greenfield site (R-9) near Paynesville, Lincoln County, near the Mississippi River; the greenfield site (C-9) in Lamine, Cooper County, near the Missouri River; and the Chamois site were most favorable with respect to the initial siting criteria. These sites were carried forward to become Alternate Candidate Sites.

### 9.3.2 PROPOSED AND ALTERNATIVE SITE EVALUATION

The alternative sites that are compared with the Callaway Plant Unit 2 site (the proposed site) include two brownfield sites (Chamois Coal Power Plant (Chamois) site and the Fred Weber, Inc. Auburn Rock Quarry (Fred Weber Quarry) site) and two greenfield sites (the Lamine site and the Paynesville site). A brownfield site is one that has been previously developed and can be redeveloped for a more profitable use. Brownfield sites were included because the State of Missouri and the federal government have encouraged the redevelopment of brownfield properties, which benefits the environment by preserving green space. These sites were compared with greenfield sites to determine if development of a brownfield site would be environmentally preferable to a greenfield site.

The alternative sites were compared to the proposed site based on information about the existing nuclear plant and the surrounding area, as well as existing environmental studies and Final Environmental Impact Statements issued by the Atomic Energy Commission and/or the U.S. Nuclear Regulatory Commission. This comparison is performed to determine whether or not any alternative sites are environmentally preferable to the proposed site.

Throughout this section, environmental impacts of the alternatives are assessed using the NRC three-level standard of significance – SMALL, MODERATE, or LARGE. This standard of

significance was developed using Council on Environmental Quality guidelines set forth in the footnotes to Table B-1 of 10 CFR 51, Subpart A, Appendix B (NRC, 2007c):

**SMALL:** Environmental effects are not detectable or are so minor they will neither destabilize nor noticeably alter any important attribute of the resource.

**MODERATE:** Environmental effects are sufficient to alter noticeably but not to destabilize important attributes of the resource.

**LARGE:** Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

In order to analyze the effects of building a new nuclear plant at each of these locations, it was assumed the construction and operation practices described in Chapters 4 and 5 would generally be carried to each site. In this manner, it was possible to apply a consistent description of the impacts at each site.

### 9.3.2.1 Chamois Generating Station Brownfield Site

A brownfield site is a property that has been previously developed and can be redeveloped for a more profitable use. The first of two brownfield sites chosen for analysis is the Chamois Generating Station on the south bank of the Missouri River in Osage County, Missouri. This site is currently owned and operated by Central Electric Power Cooperative as a 72 MWe coal burning steam power plant.

The Chamois candidate site is located in central Missouri at a latitude of 38 degrees, 41 minutes, and 4 seconds north, and a longitude of 91 degrees, 45 minutes, and 23 seconds west. Figure 9.3-7 and Figure 9.3-8 identify the Chamois candidate site location and plant layout on geographic and USGS topography maps, respectively.

For the purposes of this alternative siting study it was assumed that the existing Chamois Generating Station would be decommissioned and replaced with a nuclear reactor similar to the proposed Callaway Plant Unit 2. It was assumed the proposed nuclear plant site would occupy at least 500 acres (202 hectares), the minimum area that would provide a regulatory required 0.5-mile (0.8 km) radius exclusion zone (NRC, 2007b).

#### 9.3.2.1.1 Land Use

The Chamois site is located in an area of mixed residential, commercial and agricultural land use. The site is situated immediately to the east of the small town of Chamois, Missouri, population 456 (USCB, 2000a). The site is bounded to the north by the Missouri River and to the east, west and south by agricultural land. The site area is 210 acres (85 hectares), which is smaller than the area required for siting a nuclear plant.

Given the identified size of the proposed plant, a minimum of approximately 300 acres (121 hectares) of additional land would need to be purchased at this site. It may be necessary to relocate some adjoining commercial and residential establishments located in the adjacent town of Chamois to the west and approximately 200 to 300 acres (81 to 121 hectares) of quality agricultural land to the west.

Approximately 3279 acres (1327 hectares) of National Wetlands Inventory (NWI) wetlands are contained entirely within a 5 mile (8 km) radius of the Chamois site.

The U. S. Department of Agriculture - Natural Resource Conservation Service (NRCS) has mapped the soil in Osage County and has classified the soil at the site in two categories, as "Prime farmland if drained" and as "All areas are prime farmland" (NRCS, 2006a). Approximately 171 acres (69 hectares) of the Chamois site, including the land to be acquired, have been classified as prime farmland. Of this, approximately 50 percent (87 acres (35 hectares)) will be impacted by the proposed plant. Approximately 17 percent of the land within a 5 mile (8 km) radius surrounding the Chamois site has been classified as prime farmland, with approximately 0.17 percent of this to be disturbed with the proposed plant. Figure 9.3-21 shows farmland on the Chamois site, including the land to be acquired.

Approximately 135 acres (55 hectares) of the Chamois site, including the land to be acquired, is National Wetlands Inventory (NWI) wetland. Of this, approximately 24 percent (33 acres (13 hectares)) will be impacted by the proposed plant. Figure 9.3-26 shows NWI wetlands on the Chamois site, including the land to be acquired. There are no state zoning, land use, farmland preservation plans, regulations, or county or local zoning ordinances that would restrict the development or use of the Chamois site as a nuclear power plant. Due to the necessity to significantly change several hundred acres of the surrounding area's land use to accommodate the new nuclear site, the impact on land use in this area would be MODERATE to LARGE.

#### 9.3.2.1.2 Air Quality

Construction activities may result in increased air emissions and the impacts would be similar at all of the alternative sites evaluated. The potential air impacts may include fugitive dust and fine particulate matter generated during earth moving and material handling activities. Vehicles and engine-driven equipment (e.g. generators and compressors) will generate combustion product emissions such as carbon monoxide, oxides of nitrogen, and, to a lesser extent, sulfur dioxides. Painting, coating and similar operations will also generate emissions from the use of volatile organic compounds. The air quality impacts of the construction and operation of a new nuclear unit would be similar at all of the candidate sites.

Emission-specific strategies, plans, and measures would be developed and implemented to limit and mitigate releases, ensuring compliance within the applicable regulatory limits. These limits are defined by the primary and secondary National Ambient Air Quality Standards in 40 CFR 50 (USEPA, 2007a) and the National Emission Standards for Hazardous Air Pollutants in 40 CFR 61 (USEPA, 2007b). The same or similar measures would be taken if a nuclear generating unit was to be constructed at any of the alternative sites.

The relatively minor air quality impacts attributed to the operation of a modern nuclear plant are related to ancillary minor source equipment such as emergency generators and cooling towers. Based on the design of the new reactor and the actions that will be taken to comply with permit requirements for emissions, it is expected that siting the unit at this location would have a SMALL impact on air quality.

Osage County's status for all National Ambient Air Quality Standards (NAAQS) regulated air quality pollutants is designated as in-attainment (MDNR, 2007b). Closing the coal burning power plant at the Chamois site and replacing this generating facility with a nuclear plant would reduce the amount of particulate matter, NO<sub>x</sub>, and greenhouse gases that are released into the atmosphere. The positive impact of reduced NO<sub>x</sub>, particulates, and greenhouse gases on the general air quality in the state of Missouri would be SMALL, but the local impact may be MODERATE. In both cases, the overall impact of this transformation would be beneficial.

### 9.3.2.1.3 Water

Surface and groundwater uses that could affect or be affected by the construction or operation of Callaway Plant Unit 2 and associated facilities are described in Section 2.3.2. The consumptive and non-consumptive water uses are identified, and water diversions, withdrawals, consumption, and returns are quantified.

The planned Callaway Plant Unit 2 cooling water system requirements were used to compare potential impacts to water resources at the Chamois site. It is assumed that the same water needs, water source (the Aquifer) and collector well system would be used at the Chamois site.

The Missouri State Water Resources Plan was prepared by the MDNR with the purpose of identifying the state's water use problems and opportunities related to drinking water, agriculture, industrial, recreational, and environmental needs. The Chamois candidate site is located in the central region of the state and is identified in the Plan as having relatively abundant surface water and groundwater resources and, as a result, water use concerns are primarily focused on water quality and resource protection (MDNR, 1995). The existing source of cooling water for the Chamois Coal Generating Plant is a surface water intake located along the Missouri River. Water is pumped from the water intake to the plant, used for cooling, and then discharged downstream from the water intake location.

Impacts to water resources at the site from the construction and operation of a new reactor unit are anticipated to be SMALL due to the proposed replacement of the existing Chamois Plant's water usage with a system similar to that described for Callaway Plant Unit 2, the large size of both the surface water and groundwater resources, the current rural nature of the area, and resultant relatively low usage of these resources.

### 9.3.2.1.4 Terrestrial Ecology and Sensitive Species

The Chamois site is located in Missouri's Ozark Highlands Ecological Section which includes most of southern Missouri, most of northern Arkansas, and small parts of southwest Illinois. The Ozark Highlands Ecological Section includes a total of sixteen ecological subsections all of which are located in Missouri. The Chamois candidate site is located on the northern outer boundary of the Osage River Hills Ecological Subsection. Prior to European settlement, this ecological subsection was historically dominated by tall grass prairie intergraded from the surrounding plains (Osage, Springfield, and Central Plateau) into complex mosaics of glades, oak savanna, oak woodlands, and oak forests (MDC, 2002).

Today much of the region is dominated by fescue pasture and cropland along the alluvial plains. Much of the area has been degraded due to overgrazing and repeated timber harvest. In addition, glades and open woodlands have succeeded to cedar thickets and brushy forestland in the absence of natural prairie fires. Many of the forested bottoms, including the subject site vicinity, have been cleared for agriculture (MDC, 2002).

The U.S. Fish and Wildlife Service National Wetlands Inventory's Mokane East Map identifies three palustrine wetlands on the site, and several more mapped palustrine wetland units in the site vicinity. Measures and controls that would be implemented to mitigate potential impacts to wetlands are similar to those described in Section 4.6. There are no Special State Concern Wetlands, Federally designated Wilderness Areas, Wildlife Preserves, Sanctuaries, Refuges, National Forests, Agricultural Preservation Lands, or Forest Legacy Lands known to be in the site vicinity (EDR, 2007a).

No known state or federally listed species or sensitive habitats are known to be located in the immediate candidate site area. The entire Ozark Highlands ecological region contains 142 records of 72 state-listed species of concern. Many of the occurrences are associated with rivers and streams or caves. These include several species whose only occurrence in the state is from the Osage River Hills: a perlid stonefly, a hornwort, an elderberry, and a moss (MDC, 2002). The U.S. EPA lists three mammals, the gray bat, Indiana bat and the bald eagle on the Endangered Species Protection Program Database for Osage County (EDR, 2007a). As of August 9, 2007, the bald eagle is no longer protected under the federal Endangered Species Act and Section 7 consultation with the U.S. Fish and Wildlife Service is no longer necessary. However, the bald eagle remains protected under the Bald and Golden Eagle Protection Act (USFWS, 2007).

The Chamois site would not be expected to have fewer rare, threatened, or endangered species than the Callaway site.

Little or no wildlife habitat area would need to be cleared and developed because the new nuclear plant would replace the existing coal plant and the additional several hundred acres needed for the siting of the proposed nuclear plant is largely already developed commercially or agriculturally. The impacts to the terrestrial ecosystem at the site would therefore be SMALL and would predominantly occur during the conversion of the plant from coal to nuclear power. Construction Best Management Practices would be followed to minimize potential impacts.

#### 9.3.2.1.5 Aquatic Ecology and Sensitive Species

No known state or federally listed threatened or endangered aquatic species occur at the Chamois site. However, the U.S. EPA lists Pink Mucket Clams, Niangua darter, and Geocarpon Fish on the Endangered Species Protection Program Database for Osage County (EDR, 2007a).

The Chamois site would not be expected to have fewer rare, threatened, or endangered species than the Callaway site.

Because this area is a floodplain, a new levee would need to be constructed on the south bank of the Missouri River. The levee would necessarily alter the ecology of the river bank. The conversion from a surface water intake to a submerged collector well system would improve the aquatic ecology since the potential for fish impingement and entrainment would be eliminated.

Because the site is already being used for power generation and construction Best Management Practices would be followed, the construction impacts of a plant conversion project on the aquatic ecology would be SMALL and temporary. These potential impacts would primarily be related to runoff and siltation. The thermal impact that would result from cooling water discharge to the Missouri River is similar to that for the proposed site and would likely be SMALL due to permit restrictions and mitigation implementation. Because of the levee construction, however, the overall impacts to the aquatic ecology would be MODERATE.

#### 9.3.2.1.6 Socioeconomics

Osage County is a relatively sparsely populated area. Demographic and population characteristics for the site vicinity, a 50-mile (80 km) radius from the site, are presented in Table 9.3-1. Other socioeconomic facts related to Osage County are as follows:

- ◆ The county has experienced a 3.3% population increase since the 2000 census (USCB, 2008a).

- ◆ Median household income within a 50 mile (80 km) radius was \$50,661 per year in 2000 (MCDC, 2000a).
- ◆ 7.7% of the county's population within a 50 mile (80 km) radius lived below the poverty level in 2000 (MCDC, 2000a).
- ◆ The nearest large city is Jefferson City, Missouri.
- ◆ The mean value of owner-occupied housing units was \$135,237 in the year 2000 (MCDC, 2000a).
- ◆ There were 1,048 firms doing business in the county in 2002 (USCB, 2008a).

SECPOP was used to determine the population surrounding the Chamois site. The cumulative population within 10 miles (16 km) of the Chamois site is 4,239. The cumulative population within 50 miles (80 km) of the Chamois site is 505,389.

There is housing in Osage County to accommodate the workers at the proposed plant. Apartment complexes in Osage County include the John H Stratman Apartments and the Linn Court Apartments (YellowPages, 2009c).

Hotels in Osage County include the Westphalia Inn (YellowPages, 2009h).

Public schools in Osage County are divided into three school districts. The Osage Co. R-I school district is comprised of two schools. Osage County Elementary houses kindergarten through grade 6. The school has approximately 17 certificated staff members and 112 enrolled students. Chamois High houses grades 7 through 12. The school has approximately 20 certificated staff members and 117 enrolled students (DESE, 2009a). The Osage Co. R-II school district is comprised of two schools. Osage County Elementary houses pre-kindergarten through grade 6. The school has approximately 31 certificated staff members and 320 enrolled students. Linn High houses grades 7 through 12. The school has approximately 35 certificated staff members and 338 enrolled students (DESE, 2009b). The Osage Co. R-III school district is comprised of two schools. Fatima Elementary houses kindergarten through grade 6. The school has approximately 35 certificated staff members and 291 enrolled students. Fatima High houses grades 7 through 12. The school has approximately 44 certificated staff members and 441 enrolled students (DESE, 2009c).

The Osage County Sheriff's office is located in Linn, Missouri, approximately 15 miles (24 km) from the Chamois site. Also located in the city of Linn is the Linn Police Department, located approximately 15 miles (24 km) from the Chamois site (MOVA, 2009). The Belle Police Department is located in Belle, Missouri and serves the City of Belle, Osage County, and Maries County (USACops, 2009). The Belle Police Department is located approximately 27 miles (44 km) from the Chamois site. There are two fire departments located in Osage County. The Belle Fire Department is located in the city of Belle, Missouri, and serves both Osage and Maries Counties. The Belle Fire Department is located approximately 27 miles (44 km) from the Chamois site. The Linn Fire Department is located in Linn, Missouri, approximately 15 miles (24 km) from the Chamois site and serves Osage County (USAFR, 2009).

The Chamois Generating Station site is currently being used for power generation, and it is expected that the shift from coal to nuclear power would not initiate any substantial shifts in population or real estate; therefore, the effect of the proposed new facility on the population and demographics of Osage County, Missouri, is expected to be SMALL. Equitable

accommodation would need to be made for employees of the Chamois Generating Station whose jobs would be lost. Assuming that this can be accomplished, the effect of this new facility on socioeconomics would be SMALL.

### 9.3.2.1.7 Transportation

The site is located near the small town of Chamois, Osage County, in a relatively undeveloped rural area of Missouri. The site vicinity is characterized by an existing coal generating plant, transmission and rail corridors, agricultural land, state highways, and local and county roads. The Chamois candidate site is located approximately 100 miles (160 km) west of the City of St. Louis, Missouri, on State Highway 100, approximately 0.5 miles (0.8 km) east of its intersection with State Highway 89. Interstate Highway 70 is located approximately 10 miles (16 km) north of the site; however, it is greater than 20 miles (32 km) driving distance due to the distance to the nearest Missouri River bridge crossing. The nearest bridge that traverses the Missouri River is located on State Highway 19 approximately 20 miles (32 km) east of the site in Hermann, Missouri.

Significant traffic increases on the local State Highways 100, 89, and 19, which are rural two-lane highways, would be noticeable during peak construction periods. The greatest periods of traffic impact would be during shift changes. Impact on area transportation resources would generally decrease with increased distance from the site as varied routes are taken by individual vehicles. Additionally, the use of shared (e.g., carpooling) and multi-person transport (e.g., buses) during construction and/or operation of the facility would be encouraged.

A description of estimated traffic volumes and impacts associated with the proposed project is included in Section 4.4.1.5. There could be a maximum of an estimated peak of 1,450 vehicles per hour. Heavy vehicle shipments and construction traffic will make up most of the traffic, assuming a peak construction workforce of about 3,950 workers (calculated at 1.3 drivers per vehicle). Staggering the shifts of various workers and increasing the amount of entrances are steps that could be taken to mitigate traffic congestion around the plant site. Impacts on local roads from the construction workforce would be temporary and would likely end after the construction was finished. However, a new operation workforce of some 850 individuals would present a continuing impact to the roads.

Additionally, construction truck traffic could exceed 100,000 truck trips over the 6-year period of construction. Rail service could pick up much of the burden, resulting in increased rail traffic, impact at railroad crossings, and noise. These impacts would be generally the same at all locations. Highway access to the Chamois site is limited to two lane roads. By implementing the appropriate measures, it is expected that there would be SMALL to MODERATE impacts on transportation during construction activities and a SMALL impact during operation of the facility.

### 9.3.2.1.8 Historic, Cultural, and Archeological Resources

The National Register of Historic Places (NRHP) is the official list of districts, sites, buildings, structures and objects significant in American history, architecture, archaeology, engineering, and culture. The National Register includes:

- ◆ All prehistoric units of the National Park System;
- ◆ National Historic Landmarks, which are properties recognized by the Secretary of the Interior as possessing national significance; and

- ◆ Properties significant in American, state, or local prehistory and history that have been nominated by State Historic Preservation Officers, federal agencies, and others, and have been approved for listing by the National Park Service.

The MDNR maintains a list of Missouri Historic Sites listed in the National Register of Historic Places in Missouri. A search of the most current versions available of the National Register of Historic Places and the Missouri Historic Sites list resulted in two known archaeological, National Register of Historic Places, State Historic Places or other historical resources located at the Chamois site, in the immediate vicinity, or within a 1 mile (1.6 km) radius of the site (EDR, 2007a). Townley Alvah Washington Farmstead Historic District is located in the town of Chamois. The district is situated on the corner of Third and Market Streets and is an example of a rural farmstead in an urban environment. The district includes an "I" house, smokehouse, barn, storage shed, and tool and machine shed. The "I" house was a common farmhouse style during the mid-nineteenth century that consisted of a central passage flanked by rooms on either side.

Chamois Public School is located at 402 South Main Street and was listed on the NRHP in 2003. The building is significant for its contributions to the public education system in Osage County during the last half of the nineteenth century. The building is a two story red brick building and is the only historic public school building extant in Osage County. Historic, cultural, and archaeological mitigation measures designed to protect these resources would be implemented during the construction phase.

The United States Geologic Survey (USGS) maintains a map that portrays Native American administered lands of the United States that have an area equal to or greater than 640 acres (259 hectares). A review of the most recent edition of the USGS map resulted in no known Native American administered lands over 640 acres (259 hectares) on the Chamois site or within a one mile (1.6 km) radius (EDR, 2007a).

It is assumed that no impacts to these potential resources would occur during construction or operation of a nuclear facility at this site. Therefore, the potential impacts would be classified as SMALL.

#### 9.3.2.1.9 Environmental Justice

Table 9.3-1 presents demographic information for a 50-mile (80 km) radius surrounding the site, the state of Missouri, and the U.S. These data demonstrate that the racial mix of the population of this area has a lesser percent population of minority races than the state of Missouri and the U.S. as a whole. The Chamois site is located in a largely rural area, and the likelihood of minority communities being disproportionately and/or adversely affected by this plant is low. There are 46,504 poor persons located within 50 miles (80 km) of the site. This is approximately 7.7% of the population in the area (MCD, 2000a). Furthermore, this site has been operating as a power generating facility for many years. Therefore, it is anticipated that environmental justice impacts at this site would be SMALL.

Additionally, the locations of low income and minority populations within a 50 mile (80 km) radius were compared with the locations of highways to determine if these populations live disproportionately close to roads and who may be disproportionately affected by the proposed plant. Figure 9.3-36 portrays the locations of low income populations relative to the locations of highways. While this figure shows that there are low income populations located near highways and major roads, these populations are not located near the Chamois site and will thus not be disproportionately affected. Figure 9.3-31 portrays the locations of minority populations relative to the locations of highways. While this figure shows that there are

minority populations located near highways and major roads, these populations are not located near the Chamois site and will thus not be disproportionately affected.

Osage County has approximately 1,100 people enrolled for MO HealthNet services, a service provided by the Missouri Department of Social Services. This is approximately 8 percent of the total population of Osage County (USCB, 2000b). In fiscal year 2008, approximately \$8.5 million was spent providing these services (DSS, 2009b). The unemployment rate in Osage county was 4.69% in 2005, with 9.0% of the county below the poverty level in 2004 (DSS, 2009). There are many other resources available in Osage County around the Chamois site to assist low-income and minority persons. One such resource is the Central Missouri Food Bank. This food bank serves 32 counties, including Osage County. They provide food to those who are unable to provide for themselves (DSS, 2006a). A second resource serving Osage County is the Salvation Army. While not located in Osage County, the Salvation Army has many locations in nearby Cole County. The Salvation Army provides service such as emergency financial assistance, food & nutrition programs (food banks), emergency shelter, school, and youth services, among others (Salvation Army, 2009). Other resources include Head Start (a preschool for disadvantaged children), Osage County Family Services offices, and the Osage County Health Department (MERIC, 2008). No evidence of subsistence fishing or hunting by either minority or low income residents occurs around the Chamois site, as discussed for the Callaway site in Section 2.5.4.3.

#### **9.3.2.1.10 Transmission Corridors**

The site has been in use for electrical generation for many years. Figure 9.3-17 depicts the transmission plan for the Chamois candidate site. This site is adjacent to the existing Callaway-Bland transmission right-of-way. It is assumed that the existing Callaway-Bland 345 kV lines would be split at the new 345 kV switchyard to provide two outlet circuits to the north and two outlet circuits to the south. Although it will be necessary to build new infrastructure to accommodate the new output for the plant, it is anticipated that existing corridors would be sufficient to accommodate construction. A new 1-mile (1.6 km) line extension would be required from the new switchyard to the existing Callaway-Loose Creek 345 kV line. A rough cost of \$800,000 is assumed for the new line extension. The plant site is developed and the surrounding corridors are traversing predominantly agricultural land. In addition, the current transmission system could be used with limited or no modifications. It is anticipated that the impacts due to transmission corridors would be SMALL.

#### **9.3.2.2 Fred Weber Quarry Brownfield Site**

The second brownfield site chosen for analysis is the Fred Weber Quarry brownfield site. The approximately 262 acre (106 hectares) site is located in the northwest corner of the intersection of State Highway 61 and County Road B in northern Lincoln County, Missouri. The candidate site is located in northeast Missouri at latitude 39 degrees, 08 minutes, and 09 seconds north and longitude 90 degrees, 57 minutes, and 33 seconds west. Figure 9.3-9 and Figure 9.3-10 identify the Fred Weber Quarry candidate site location and plant layout on geographic and USGS topography maps, respectively. The candidate site is located on an inactive limestone quarry owned by Fred Weber, Inc. (EDR, 2007c).

For the purposes of this alternative siting analysis, it was assumed that the existing rock quarry operation would be closed and replaced with a generating facility similar to the proposed Callaway Plant Unit 2 reactor and would be sited within the existing property boundaries. It was assumed the proposed nuclear plant site would occupy at least 500 acres (202 hectares), the minimum area that would provide a regulatory required 0.5-mile (0.8 km) radius exclusion zone.

### 9.3.2.2.1 Land Use

The Fred Weber Quarry site is located in an area of mixed residential, commercial, and agricultural land use. The site is situated approximately 0.25-mile (0.4 km) east of the small town of Auburn, Missouri. The site is bounded to the north and east by residential and agriculturally developed land. A triangular strip of commercially developed land with State Highway 61 beyond it lies to the west, and County Road B bounds the site to the south with more residential and agricultural land across the county road to the south. A minimum of approximately 248 acres (100 hectares) of additional land would need to be purchased for the operation of a new nuclear plant at this site.

Approximately 600 acres (243 hectares) of National Wetlands Inventory (NWI) wetlands are contained entirely within a 5 mile (8 km) radius of the Fred Weber site.

The U. S. Department of Agriculture - Natural Resource Conservation Service (NRCS) has mapped the soil in Lincoln County and although most of the soil at the site has been removed for rock quarrying, approximately half of the site is classified as "Farmland of Statewide Importance" and the other half as "Prime Farmland" (NRCS, 2006c). Approximately 32 acres (13 hectares) of the Fred Weber site has been classified as prime farmland. Of this, approximately 58 percent (19 acres (8 hectares)) will be impacted by the proposed plant. Approximately 16 percent of the land within a 5 mile (8 km) radius surrounding the Fred Weber site has been classified as prime farmland, with approximately 0.04 percent of this to be disturbed with the proposed plant. Figure 9.3-22 shows farmland on the Fred Weber site. Approximately 1.7 acres (0.7 hectares) of the Fred Weber site is National Wetlands Inventory (NWI) wetland. Of this, approximately 71 percent (1.2 acres (0.5 hectares)) will be impacted by the proposed plant. Figure 9.3-27 shows NWI wetlands on the Fred Weber site. There are no state zoning, land use, or farmland preservation plans, regulations, or county or local zoning ordinances that would restrict the development or use of the Fred Weber Quarry site as a power plant.

Agricultural land along with several small businesses and residences would have to be cleared and the quarry operation would need to be replaced to make way for the power plant. Due to the necessity to change the land use of the site and surrounding areas to accommodate the new nuclear site, the impact on land use in this area would be MODERATE.

### 9.3.2.2.2 Air Quality

Lincoln County's status for all National Ambient Air Quality Standards (NAAQS) regulated air quality pollutants is designated in-attainment (MDNR, 2007b). Construction activities may result in increased air emissions. Fugitive dust and fine particulate matter may be generated during earth moving and material handling activities. Vehicles and engine-driven equipment (e.g. generators and compressors) will generate combustion product emissions such as carbon monoxide, oxides of nitrogen, and, to a lesser extent, sulfur dioxides. Painting, coating, and similar operations will also generate emissions from the use of volatile organic compounds.

Emission-specific strategies, plans, and measures will be developed and implemented to limit and mitigate releases, ensuring compliance within the applicable regulatory limits. These limits are defined by the primary and secondary National Ambient Air Quality Standards in 40 CFR 50 (USEPA, 2007a) and the National Emission Standards for Hazardous Air Pollutants in 40 CFR 61 (USEPA, 2007b). Air quality and release permits and operating certificates will be secured where required.

Based on the design of the new reactor and the actions that will be taken to comply with permit requirements for emissions, it is expected that siting the unit at this location would have

a SMALL temporary impact on air quality during construction. Additionally, it is expected that siting the unit at this location would have a SMALL impact on air quality during operations.

### 9.3.2.2.3 Water

The Missouri State Water Resources Plan attempts to identify water use problems and opportunities related to drinking water, agriculture, industrial, recreational and environmental needs. The Fred Weber Quarry candidate site is located in the northeastern region of the state in an area identified as having relatively limited surface water and very limited groundwater resources and, as a result, water use is a concern during drought conditions. There are also concerns with water quality and resource protection. These concerns include surface water and groundwater protection from both point and non-point sources, including municipal, industrial, sewer, septic tanks, and agricultural related potential contaminant sources (MDNR, 1995).

It was assumed that the water use for the construction and operation of a nuclear plant at the Fred Weber Quarry site would be similar to the water use at the proposed site, as described in Section 2.3.2. The consumptive and non-consumptive water uses are identified, and water diversions, withdrawals, consumption, and returns are quantified.

The planned Callaway Plant Unit 2 cooling water system requirements were used to compare potential impacts to water resources at the Fred Weber Quarry site. It is assumed that the water needs would be obtained from a Mississippi River/Mississippi Alluvial Aquifer by a collector well system similar to the one described in Section 9.3.2.1.3 above, and a cooling water system similar to the Callaway Plant Unit 2 system would be used at the Fred Weber Quarry site. The site is located approximately 12 miles (19.3 km) west of the Mississippi River. A cooling water intake and return system would have to be constructed to supply cooling water for the plant. The impacts associated with the construction of an approximately 12 mile (19.3 km) cooling water conveyance system are expected to be LARGE during construction and SMALL during operation.

Due to the ample supply of surface water resources of the Mississippi River, the current rural nature of the area, and resultant relatively low usage of these resources, impacts to water resources at the site from the construction and operation of the new reactor unit are anticipated to be SMALL.

### 9.3.2.2.4 Terrestrial Ecology and Sensitive Species

The Fred Weber Quarry site is located in Missouri's Central Dissected Till Plains Section which covers all of Missouri north of the Missouri River and extends into southern Iowa and small portions of Kansas and Nebraska. Due to differences in landform, geology (including till and loess), soils, and vegetation, there are nineteen ecological subsections, with nine located in Missouri's Central Dissected Till Plains Ecological Section. The Fred Weber Quarry candidate site is located in the Mississippi River Hills Subsection. This area consists of a broad belt of hills, valleys, and bluff lands along the Mississippi River from the North River southward to the Missouri River in northeastern Missouri.

The Fred Weber Quarry site is located in the center of the Mississippi River Hills Ecological Subsection which was historically dominated by timberlands consisting of oak savannas and open-oak woodlands with occasional glade and prairie openings occurring on flatter uplands. Today some of the oldest and most productive timberland is located in this region along with fescue pasture and cropland along the alluvial plains (MDC, 2002).

The U.S. Fish and Wildlife Service National Wetlands Inventory Mokane East Map identifies 7 palustrine wetland mapped units on the site, and 22 more palustrine mapped wetland units within a 1-mile (1.6 km) radius of the approximate center of site. Measures and controls that would be implemented to mitigate potential impacts to wetlands are similar to those described in Section 4.6. There are no Special State Concern wetlands, Federally designated Wilderness Areas, Wildlife Preserves, Sanctuaries, Refugees, National Forests, agricultural preservation lands, or forest legacy lands known to be in the site vicinity (EDR, 2007c).

No known state or federally listed species or sensitive habitats are known to be located in the immediate vicinity of the site. The Mississippi River Hills Subsection contains 116 records of 53 state-listed rare or endangered species. Three of the state-listed species are found only in this subsection, including a cave-dwelling pseudoscorpion and a moss.

The Fred Weber Quarry site would not be expected to have fewer rare, threatened, or endangered species than the Callaway site.

The U.S. EPA lists four federally listed species on the Endangered Species Protection Program Database for Lincoln County: the Indiana and gray bats, the Bald Eagle, and one plant species, the eastern prairie fringed orchid. Because the new nuclear plant would replace the existing rock quarry and the additional several hundred acres needed for the siting of the proposed nuclear plant is already developed commercially, residentially, or agriculturally, little or no additional pristine wildlife habitat area would need to be cleared and developed. The impacts to the terrestrial ecosystem at the site would therefore be SMALL and would occur predominantly during the construction of the plant. Construction Best Management Practices would be followed to minimize these impacts.

#### 9.3.2.2.5 Aquatic Ecology and Sensitive Species

No known state or federally listed aquatic species occur at the site; however, the U.S. EPA lists scaleshell, and Curtis' pearly mussels, pink mucket clams, and pallid sturgeon fish on the Endangered Species Protection Program Database for Lincoln County (EDR, 2007c). An exceptionally high number of state-listed species are associated with the streams of this ecological region (MDC, 2002).

The Fred Weber Quarry site would not be expected to have fewer rare, threatened, or endangered species than the Callaway site.

Because the majority of the site is already developed as a rock quarry, the rest is developed residentially and agriculturally, and construction Best Management Practices would be followed, the impacts of plant construction on the aquatic ecology would be SMALL and temporary. These potential impacts would primarily be related to runoff and siltation. The impacts of operation including the thermal impact that would result from cooling water discharge to the Mississippi River is similar to that for the proposed site and would likely be SMALL due to permit restrictions and mitigation requirements.

#### 9.3.2.2.6 Socioeconomics

Lincoln County is a moderately populated area that borders the densely populated St. Louis metropolitan area. Demographic and population characteristics for the site vicinity, a 50-mile (80 km) radius from the site are presented in Table 9.3-2. Other socioeconomic facts related to Lincoln County are as follows:

- ◆ The county has experienced a 28.7% population increase since the 2000 census (USCB, 2008b).
- ◆ Median household income within a 50 mile (80 km) radius was \$45,650 per year in 2000 (MCDC, 2000c).
- ◆ 8.5% of the county's population within a 50 mile radius lived below the poverty level in 2000 (MCDC, 2000c).
- ◆ The nearest large city is O'Fallon, Missouri.
- ◆ The mean value of owner-occupied housing units was \$98,062 in 2000 (MCDC, 2000c).
- ◆ There were 3,042 firms doing business in the county in 2002 (USCB, 2008b).

SECPOP was used to determine the population surrounding the Fred Weber site. The cumulative population within 10 miles (16 km) of the Fred Weber site is 13,249. The cumulative population within 50 miles (80 km) of the Fred Weber site is 1,054,107.

There is housing in Lincoln County to accommodate the workers at the proposed plant. Apartment complexes in Lincoln County include Bristol Manor of Elsberry, Winfield Properties, Troy Manor LLC, Stone Creek Apartments, Gateway Villa, and Pin Oak Grove Apartments (YellowPages, 2009b).

Hotels in Lincoln County include the Super 8 Motel and the Comfort Inn (YellowPages, 2009g).

Public schools in Lincoln County are divided into four school districts. The Elsberry R-II school district is comprised of three schools. Clarence Cannon Elementary houses pre-kindergarten through grade 4. The school has approximately 32 certificated staff members and 359 enrolled students. Ida Cannon Middle houses grades 5 through 8. The school has approximately 32 certificated staff members and 231 enrolled students. Elsberry High houses grades 9 through 12. The school has approximately 29 certificated staff members and 283 enrolled students (DESE, 2009). The Silex R-I school district is comprised of two schools. Silex Elementary houses kindergarten through grade 6. The school has approximately 21 certificated staff and 153 enrolled students. Silex High houses grades 7 through 12. The school has approximately 22 certificated staff and 210 enrolled students (DESE, 2009d). The Troy R-III school district is comprised of nine schools. Main Street Elementary houses kindergarten through grade 4. The school has approximately 47 certificated staff members and 701 enrolled students. Lincoln Elementary houses kindergarten through grade 4. The school has approximately 34 certificated staff members and 492 enrolled students. Claude Brown Intermediate houses grades 5 and 6. The school has approximately 54 certificated staff members and 820 enrolled students. William R. Cappel Elementary houses kindergarten through grade 5. The school has approximately 34 certificated staff members and 495 enrolled students. Boone Elementary houses kindergarten through grade 4. The school has approximately 33 certificated staff members and 500 enrolled students. Hawk Point Elementary houses kindergarten through grade 4. The school has approximately 11 certificated staff members and 119 enrolled students. Troy Middle houses grades 7 and 8. The school has approximately 62 certificated staff members and 912 enrolled students. The Ninth Grade Center houses grade 9. Troy Buchanan High houses grades 10 through 12. The school has approximately 111 certificated staff members and 1909 enrolled students (DESE, 2009e). The Winfield R-IV school district is comprised of four schools. Winfield Elementary houses kindergarten through grade 2. The school has approximately 33 certificated staff members and 343 enrolled students. Winfield

Intermediate houses grades 3 through 5. The school has approximately 29 certificated staff members and 373 students. Winfield Middle houses grades 6 through 8. The school has approximately 34 certificated staff members and 360 enrolled students. Winfield High houses grades 9 through 12. The school has approximately 43 certificated staff members and 551 enrolled students (DESE, 2009f).

The Lincoln County Sheriff's office is located in Troy, Missouri, approximately 12 miles (19 km) from the Fred Weber site. Also located in Lincoln County are the Elsberry Police Department (approximately 9 miles (14.5 km) from the site), the Foley Police Department (approximately 13 miles (21 km) from the site), the Moscow Mills Police Department (approximately 13 miles (21 km) from the site), the Old Monroe Police Department (approximately 18 miles (29 km) from the site), the Silex Police Department (approximately 6 miles (9.5 km) from the site), the Hawk Point Police Department (approximately 13 miles (21 km) from the site), the Troy Police Department (approximately 11.5 miles (18.5 km) from the site), and the Winfield Police Department (approximately 15 miles (24 km) from the site) (MOVA, 2009a). The Elsberry Fire Department is located in Elsberry, Missouri, approximately 9 miles (14.5 km) from the site (USAFR, 2009a).

The Fred Weber Quarry site is currently being used as a rock quarry, and it is expected that the shift from the quarry operation to a nuclear power plant would contribute to the already significant population growth rate; therefore, the effect of the proposed new facility on the population and demographics of Lincoln County, Missouri, is expected to be SMALL.

#### **9.3.2.2.7 Transportation**

The site is located within 1 mile (1.6 km) of the small town of Auburn and just over 4 miles (6.4 km) from the town of Silex, Missouri, in a relatively undeveloped rural area of northern Lincoln County, Missouri. The site vicinity is characterized by an existing rock quarry; residential, commercial, and agricultural land; state highways; county roads; and railroad tracks. The project site is located approximately 30 miles (48 km) north of the St. Louis Metropolitan Area, Missouri, on State Highway 61 in the northwest corner of its intersection with County Road B. Interstate Highway 70 is located approximately 20 miles (32 km) south of the site. Some noticeable traffic increases from the construction workforce on the local State Highway 61, a primary divided highway, and State Highway 47, an arterial undivided road, may be noticeable during peak construction periods. The greatest periods of traffic impact will be during shift changes. Impact on area transportation resources will generally decrease with increased distance from the site as varied routes are taken by individual vehicles.

A description of estimated traffic volumes and impacts associated with the proposed project is included in Section 4.4.1.5. Impacts on local roads from the construction workforce would be temporary and would likely end after construction was finished. However, a new operations workforce of some 850 individuals would present a continuing impact to the roads. It is expected that there would be MODERATE to LARGE impacts on transportation during construction activities and SMALL impacts during operation of the facility.

#### **9.3.2.2.8 Historic, Cultural, and Archeological Resources**

No known archaeological or National Register of Historic Places, State Historic Places or other historical resources are located in the immediate vicinity or within a 1-mile (1.6 km) radius of the site. There are no Indian Reservations located within one mile (1.6 km) radius of the site (EDR, 2007c). It is assumed that no impacts to these resources would occur during construction or operation of a nuclear facility at this site. Therefore, the impacts would be classified as SMALL.

### 9.3.2.2.9 Environmental Justice

Table 9.3-2 presents demographic information for a 50-mile (80 km) radius surrounding the Fred Weber Quarry site, Missouri, and the U.S. These data demonstrate that the population of this area is dissimilar in composition to the State of Missouri and to the U.S. as a whole. The percentage of this population that is comprised of racial minorities is less than that in the surrounding state of Missouri or in the U.S. The Fred Weber Quarry site is located in a largely rural area, and the likelihood of minority communities being disproportionately and adversely affected by this plant is low. There are 94,961 low income persons within 50 miles (80 km) of the site. This accounts for approximately 8.5% of the population in the area (MCDC, 2000c). Furthermore, this site has been operating as a commercial stone quarry facility for a number of years. Therefore, it is anticipated that environmental justice impacts at this site would be SMALL.

Additionally, the locations of low income and minority populations within a 50 mile (80 km) radius were compared with the locations of highways to determine if these populations live disproportionately close to roads and who may be disproportionately affected by the proposed plant. Figure 9.3-37 portrays the locations of low income populations relative to the locations of highways. While this figure shows that there are low income populations located near highways and major roads, these populations are not located near the Fred Weber site and will thus not be disproportionately affected. Figure 9.3-32 portrays the locations of minority populations relative to the locations of highways. While this figure shows that there are minority populations located near highways and major roads, these populations are not located near the Fred Weber site and will thus not be disproportionately affected.

Lincoln County has approximately 6,200 people enrolled for MO HealthNet services, a service provided by the Missouri Department of Social Services. This is approximately 12 percent of the total population of Lincoln County (USCB, 2000b). In fiscal year 2008, approximately \$38 million was spent providing these services (DSS, 2009a). The unemployment rate in Lincoln County was 5.15% in 2005, with 9.8% of the county population below the poverty level in 2004 (DSS, 2009). There are many other resources available in Lincoln County around the Fred Weber Quarry site to assist low-income and minority persons. One such resource is the St. Louis Area Foodbank Service. This Foodbank serves 13 counties, including Lincoln County. They provide food to those who are unable to provide for themselves (DSS, 2006). A second resource serving Lincoln County is the Salvation Army. While not located in Lincoln County, the Salvation Army has many locations in nearby St. Charles County. The Salvation Army provides services such as emergency financial services, emergency shelter, domestic violence services, school, alcohol and drug treatment, and clothing, among others (Salvation Army, 2009). Other resources include the Lincoln County Cupboard (a food bank), the WIC office Elsberry, the Lincoln County Family Services office, Headstart Youth in Need (a preschool for disadvantaged children), a family planning clinic, and the NECAC Agency (social services and welfare) (MERIC, 2008). No evidence of subsistence fishing or hunting by either minority or low income residents occurs around the Fred Weber site, as there is no hunting permitted nearby and the river is at some distance. The collector wells will not permanently impact any usage of the River.

### 9.3.2.2.10 Transmission Corridors

Figure 9.3-18 depicts the preliminary transmission plan for the Fred Weber Quarry candidate site. This site in northern Lincoln County, Missouri, is not close to any existing 345 kV lines. It is assumed that two 42-mile 345 kV lines would be required to connect the new switchyard to the Sioux 345/138 kV Substation and two 30-mile 345 kV lines would be required to connect to the Montgomery 345/161 kV Substation. The new lines to the Sioux substation could follow a portion of the AmerenUE-owned Troy-Cyrene section of the Troy-Pike 161 kV line or the

Sioux-Belleau section of the Sioux-Montgomery 345 kV right-of-way. New 345 kV line extensions would total 144 miles (232 km) at an estimated cost of \$115.2 million. The site has been in use as a stone quarry for many years. It will be necessary to build new infrastructure to accommodate the new output for the plant. The plant site is developed and the surrounding corridors are predominantly agricultural land. In addition, the current transmission system could be used with few or no modifications. It is anticipated that the impacts due to transmission corridors would be LARGE.

### 9.3.2.3 Lamine Greenfield Site

The first of two greenfield candidate sites chosen for alternative site analysis is the Lamine greenfield site, located in the town of Lamine, in Cooper County, Missouri. The candidate site is located in central Missouri at latitude 38 degrees, 58 minutes, and 20 seconds north and longitude 92 degrees, 52 minutes, and 48 seconds west. Figure 9.3-11 and Figure 9.3-12 identify the Lamine candidate site and plant layout on geographic and USGS topography maps, respectively. The candidate is located on an approximately 1,300-acre (526-hectare) property.

For the purposes of this alternative siting study, it was assumed that the power plant site would occupy at least 500 acres (202 hectares), the minimum area that would provide a regulatory required 0.5 mile (0.8 km) radius exclusion zone.

#### 9.3.2.3.1 Land Use

The Lamine greenfield site is located in a sparsely populated area. The site is bounded by Arrow Rock Road to the north and Lamine Road to the south and east. Additionally, Sky View Lane (a two lane road) runs through the middle of the site in a north-south direction. The site area is identified as being approximately 1,300 acres (526 hectares), which would need to be purchased at this site. The land that would need to be acquired is currently undeveloped.

Approximately 600 acres (243 hectares) of National Wetlands Inventory (NWI) wetlands are contained entirely within a 5 mile (8 km) radius of the Fred Weber site.

The U.S. Department of Agriculture – Natural Resource Conservation Service (NRCS) has mapped the soil in Cooper County and has classified approximately half the site as “Farmland of statewide importance” and half the site as “prime farmland if drained” (NRCS, 2006f). Approximately 86 acres (35 hectares) of the Lamine site has been classified as prime farmland. Of this, approximately 46 percent (40 acres (16 hectares)) will be impacted by the proposed plant. Approximately 28 percent of the land within a 5 mile (8 km) radius surrounding the Lamine site has been classified as prime farmland, with approximately 0.08 percent of this to be disturbed with the proposed plant. Figure 9.3-23 shows farmland on the Lamine site. Approximately 76 acres (31 hectares) of the Lamine site is National Wetlands Inventory (NWI) wetland. Of this, approximately 4 percent (3 acres (1.2 hectares)) will be impacted by the proposed plant. Figure 9.3-28 shows NWI wetlands on the Lamine site. There are no state zoning, land use, farmland preservation plans, regulations, or county or local zoning ordinances that would restrict the development of use of the Lamine site as a power plant.

Due to the use of several hundred acres of greenfield land, with no need to acquire residential property or other commercial property to accommodate a new nuclear site, the impact on land use in this area would be LARGE.

#### 9.3.2.3.2 Air Quality

Cooper County’s status for all National Ambient Air Quality Standards (NAAQS) regulated air quality pollutants is designated as in-attainment (MDNR, 2007b). Construction activities may

result in increased air emissions. Fugitive dust and fine particulate matter may be generated during earth moving and material handling activities. Vehicles and engine-driven equipment (e.g. generators and compressors) will generate combustion product emissions such as carbon monoxide, oxides of nitrogen, and to a lesser extent, sulfur dioxides. Painting, coating, and similar operations will also generate emissions from the use of volatile organic compounds.

Emission-specific strategies, plans, and measures will be developed and implemented to limit and mitigate releases, ensuring compliance within the applicable regulatory limits. These limits are defined by the primary and secondary National Ambient Air Quality Standards in 40 CFR 50 (USEPA, 2007a) and the National Emission Standards for Hazardous Air Pollutants in 40 CFR 61 (USEPA, 2007b). Air quality and release permits and operating certificates will be secured where required.

Based on the design of the new reactor and the actions that will be taken to comply with permit requirements for emissions, it is expected that siting the unit at this location would have a SMALL temporary impact on air quality during construction and a SMALL impact on air quality during operation.

#### **9.3.2.3.3 Water**

The Missouri State Water Resources Plan attempts to identify water use problems and opportunities related to drinking water, agriculture, industrial, recreational, and environmental needs. The Lamine candidate site is located in west-central Missouri in an area identified as having the largest number of reservoirs and the greatest surface water storage in the state. Additionally, surface water quality in this region is generally good (MDNR, 1995).

The planned Callaway Plant Unit 2's cooling water system requirements were used to compare potential impacts to water resources at the Lamine site similar to the Callaway Site which is also located on the Missouri River. It is assumed that the water needs could be obtained from the Missouri River/Missouri River Alluvial Aquifer by a collector well system similar to the one described in Section 9.3.2.1.3, and a cooling water system similar to the Callaway Plant Unit 2 system would be used at the Lamine site. The site is located about 3 miles (4.8 km) south of the Missouri River in a largely undeveloped location. A cooling water intake and return system would have to be constructed to supply cooling water to the plant. The impacts associated with the construction of an approximately 3 mile (4.8 km) cooling water conveyance system are expected to be MODERATE during construction and SMALL during operation.

Due to the anticipated ample supply of water resources of the Missouri River/Missouri River Alluvial Aquifer, the rural nature of the area, and relatively low usage of these resources, impacts to water resources at the site from the construction and operation of a new reactor unit are anticipated to be SMALL.

#### **9.3.2.3.4 Terrestrial Ecology and Sensitive Species**

The Lamine site is located in Missouri's Ozark Highlands Section which covers most of southern Missouri and much of northern Arkansas and small parts of Illinois, Oklahoma, and Kansas. Due to differences in landform, geology (including till and loess), soils, and vegetation, there are sixteen ecological subsections, all of which occur in Missouri. The Lamine candidate site is located in the Inner Ozark Border Subsection. This area consists of dissected plains and hills with various expressions of local relief with a range of 150 ft to 300 ft (46 m to 91 m). This subsection wraps around the interior Ozarks from central Missouri to southeastern Missouri.

The Lamine site is located in the western section of the Inner Ozark Border Subsection, which was historically dominated by oak savannas, woodlands, and forests, with occasional glade and prairie openings. The density of the timber generally increased with the roughness of the land. Today the region is dominated by fescue pasture.

The U.S. Fish and Wildlife Service National Wetlands Inventory Pilot Grove North Map identifies 80 palustrine mapped wetland units within a 1-mile (1.6-km) radius of the approximate center of the site (EDR, 2008b). Measures and controls that will be implemented to mitigate potential impacts to wetlands are similar to those described in Section 4.6. There are no Special State Concern wetlands, Federally designated Wilderness Areas, Wildlife Preserves, Sanctuaries, Refuges, National Forests, agricultural preservation lands, or forest legacy lands known to be in the site vicinity (EDR, 2008b).

No known state or federally listed species or sensitive habitats are known to be located in the immediate vicinity of the site. The Inner Ozark Border Subsection contains 285 records of 100 state-listed rare or endangered species. There are 20 species whose principal distributions in Missouri are within this subsection.

The Lamine site would not be expected to have fewer rare, threatened, or endangered species than the Callaway site.

The U.S. EPA does not list any terrestrial flora or fauna species on the Endangered Species Protection Program Database for Cooper County (EDR, 2008b). Because the new nuclear plant would be located at a previously undeveloped site, much of the pristine wildlife habitat area would need to be cleared and developed. The impacts to the terrestrial ecosystem at the site would therefore be LARGE and would occur predominantly during the construction of the plant. Construction Best Management Practices would be followed to minimize these impacts.

#### 9.3.2.3.5 Aquatic Ecology and Sensitive Species

The U.S. EPA lists the Topeka shiner and the pallid sturgeon fish on the Endangered Species Program Database for Cooper County (EDR, 2008b). An exceptionally high number of state-listed species are associated with the streams of this ecological region (MDC, 2002).

The Lamine site would not be expected to have fewer rare, threatened, or endangered species than the Callaway site.

The site is expected to use a Collector Well Intake System which avoids the potential for impingement or entrainment of fish in the Missouri River. However, it is likely that development of the site may impact wetlands in the area. Therefore, the impact of plant construction on the aquatic ecology is estimated to be MODERATE during construction and SMALL during operation. The impacts of operation including the thermal impact that would result from cooling water discharge to the Missouri River is similar to that for the proposed site and would likely be SMALL due to distance from the river and compliance with permit restrictions.

#### 9.3.2.3.6 Socioeconomics

Cooper County is a moderately populated area in central Missouri. Demographic and population characteristics for the site vicinity, a 50-mile (80 km) radius from the site, are presented in Table 9.3-4. Other socioeconomic facts related to Cooper County are as follows:

- ◆ The county has experienced a 4.6% population increase since the 2000 census (USCB; 2008c)

- ◆ Median household income within a 50 mile (80 km) radius was \$37,326 per year in 2000 (MCDC, 2000b)
- ◆ 19.8% of the county's population within a 50 mile (80 km) radius lived below the poverty level in 2000 (MCDC, 2000b)
- ◆ The nearest large city is Columbia, Missouri.
- ◆ The mean value of owner-occupied housing units was \$99,497 in 2000 (MCDC, 2000b)
- ◆ There were 1,292 firms doing business in the county in 2002 (USCB, 2008c)

SECPOP was used to determine the population surrounding the Lamine site. The cumulative population within 10 miles (16 km) of the Lamine site is 1,303. The cumulative population within 50 miles (80 km) of the Lamine site is 151,242.

There is housing in Cooper County to accommodate the workers at the proposed plant. Apartment complexes in Cooper County include the Selwyn Place Apartments, Village Meadow Apartments, Boonville Estates, the Boone Village Apartments, the Liberty Court Apartments, Banner Properties, the Excelsior Village Apartments, Homestead Village, Leonard Rentals, Pheasant Run Apartments, Rankin Mill Apartments, Susquehanna Apartments, the Villas of Autumn Bend, and Katy Manor Apartments (YellowPages, 2009; YellowPages, 2009a).

Hotels in Cooper County include the Hotel Frederick, Riverview Suites, Oddfellow Lodge, Days Inn, Super 8 Motel, the Isle of Capri Casino Hotel, and Comfort Inn (YellowPages, 2009f).

Public Schools in Cooper County are divided into six school districts. The Blackwater R-II school district is comprised of one school. Blackwater Elementary houses kindergarten through grade 8. The school has approximately 19 certificated staff members and 120 enrolled students (DESE, 2009g). The Boonville R-I school district is comprised of four schools. David Barton Elementary houses grades 2 through 5. The school has approximately 39 certificated staff members and 437 enrolled students. Central Elementary houses kindergarten and grade 1. The school has approximately 23 certificated staff members and 216 enrolled students. Laura Speed Elliott Middle houses grades 6 through 8. The school has approximately 30 certificated staff members and 320 enrolled students. Boonville High houses grades 9 through 12. The school has approximately 47 certificated staff members and 617 enrolled students (DESE, 2009h). The Pilot Grove C-4 school district is comprised of three schools. Pilot Grove Elementary houses pre-kindergarten through grade 5. The school has approximately 17 certificated staff members and 125 enrolled students. Pilot Grove Middle houses grades 6 through 8. The school has approximately 15 certificated staff members and 67 enrolled students. Pilot Grove High houses grades 9 through 12. The school has approximately 20 certificated staff members and 115 enrolled students (DESE, 2009i). The Cooper County R-IV school district is comprised of two schools. Bunceton Elementary houses kindergarten through grade 6. The school has approximately 17 certificated staff members and 81 enrolled students. Bunceton High houses grades 7 through 12. The school has approximately 17 certificated staff members and 84 enrolled students (DESE, 2009j). The Otterville R-VI school district is comprised of two schools. Otterville Elementary houses kindergarten through grade 6. The school has approximately 17 certificated staff members and 118 enrolled students. Otterville High houses grades 7 through 12. The school has approximately 16 certificated staff members and 134 enrolled students (DESE, 2009k). The Prairie Home R-V school district is comprised of two schools. Prairie Home Elementary houses kindergarten through grade 6. The school has approximately 19 certificated staff members and 80 enrolled students. Prairie Home High

houses grades 7 through 12. The school has approximately 15 certificated staff members and 62 enrolled students (DESE, 2009).

The Cooper County Sheriff's Office is located in Boonville, Missouri, approximately 7 miles (11 km) from the Lamine site. Also located in Boonville is the Boonville Police Department, located approximately 7 miles (11 km) from the site. Other police departments in Cooper County include the Bunceton Police Department (approximately 13.5 miles (22 km) from the site), the Otterville Police Department (approximately 20 miles (32 km) from the site), and the Pilot Grove Police Department (approximately 7 miles (11 km) from the site) (MOVA, 2009b). Cooper County has three fire departments. These are the Boonville Fire Department (approximately 7.5 miles (12 km) from the site), the Bunceton Fire Department (approximately 13.5 miles (22 km) from the site), and the Pilot Grove Fire Department (approximately 7 miles (11 km) from the site) (USAFR, 2009b).

Cooper County, Missouri, currently has a lower population growth rate than does Callaway County (5.7%). Additionally, the 50 mile (80 km) radius around the Lamine site has a lower household income and lower value of owner-occupied housing units than does the 50 mile (80 km) radius around the Callaway site. Therefore, the effect of the proposed new facility on the population and demographics of Cooper County, Missouri, is expected to be MODERATE and BENEFICIAL due to the increases in jobs and taxes for the county.

#### **9.3.2.3.7 Transportation**

The site is located to the west of the town of Boonville, Missouri, in a relatively undeveloped rural area of Cooper County, Missouri. The site vicinity is undeveloped land. The project site is located on CC Highway at its intersection with Lamine Road. Interstate Highway 70 is located approximately 3 miles (4.8 km) south of the site. Significant traffic increases from the construction workforce on the local Highway CC, Lamine Road, Arrow Rock Road, and Cape Verde Lane will likely be noticeable during peak construction periods. These roads would have to be improved to handle the influx of construction related traffic. This would permanently change the rural nature of the immediate vicinity. The greatest periods of traffic impact will be during shift changes. Impact on area transportation resources will generally decrease with increased distance from the site as most vehicles will utilize Interstate Highway 70. Although Interstate Highway 70 offers an excellent route for most construction related traffic to within three miles of the site, access is also provided from Highway CC from the south.

A description of estimated traffic volumes and impacts associated with the proposed project is included in Section 4.4.1.5. Impacts on local roads from the construction workforce would be temporary and would end after construction was finished. However, a new operations workforce of some 850 individuals would present a continuing impact to the roads.

Because the influx of construction related vehicles will be a significant alteration to the traffic patterns of the area, it is expected that there would be MODERATE to LARGE impacts on transportation during construction activities and a MODERATE impact during operation of the facility.

#### **9.3.2.3.8 Historic, Cultural, and Archeological Resources**

No known archaeological or National Register of Historic Places, State Historic Places or other historical resources are located within a 1-mile (1.6-km) radius of the center of the site. There are no Indian Reservations located within a 1-mile (1.6-km) radius of the center of the site (EDR, 2008b). It is assumed that no impacts to these types of resources would occur during

construction or operation of a nuclear facility at this site. Therefore, the impacts would be classified as SMALL.

### 9.3.2.3.9 Environmental Justice

Table 9.3-4 presents demographic information for a 50-mile (80-km) radius surrounding the Lamine site, Cooper County, Missouri, and the U.S. These data demonstrate that the population of this area is similar in composition to the State of Missouri and dissimilar to that of the U.S. as a whole. The percentage of racial minorities is significantly lower than that in the U.S. The Lamine site is located in a largely rural area, and the likelihood of minority communities being disproportionately and adversely affected by this plant is low. However, there are 54,303 low income persons within 50 miles (80 km) of the site. This accounts for approximately 12.9% of the population of the area, which is a greater proportion than that of the alternative sites already mentioned (MCDC, 2000b). Therefore, it is possible that environmental justice impacts at this site could be MODERATE.

Additionally, the locations of low income and minority populations within a 50 mile (80 km) radius were compared with the locations of highways to determine if these populations live disproportionately close to roads and who may be disproportionately affected by the proposed plant. Figure 9.3-38 portrays the locations of low income populations relative to the locations of highways. While this figure shows that there are low income populations located near highways and major roads, these populations are not located near the Lamine site and will thus not be disproportionately affected. Figure 9.3-33 portrays the locations of minority populations relative to the locations of highways. While this figure shows that there are minority populations located near highways and major roads, these populations are not located near the Lamine site and will thus not be disproportionately affected.

Cooper County has approximately 2,000 people enrolled for MO HealthNet services, a service provided by the Missouri Department of Social Services. This is approximately 11 percent of the total population of Cooper County (USCB, 2000b). In fiscal year 2008, approximately \$15 million was spent providing these services (DSS, 2009c). The unemployment rate in Cooper County was 4.87% in 2005, with 12.2% of the county population below the poverty level in 2004 (DSS, 2009). There are many other resources available in Cooper County around the Lamine site to assist low-income and minority persons. One such resource is the Central Missouri Food Bank. This food bank serves 32 counties, including Cooper County. They provide food to those who are unable to provide for themselves (DSS, 2006a). A second resource serving Cooper County is the Salvation Army. The Salvation Army provides services such as emergency shelter, emergency food & nutrition programs, school, youth services, and worship, among others (Salvation Army, 2009).

Other resources include the Housing Authority of Boonville, Central Missouri Counties Human Development Corporation (CMCHDC provides employment training, energy assistance, family support, etc.), United Church of Christ – Ministerial Alliance, Harvest House (a transition shelter), As the River Flows Community Outreach (food pantry and clothes closet), Cooper County Health Department, Medicaid NEMT (Non-Emergency Medical Transportation), Missouri Health Care Plan (non-emergency medical transportation), Santa Fe Trail Baptist Church Food Pantry, Savvy Seconds (clothing), Birthright (pregnancy assistance, adoption services, etc.), Elks Mobile Dental Program, Central Missouri Community Action (social services and welfare, Cooper Headstart (a preschool for disadvantaged children), Family Support and Children's Division, and Theresa Open Arms (domestic abuse information & treatment) (MERIC, 2008). No evidence of subsistence fishing or hunting by either minority or low income residents has been identified around the Lamine site.

### 9.3.2.3.10 Transmission Corridors

This site in Cooper County, MO is located approximately 14 miles (22 km) west of the AmerenUE Overton 345/161 kV substation and near the existing KCPL-owned Overton-Sibley 345 kV line. However, as there are concerns with the need for transmission service charges if this KCPL-owned line would be used in the interconnection of the proposed plant (since KCPL is an SPP member and not a MISO member) it is believed that this line should not be considered in the initial transmission development to allow similar comparisons with other alternatives.

It is assumed that two new 14 mile (22 km) 345 kV lines from the Lamine plant switchyard to Overton Substation would be required for primary connection. It is suggested that at least one of these lines be on a separate right-of-way from the existing Overton-Sibley 345 kV line.

A new 44-mile (71 km) 345 kV line would be proposed to connect to the new Lamine switchyard to the existing Thomas Hill 345/161 kV Substation in Randolph County. The new transmission line could follow an existing AECl 69 kV right-of-way from Fayette north to Thomas Hill.

A new 72-mile (116 km) 345 kV line would be proposed to connect the new switchyard to a new Barnett 345/161 kV Substation north of Eldon in Miller County and to the existing Mariosa Delta 345/161 kV substation east of Jefferson City.

New 345 kV line extensions would total 144 miles (232 km) at an estimated cost of \$115.2 million. (If there are no transmission service issues with using the Overton-Sibley 345 kV line in the plant interconnection, then at least one of the two 345 kV lines to Overton 345/161 kV Substation may be deferred, resulting in a cost reduction of approximately \$11.2-22.4 million.) Thus it is anticipated that transmission corridor impacts at this site would be LARGE.

### 9.3.2.4 Paynesville Greenfield Site

The second of two greenfield candidate sites chosen for alternative site analysis is the Paynesville greenfield site, located near the town of Elsberry, in Lincoln County, Missouri. The candidate site is located in eastern Missouri at latitude 39 degrees, 11 minutes, and 46 seconds north and longitude 90 degrees, 53 minutes, and 40 seconds west. Figure 9.3-13 and Figure 9.3-14 identify the Paynesville candidate site and plant layout on geographic and USGS topography maps, respectively. The candidate site is located on an approximately 850-acre (344-hectare) property.

For the purposes of this alternative siting study, it was assumed that the proposed nuclear plant site would occupy at least 500 acres (202 hectares), the minimum area that would provide a regulatory required 0.5 mile (0.8 km) radius exclusion zone.

#### 9.3.2.4.1 Land Use

The Paynesville greenfield site is located in a sparsely populated area. The site is bounded by Highway N to the east, Highway F to the North, Richards Road to the West, and Barnes Road to the South. The site area is estimated to be approximately 850 acres (344 hectares), which would need to be purchased at this site. The land that would need to be acquired is currently undeveloped although a farm is located on the property.

Approximately 455 acres (184 hectares) of National Wetlands Inventory (NWI) wetlands are contained entirely within a 5 mile (8 km) radius of the Paynesville site.

The U.S. Department of Agriculture – Natural Resource Conservation Service (NRCS) has mapped the soil in Lincoln County and has classified approximately half of the site as “not prime farmland,” a quarter as “farmland of statewide importance,” and the remaining quarter as “all areas are prime farmland” (NRCS, 2006e). Approximately 57 acres (23 hectares) of the Paynesville site has been classified as prime farmland. Of this, 0 percent (0 acres (0 hectares)) will be impacted by the proposed plant. Approximately 19 percent of the land within a 5 mile (8 km) radius surrounding the Paynesville site has been classified as prime farmland, with 0 percent of this to be disturbed with the proposed plant. Figure 9.3-24 shows farmland on the Paynesville site. Approximately 16 acres (6 hectares) of the Paynesville site is National Wetlands Inventory (NWI) wetland. Of this, approximately 3 percent (0.5 acres (0.2 hectares)) will be impacted by the proposed plant. Figure 9.3-29 shows NWI wetlands on the Paynesville site. There are no state zoning, land use, farmland preservation plans, regulations, or county or local zoning ordinances that would restrict the development or use of the ~~Sledd~~ Paynesville site as a power plant.

Due to the use of several hundred acres of greenfield land, with no need to acquire residential property or other commercial property to accommodate a new nuclear site, the impact on land use in this area would be LARGE.

#### 9.3.2.4.2 Air Quality

Lincoln County’s status for all National Ambient Air Quality Standards (NAAQS) regulated air quality pollutants is designated as in-attainment (MDNR, 2007b). Construction activities may result in increased air emissions. Fugitive dust and fine particulate matter may be generated during earth moving and material handling activities. Vehicles and engine-driven equipment (e.g. generators and compressors) will generate combustion product emissions such as carbon monoxide, oxides of nitrogen, and to a lesser extent, sulfur dioxides. Painting, coating, and similar operations will also generate emissions from the use of volatile organic compounds.

Emission-specific strategies, plans, and measures would be developed and implemented to limit and mitigate releases, ensuring compliance within the applicable regulatory limits. These limits are defined by the primary and secondary National Ambient Air Quality Standards in 40 CFR 50 (USEPA, 2007a) and the National Emission Standards for Hazardous Air Pollutants in 40 CFR 61 (USEPA, 2007b). Air quality and release permits and operating certificates will be secured where required.

Based on the design of the new reactor and the actions that will be taken to comply with permit requirements for emissions, it is expected that siting the unit at this location would have a SMALL temporary impact on air quality during construction and a SMALL impact on air quality during operation.

#### 9.3.2.4.3 Water

The Missouri State Water Resources Plan attempts to identify water use problems and opportunities related to drinking water, agriculture, industrial, recreational, and environmental needs. The Paynesville candidate site is located in the northeastern region of the state in an area identified as having relatively limited surface water and very limited groundwater resources and, as a result, water use is a concern during drought conditions. There are also concerns with water quality and resource protection. These concerns include surface water and groundwater protection from both point and non-point sources, including municipal, industrial, sewer, septic tanks, and agricultural related potential containment sources (MDNR, 1995).

The planned Callaway Plant Unit 2's cooling water system requirements were used to compare potential impacts to water resources at the Paynesville site. It is assumed that the water needs could be obtained from a Mississippi River/Mississippi River Alluvial Aquifer by a collector well system similar to the one described in Section 9.3.2.1.3 above, and a cooling water system similar to the Callaway Plant Unit 2 system would be used at the Paynesville site. The site is located about 7.5 miles (12 km) west of the Mississippi River. A cooling water intake and return system would have to be constructed to supply cooling water to the plant. The impacts associated with the construction of an approximately 7.5 mile (12 km) cooling water conveyance system are expected to be LARGE during construction and SMALL during operation.

Due to the anticipated ample supply of water resources of the Mississippi River/Mississippi River Alluvial Aquifer, the current rural nature of the area and resultant relatively low usage of these resources, impacts to water resources at the site from the construction and operation of a new reactor unit are anticipated to be SMALL.

#### 9.3.2.4.4 Terrestrial Ecology and Sensitive Species

The Paynesville site is located in Missouri's Central Dissected Till Plains Section which covers all of Missouri north of the Missouri River and extends into southern Iowa and small portions of Kansas and Nebraska. Due to differences in landform, geology (including till and loess), soils, and vegetation, there are nineteen ecological subsections, with nine located in Missouri's Central Dissected Till Plains Ecological Section. The Paynesville candidate site is located in the Mississippi River Hills Subsection. This area consists of a broad belt of hills, valleys, and bluff lands along the Mississippi River from the North River southward to the Missouri River in northeastern Missouri.

The Paynesville site is located on the eastern edge of the Mississippi River Hills Ecological Subsection, which was historically dominated by timberlands consisting of oak savannas and open-oak woodlands with occasional glade and prairie openings occurring on flatter uplands. Today some of the oldest and most productive timberland is located in this region along with fescue pasture and cropland along the alluvial plains (MDC, 2002).

The U.S. Fish and Wildlife Service National Wetlands Inventory Auburn Map identifies fifteen palustrine mapped wetland units within a 1-mile (1.6-km) radius of the approximate center of the site. Measures and controls that will be implemented to mitigate potential impacts to wetlands are similar to those described in Section 4.6. There are no Special State Concern wetlands, Federally designated Wilderness Areas, Wildlife Preserves, Sanctuaries, Refuges, National Forests, agricultural preservation lands, or forest legacy lands known to be in the site vicinity (EDR, 2008a).

No known state or federally listed species or sensitive habitats are known to be located in the immediate vicinity of the site. The Mississippi River Hills Subsection contains 116 records of 53 state-listed rare or endangered species. Three of the state-listed species are found only in this subsection, including a cave-dwelling pseudoscorpion and a moss.

The Paynesville site would not be expected to have fewer rare, threatened, or endangered species than the Callaway site.

The U.S. EPA lists four federally listed species on the Endangered Species Protection Program Database for Lincoln County: the Indiana and gray bats, the Bald Eagle, and one plant species, the eastern prairie fringed orchid. Because the nuclear power plant would be located at a previously undeveloped site, much of the pristine wildlife habitat area would need to be

cleared and developed. The impacts to the terrestrial ecosystem at the site would therefore be LARGE and would occur predominantly during the construction of the plant. Construction Best Management Practices would be followed to minimize these impacts.

#### 9.3.2.4.5 Aquatic Ecology and Sensitive Species

The U.S. EPA lists scaleshell, Curtis' pearly mussels, pink mucket clams, and pallid sturgeon fish on the Endangered Species Protection Program Database for Lincoln County (EDR, 2008a). An exceptionally high number of state-listed species are associated with the streams of this ecological region (MDC, 2002).

The Paynesville site would not be expected to have fewer rare, threatened, or endangered species than the Callaway site.

The site is expected to use a Collector Well Intake System which avoids the potential for impingement or entrainment of fish in the Mississippi River. However, it is likely that development of the site may impact wetlands in the area. Therefore, the impact of plant construction on the aquatic ecology is estimated to be MODERATE during construction and SMALL during operation. The impacts of operation including the thermal impact that would result from cooling water discharge to the Mississippi River is similar to that for the proposed site and would likely be SMALL due to distance from the river and compliance with permit restrictions.

#### 9.3.2.4.6 Socioeconomics

Lincoln County is a moderately populated area that borders the densely populated St. Louis metropolitan area. Demographic and population characteristics for the site vicinity, a 50-mile (80 km) radius from the site, are presented in Table 9.3-5. Other socioeconomic facts related to Lincoln County are as follows:

- ◆ The county has experienced a 28.7% population increase since the 2000 census (USCB, 2008b).
- ◆ Median household income within a 50 mile (80 km) radius was \$53,601 per year in 2000 (MCDC, 2000e).
- ◆ 8.1% of the county's population within a 50 mile (80 km) radius lived below the poverty level in 2000 (MCDC, 2000e).
- ◆ The nearest large city is O'Fallon, Missouri.
- ◆ The mean value of owner-occupied housing units was \$149,102 in 2000 (MCDC, 2000e).
- ◆ There were 3,042 firms doing business in the county in 2002 (USCB, 2008b).

SECPOP was used to determine the population surrounding the Paynesville site. The cumulative population within 10 miles (16 km) of the Paynesville site is 8,614. The cumulative population within 50 miles (80 km) of the Paynesville site is 1,435,204.

There is housing in Lincoln County to accommodate the workers at the proposed plant. Apartment complexes in Lincoln County include Bristol Manor of Elsberry, Winfield Properties, Troy Manor LLC, Stone Creek Apartments, Gateway Villa, and Pin Oak Grove Apartments (YellowPages, 2009b).

Hotels in Lincoln County include the Super 8 Motel and the Comfort Inn (YellowPages, 2009g)

Public schools in Lincoln County are divided into four school districts. The Elsberry R-II school district is comprised of three schools. Clarence Cannon Elementary houses pre-kindergarten through grade 4. The school has approximately 32 certificated staff members and 359 enrolled students. Ida Cannon Middle houses grades 5 through 8. The school has approximately 32 certificated staff members and 231 enrolled students. Elsberry High houses grades 9 through 12. The school has approximately 29 certificated staff members and 283 enrolled students (DESE, 2009). The Silex R-I school district is comprised of two schools. Silex Elementary houses kindergarten through grade 6. The school has approximately 21 certificated staff and 153 enrolled students. Silex High houses grades 7 through 12. The school has approximately 22 certificated staff and 210 enrolled students (DESE, 2009d). The Troy R-III school district is comprised of nine schools. Main Street Elementary houses kindergarten through grade 4. The school has approximately 47 certificated staff members and 701 enrolled students. Lincoln Elementary houses kindergarten through grade 4. The school has approximately 34 certificated staff members and 492 enrolled students. Claude Brown Intermediate houses grades 5 and 6. The school has approximately 54 certificated staff members and 820 enrolled students. William R. Cappel Elementary houses kindergarten through grade 5. The school has approximately 34 certificated staff members and 495 enrolled students. Boone Elementary houses kindergarten through grade 4. The school has approximately 33 certificated staff members and 500 enrolled students. Hawk Point Elementary houses kindergarten through grade 4. The school has approximately 11 certificated staff members and 119 enrolled students. Troy Middle houses grades 7 and 8. The school has approximately 62 certificated staff members and 912 enrolled students. The Ninth Grade Center houses grade 9. The number of certificated staff and enrolled students at the school are unknown. Troy Buchanan High houses grades 10 through 12. The school has approximately 111 certificated staff members and 1909 enrolled students (DESE, 2009e). The Winfield R-IV school district is comprised of four schools. Winfield Elementary houses kindergarten through grade 2. The school has approximately 33 certificated staff members and 343 enrolled students. Winfield Intermediate houses grades 3 through 5. The school has approximately 29 certificated staff members and 373 students. Winfield Middle houses grades 6 through 8. The school has approximately 34 certificated staff members and 360 enrolled students. Winfield High houses grades 9 through 12. The school has approximately 43 certificated staff members and 551 enrolled students (DESE, 2009f).

The Lincoln County Sheriff's office is located in Troy, Missouri, approximately 16 miles (26 km) from the Paynesville site. Also located in Lincoln County are the Elsberry Police Department (approximately 6 miles (9.5 km) from the site), the Foley Police Department (approximately 13 miles (21 km) from the site), the Moscow Mills Police Department (approximately 17 miles (27 km) from the site), the Old Monroe Police Department (approximately 20 miles (32 km) from the site), the Silex Police Department (approximately 10 miles (16 km) from the site), the Hawk Point Police Department (approximately 20 miles (32 km) from the site), the Troy Police Department (approximately 16 miles (26 km) from the site), and the Winfield Police Department (approximately 16 miles (26 km) from the site) (MOVA, 2009a). The Elsberry Fire Department is located in Elsberry, Missouri, approximately 6 miles (9.5 km) from the site (USAFR, 2009a).

Lincoln County, Missouri, has experienced a much larger population growth rate than has Callaway County (5.7%). The median household income and the value of owner-occupied housing units in Lincoln County are greater than that in Callaway County. Due to this site's proximity to the St. Louis environs, it is expected that the region can absorb the influx of construction workers as well as the permanent workforce with ample housing within a

one-hour drive. Therefore, the effect of the proposed new facility on the population and demographics, including housing and taxes of Lincoln County, Missouri, is expected to be MODERATE and beneficial.

#### 9.3.2.4.7 Transportation

The site is located near the town of Elsberry, Missouri, in a relatively undeveloped rural area of Lincoln County, Missouri. The site vicinity is undeveloped land except for the presence of a farm. The project site is located on Richards Road at its intersection with Highway F. Interstate Highway 70 is located approximately 28 miles (45 km) south of the site. Some noticeable traffic increases from the construction workforce on the local State Route 61 and Highways F and N will be noticeable during peak construction periods. The greatest periods of traffic impact will be during shift changes. Impact on area transportation resources will generally decrease with increased distance from the site as varied routes are taken by individual vehicles. The site can be accessed from the west via State Route 61 and from the east via Highway N.

A description of estimated traffic volumes and impacts associated with the proposed project is included in Section 4.4.1.5. Impacts on local roads from the construction workforce would be temporary and would likely end after construction was finished. However, a new operations workforce of some 850 individuals would present a continuing impact to the roads. It is expected that there would be MODERATE to LARGE impacts on transportation during construction activities and a SMALL impact during operation of the facility.

#### 9.3.2.4.8 Historic, Cultural, and Archeological Resources

No known archeological or National Register of Historic Places, State Historic Places or other historical resources are located within a 1-mile (1.6-km) radius of the center of the site. There are no Indian Reservations located within a 1-mile (1.6-km) radius of the site (EDR, 2008a). It is assumed that no impacts to these resources would occur during construction or operation of a nuclear facility at this site. Therefore, the impacts would be classified as SMALL.

#### 9.3.2.4.9 Environmental Justice

Table 9.3-5 presents demographic information for a 50-mile (80-km) radius surrounding the Paynesville site, Lincoln County, Missouri, and the U.S. These data demonstrate that the population of this area is similar in composition to the State of Missouri and dissimilar to that of the U.S. as a whole. The percentage of this population that is comprised of racial minorities is similar to that in the surrounding state of Missouri and significantly lower than that of the U.S. The Paynesville site is located in a largely rural area, and the likelihood of minority communities being disproportionately and adversely affected by this plant is low. There are 101,324 low income persons within 50 miles (80 km) of the site. This accounts for approximately 8.1% of the population in the area, which is proportional to both the Chamois and Fred Weber candidate sites (MCDC, 2000e). Because the proportions of low income persons are not disproportionately larger in this area, it is anticipated that environmental justice impacts at this site would be SMALL.

Additionally, the locations of low income and minority populations within a 50 mile (80 km) radius were compared with the locations of highways to determine if these populations live disproportionately close to roads and who may be disproportionately affected by the proposed plant. Figure 9.3-39 portrays the locations of low income populations relative to the locations of highways. While this figure shows that there are low income populations located near highways and major roads, these populations are not located near the Paynesville site and will thus not be disproportionately affected. Figure 9.3-34 portrays the locations of minority populations relative to the locations of highways. While this figure shows that there are

minority populations located near highways and major roads, these populations are not located near the Paynesville site and will thus not be disproportionately affected.

Lincoln County has approximately 6,200 people enrolled for MO HealthNet services, a service provided by the Missouri Department of Social Services. This is approximately 12 percent of the total population of Lincoln County (USCB, 2000b). In fiscal year 2008, approximately \$38 million was spent providing these services (DSS, 2009a). The unemployment rate in Lincoln County was 5.15% in 2005, with 9.8% of the county population below the poverty level in 2004 (DSS, 2009). There are many other resources available in Lincoln County around the Paynesville site to assist low-income and minority persons. One such resource is the St. Louis Area Foodbank Service. This Foodbank serves 13 counties, including Lincoln County. They provide food to those who are unable to provide for themselves (DSS, 2006). A second resource serving Lincoln County is the Salvation Army. While not located in Lincoln County, the Salvation Army has many locations in nearby St. Charles County. The Salvation Army provides services such as emergency financial services, emergency shelter, domestic violence services, school, alcohol and drug treatment, and clothing, among others (Salvation Army, 2009). Other resources include the Lincoln County Cupboard (a food bank), the WIC office Elsberry, the Lincoln County Family Services office, Headstart Youth in Need (a preschool for disadvantaged children), a family planning clinic, and the NECAC Agency (social services and welfare) (MERIC, 2008).

#### **9.3.2.4.10 Transmission Corridors**

This site in northern Lincoln County, MO is not close to any existing 345 kV lines. It is assumed that two 48-mile (77 km) 345 kV lines would be required to connect the new Paynesville plant switchyard to the Sioux 345/138 kV Substation and two 35-mile (56 km) 345 kV lines would be required to connect to the Montgomery 345/161 kV Substation. The new lines to Sioux could follow a portion of the AmerenUE owned Troy-Cyrene section of the Troy-Pike 161 kV line or the Sioux-Belleau section of the Sioux-Montgomery 345 kV right-of-way.

New 345 kV line extensions would total 166 miles (267 km) at an estimated cost of \$132.8 million. Thus it is anticipated that transmission corridor impacts at this site would be LARGE.

#### **9.3.2.5 Evaluation of the Existing Nuclear Site**

Co-locating the new reactor is preferable to both the brownfield alternative and the greenfield alternative. Co-location reduces the costs when compared to either greenfield or brownfield development because the new reactor will be able to take advantage of the infrastructure that serves the existing reactor.

Analyses of site suitability, appropriate seismicity and geological setting, federal, state, and local regulatory restrictions, and many other significant issues have been conducted for the proposed site, and are discussed in Chapters 2, 4, and 5. Discussion of resource commitments for the proposed alternative site is provided in Section 10.1 through Section 10.3.

A cost-benefit analysis for the proposed site is detailed in Section 10.4. The costs and resource commitments needed for construction and operation of the new facility would be similar regardless of the site at which the unit is located. The information presented in Section 10.1 through Section 10.4 is therefore applicable to all of the candidate sites.

#### **9.3.2.5.1 Callaway Plant Unit 2 (Proposed Site)**

The Callaway Plant Unit 2 site is the proposed site for locating the nuclear power plant. The Callaway Plant Unit 2 site is located northwest of the existing nuclear power plant, Callaway Plant Unit 1, within the Callaway site in Missouri near the Missouri River as shown in

Figure 2.1-1. A topographical map of the Callaway site is shown in Figure 2.2-3. Figure 9.3-15 and Figure 9.3-16 identify the Callaway proposed site location on geographic and USGS topography maps, respectively. A detailed description of the Callaway Plant Unit 2 site and surroundings, as well as the impacts of construction and operation, is provided in Chapters 2, 4, and 5. This information is summarized below.

### 9.3.2.5.1.1 Land Use

Section 2.2 contains a description of land use at the Callaway site and in the site vicinity. Maps depicting land use within the Callaway site and the vicinity are presented in Figure 2.2-1 and Figure 2.2-2. The Callaway site is owned by AmerenUE. The areas devoted to major land uses within the Callaway site are summarized in Table 2.2-1. Land use in the area surrounding the Callaway Plant Unit 2 site is predominantly rural.

AmerenUE-owned land accessible by the public which is subject to use restrictions includes approximately 6,600 acres (2,671 hectares) of the 7,371 acre (2,983 hectare) Callaway site. This property, known as the Reform Conservation Area, is managed by the Missouri Department of Conservation (MDC). It is anticipated that construction and operation of the proposed project would not interfere with recreational uses of this area.

Approximately 1121 acres (454 hectares) of National Wetlands Inventory (NWI) wetlands are contained entirely within a 5 mile (8 km) radius of the Callaway site.

Approximately 36 acres (15 hectares) of the Callaway site has been classified as prime farmland. Of this, 0 percent (0 acres (0 hectares)) will be impacted by the proposed plant. This does not include the collector wells or intake pipes. Approximately 9 percent of the land within a 5 mile (8 km) radius surrounding the Callaway site has been classified as prime farmland, with 0 percent of this to be disturbed with the proposed plant. Figure 9.3-25 shows farmland on the Callaway site. Approximately 69 acres (28 hectares) of the Callaway site is National Wetlands Inventory (NWI) wetland. Of this, approximately 6 percent (4 acres (1.6 hectares)) will be impacted by the proposed plant. Figure 9.3-30 shows NWI wetlands on the Callaway site.

No comprehensive land use or zoning plans exist covering the rural portions of Callaway County including the Callaway site and vicinity. The impacts to land use at this site would be expected to be SMALL because the new reactor would be placed near the existing Callaway Plant Unit 1 location largely on land that is already disturbed.

### 9.3.2.5.1.2 Air Quality

Callaway County's status for all National Ambient Air Quality Standards (NAAQS) regulated air quality pollutants is designated as in-attainment (MDNR, 2007b). Construction activities may result in increased air emissions. Fugitive dust and fine particulate matter may be generated during earth moving and material handling activities. Vehicles and engine-driven equipment (e.g. generators and compressors) generate combustion product emissions such as carbon monoxide, oxides of nitrogen, and, to a lesser extent, sulfur dioxides. Painting, coating, and similar operations also may generate emissions from the use of volatile organic compounds.

Emission-specific strategies, plans, and measures would be developed and implemented to limit and mitigate releases, ensuring compliance with the applicable regulatory limits. These limits are defined by the primary and secondary National Ambient Air Quality Standards in 40 CFR 50 (USEPA, 2007a) and the National Emission Standards for Hazardous Air Pollutants in 40 CFR 61 (USEPA, 2007b). Air quality and release permits and operating certificates would be secured where required.

Based on the design of the new reactor and the actions that will be taken to comply with permit requirements for emissions, it is expected that siting the unit at this location would have a SMALL impact on air quality.

#### **9.3.2.5.1.3 Water**

Surface and groundwater resources and uses that could affect or be affected by the construction or operation of Callaway Plant Unit 2 and associated facilities are described in Section 2.3. The consumptive and non-consumptive water uses are identified, and water diversions, withdrawals, consumption, and returns are quantified.

At the Callaway site, a collector well intake system will be installed along the Missouri River to supply makeup cooling water for Callaway Plant Units 1 and 2. The collector well intake system is described in Section 3.4. A system of collector wells will supply cooling system makeup water for both units on the Callaway site. Water will be pumped through a common line up the corridor and split for usage by the two plants. The proposed collector wells will be distributed along the north bank of the Missouri River. It is expected that 80 to 90% of the water will be derived from surface water recharge to the aquifer, while 10 to 20% will be derived from up gradient sources of groundwater.

The impacts to water resources are expected to be SMALL and would be less than or similar to impacts due to the existing reactor at the site. As discussed in Section 2.3, current groundwater use at the site for existing operational and domestic use does not noticeably alter offsite groundwater characteristics.

Additional groundwater withdrawals required for constructing the new reactor are not expected to destabilize offsite groundwater resources, as discussed in Chapter 4. Due to the large size of both the surface water and groundwater resources and the current rural nature of the area and resultant low usage of these resources, impacts to water resources at the site from construction and operation of the new reactor unit are anticipated to be SMALL.

#### **9.3.2.5.1.4 Terrestrial Ecology and Sensitive Species**

The Callaway Plant Unit 2 site is located in Missouri's Central Dissected Till Plains Section which covers all of Missouri north of the Missouri River and extends into southern Iowa and small portions of Kansas and Nebraska. Due to differences in landform, geology (including till and loess), soils, and vegetation, there are nineteen ecological subsections, with nine located in Missouri in the Central Dissected Till Plains Ecological Section. The proposed site is located in the southern area of the Claypan Till Plains Subsection. The subsection lies in northeastern Missouri in the triangle between the Mississippi, Missouri, and Chariton Rivers.

The distinguishing feature of this subsection is the presence of well-developed claypan soils on a flat glacial till plain. The Callaway Plant Unit 2 site is located in the southern portion of the Claypan Till Plains Ecological Subsection. Most of the subsection was formerly prairie, with narrow belts of timber along stream courses. Most of the subsection is now farmland, of which more than 50% is cropland (MDC, 2002).

The U.S. Fish and Wildlife Service National Wetlands Inventory Mokane East Map identifies 36 palustrine wetland mapped units within an approximate 0.5-mile (0.8 km) radius of the site. Measures and controls that would be implemented to mitigate potential impacts to wetlands are described in Section 4.6. There are no special state concern wetlands, federally designated wilderness areas, wildlife preserves, sanctuaries, national forests, agricultural preservation lands, or forest legacy lands found in the site vicinity (EDR, 2007d). A state conservation area

(Reform) is discussed in Section 2.4.1. A discussion of state and federal rare, threatened and endangered species is provided in Section 2.4.1.2.

Because the new nuclear plant would be located adjacent to an operating power generating facility, and the additional acreage needed for the siting of the proposed nuclear plant is already disturbed land, little or no additional pristine wildlife habitat area would need to be cleared and developed. The impacts to the terrestrial ecosystem at the site would therefore be SMALL and would predominantly occur during the construction of the plant. Construction Best Management Practices would be followed to minimize these impacts. The impacts of operation to terrestrial species would be SMALL.

#### **9.3.2.5.1.5 Aquatic Ecology and Sensitive Species**

A discussion of state and federal rare, threatened and endangered species is provided in Section 2.4.2.2.

Because the majority of the site is already developed as a nuclear power plant, the remainder has been previously disturbed during the construction of the Callaway, and construction Best Management Practices would be followed, the impacts of Callaway Plant Unit 2 construction on the aquatic ecology would be SMALL and temporary. These potential impacts would primarily be related to runoff and siltation. The impacts of operation including the thermal impact that would result from cooling water discharge to the Mississippi River would likely be SMALL due to permit restrictions and mitigation requirements.

The site is expected to use a Collector Well Intake System which avoids the potential for impingement or entrainment of fish in the Missouri River. However, it is likely that development of the site may impact wetlands in the area. Therefore, the impact of plant construction on the aquatic ecology is estimated to be MODERATE during construction and SMALL during operation. The impacts of operation including the thermal impact that would result from cooling water discharge to the Missouri River is similar to that for the proposed site and would likely be SMALL due to distance from the river and compliance with permit restrictions.

#### **9.3.2.5.1.6 Socioeconomics**

In 2005, the estimated population within a 50-mile (80 km) radius of the Callaway Plant Unit 2 site was 613,142 people. Demographic characteristics for the site vicinity, a 50 mile (80 km) radius from the site are presented in Table 9.3-3. Other socioeconomic facts related to Callaway County are as follows:

- ◆ Callaway County experienced a 5.7% population increase since the 2000 census (USCB, 2008d).
- ◆ The median household income within 50 miles (80 km) is slightly higher than \$51,145 per year in 2000 (MCDC, 2000d).
- ◆ Approximately 7.4% of the county's population within 50 miles (80 km) lived below the poverty level in 2000 (MCDC, 2000d).
- ◆ The nearest large city is Jefferson City, MO.
- ◆ The mean value of owner-occupied housing units within a 50 mile (80 km) radius was \$135,961 in 2000 (MCDC, 2000d).

- ◆ There were 2,629 firms doing business in the county in 2002 (USCB, 2008d).

SECPOP was used to determine the population surrounding the Callaway site. The cumulative population within 10 miles (16 km) of the Callaway site is 10,094. The cumulative population within 50 miles (80 km) of the Callaway site is 458,068.

There is housing in Callaway County to accommodate the workers at the proposed plant. Apartment complexes in Callaway County include the Fulton Apartments, Rocktree Apartments, Fulton Presbyterian Manor, the Callaway Village Apartments, Fisher Heights Apartments, Bristol Manor of Fulton, Missouri Association of the Deaf Apartments, Summit Apartments, Callaway Villa Apartments, and Raintree Apartments (YellowPages, 2009d; YellowPages, 2009e).

Hotels in Callaway County include the Super 8 Motel Kingdom City, the Red Carpet Inn, the Holiday Inn Express, Amerihost Inn & Suites – Fulton, Westwoods Motel, and America's Best Value Inn (YellowPages, 2009i; YellowPages, 2009j).

Public schools in Callaway County are divided into four school districts. The New Bloomfield R-III school district is comprised of two schools. New Bloomfield Elementary houses pre-kindergarten through grade 6. The school has approximately 39 certificated staff and 382 enrolled students. New Bloomfield High houses grades 7 through 12. The school has approximately 34 certificated staff and 338 enrolled students (DESE, 2009m). The Fulton 58 school district is comprised of five schools. McIntire Elementary houses kindergarten through grade 5. The school has approximately 40 certificated staff members and 363 enrolled students. Bush Elementary houses kindergarten through grade 5. The school has approximately 34 certificated staff members and 348 enrolled students. Bartley Elementary houses kindergarten through grade 5. The school has approximately 26 certificated staff members and 255 enrolled students. Fulton Middle houses grades 6 through 8. The school has approximately 47 certificated staff members and 470 enrolled students. Fulton Senior High houses grades 9 through 12. The school has approximately 64 certificated staff members and 762 enrolled students (DESE, 2009n). The North Callaway County R-I school district is comprised of four schools. Williamsburg Elementary houses kindergarten through grade 8. The school has approximately 31 certificated staff members and 205 enrolled students. Hatton-McCredie Elementary houses kindergarten through grade 8. The school has approximately 33 certificated staff members and 295 enrolled students. Auxvasse Elementary houses pre-kindergarten through grade 8. The school has approximately 38 certificated staff members and 359 enrolled students. North Callaway High houses grades 9 through 12. The school has approximately 52 certificated staff members and 494 enrolled students (DESE, 2009o). The South Callaway County R-II school district is comprised of three schools. South Callaway Elementary houses pre-kindergarten through grade 4. The school has approximately 39 certificated staff members and 383 enrolled students. South Callaway Middle houses grades 5 through 8. The school has approximately 30 staff members and 277 enrolled students. South Callaway High houses grades 9 through 12. The school has approximately 32 certificated staff members and 320 enrolled students (DESE, 2009p).

The Callaway County Sheriff's Office is located in Fulton, Missouri, approximately 10 miles (16 km) from the Callaway site. Other police departments located in Callaway County include the Auxvasse Police Department (located approximately 19 miles (31 km) from the site), the Fulton Police Department (located approximately 11 miles (18 km) from the site), the Holts Summit Police Department (located approximately 20 miles (32 km) from the site), and the New Bloomfield Police Department (located approximately 18 miles (29 km) from the site) (MOVA, 2009c). Callaway County also has two fire departments – the Fulton Fire Department (located

approximately 11.5 miles (18.5 km) from the site) and the Holts Summit Fire Department (located approximately 20 miles (32 km) from the site) (USAFR, 2009c).

The local and regional socioeconomic effect analysis of the proposed Callaway Plant Unit 2 is presented in Section 2.5. Although construction and operation of a new reactor would create both temporary and permanent jobs, the percent of the population employed by the new plant (and therefore the effect of the new reactor operation on the area's population) is expected to be SMALL and BENEFICIAL. The additional jobs and local tax revenues generated by the construction and operation of Callaway Plant Unit 2 is expected to have a beneficial effect on the local economy

#### **9.3.2.5.1.7 Transportation**

Callaway County is bisected in the east/west direction by I-70 and in the north/south direction by U.S. Route 54. State Route 94 runs generally in an east/west direction parallel to the Missouri River. A network of smaller lettered State or numbered County roads connects the communities and provides access to the main highways. The most important of these with respect to the Callaway site are State Route D providing access to the site from I-70, State Route O forming much of the northern site boundary, and State Route CC running north/south connecting State Route O to the north with State Route 94 to the south, intersecting County Route 459 which gives access to the site. State Route CC and County Routes 428, 448, 461, and 468 all traverse portions of the AmerenUE property. County Route 459 is located entirely on AmerenUE property.

Major land-based transportation routes and utility routes within the region are depicted in Figure 2.2-7 and Figure 2.2-9. A description of estimated traffic volumes and impacts associated with the proposed project is included in Section 4.4.1.5. Impacts on local roads would be temporary and would likely end after construction was finished. It is estimated that there would be SMALL to MODERATE impacts on transportation during construction activities and a SMALL impact during operation of the facility.

#### **9.3.2.5.1.8 Historic, Cultural, and Archeological Resources**

It is anticipated that historic and cultural impacts would be SMALL because the site is largely already disturbed and surveys have not indicated the presence of cultural resources in new areas to be disturbed as discussed in Section 2.5.3.

#### **9.3.2.5.1.9 Environmental Justice**

Table 9.3-3 presents demographic information for a 50-mile (80 km) radius surrounding the Callaway Plant Unit 2 site, Missouri, and the U.S. These data demonstrate that the population of this area has a lower percentage of minority population than the State of Missouri and the U.S. as a whole. The Callaway Plant Unit 2 site is located in a largely rural area, and the likelihood of minority communities being disproportionately and adversely affected by this plant is low, as discussed further in Section 2.5.4. There are 45,036 poor persons within 50 miles (80 km) of the site. This accounts for approximately 7.4% of the population in the area (MCDC, 2000d). This is lower than the Lamine, Fred Weber, and Paynesville candidate sites, and is on par with the Chamois candidate site. Therefore, it is anticipated that environmental justice impacts at this site would be SMALL.

Additionally, the locations of low income and minority populations within a 50 mile (80 km) radius were compared with the locations of highways to determine if these populations live disproportionately close to roads and who may be disproportionately affected by the proposed plant. Figure 9.3-39 portrays the locations of low income populations relative to the locations

of highways. While this figure shows that there are low income populations located near highways and major roads, these populations are not located near the Callaway site and will thus not be disproportionately affected. Figure 9.3-35 portrays the locations of minority populations relative to the locations of highways. While this figure shows that there are minority populations located near highways and major roads, these populations are not located near the Callaway site and will thus not be disproportionately affected.

Callaway County has approximately 5,000 people enrolled for MO HealthNet services, a service provided by the Missouri Department of Social Services. This is approximately 12 percent of the population of Callaway County (USCB, 2000b). In fiscal year 2008, approximately \$33 million was spent providing these services (DSS, 2009d). The unemployment rate in Callaway County was 4.66% in 2005, with 11% of the county population below the poverty level in 2004 (DSS, 2009). There are many other resources available in Callaway County around the Callaway site to assist low-income and minority persons. One such resource is the Central Missouri Food Bank. This food bank serves 32 counties, including Callaway County. They provide food to those who are unable to provide for themselves (DSS, 2006a). A second resource serving Callaway County is the Salvation Army. While not located in Callaway County, the Salvation Army has many locations in nearby Boone and Cole Counties. The Salvation Army provides services such as emergency shelter, emergency food & nutrition programs, school, alcohol and drug treatment programs, and domestic violence services, among others (Salvation Army, 2009).

Other resources include the Callaway County HDC, the Fulton Housing Authority, Birthright (providing pregnancy assistance, adoption information, etc.), Clothes Cupboard, the Callaway County Health Department, Head Start Programs, SERVE Inc. – Callaway Action Network (providing adult education, clothing, disaster assistance, etc.), Ecumenical Ministries, Haven House, YMCA Callaway County, Elks Mobile Dental Program, Oak Chapel Missionary Baptist Church, Sheperdsfield Pantry, Medicaid NEMT (Non-Emergency Medical Transportation), Missouri Health Care Plan (non-emergency medical transportation), the adult enrichment center, the American Red Cross, Callaway County Special Services, the Shirley Evans Center, the Family Services Division, and the Youth Services Division (MERIC, 2008). Section 2.5.4.3 discussed subsistence fishing and hunting and concludes that there is no evidence of subsistence use by either minority or low income residents around the Callaway site.

#### **9.3.2.5.1.10 Transmission Corridors**

The transmission corridor is discussed in Section 3.7, and impacts are discussed in Section 4.3 and 5.1.2. An assessment was made to identify additions and modifications to the transmission system needed to connect the new reactor unit to the power grid. These are described in Section 3.7. The results of the assessment indicated that Callaway Plant Unit 2 would require the following new facilities and upgrades to connect to the existing transmission system:

- ◆ One new 345 kV, 16 breaker, breaker-and-a-half switchyard to transmit power from Callaway Plant Unit 2,
- ◆ Two new 345 kV, 2,090 MVA (normal rating) circuits connecting the new Callaway Plant Unit 2 switchyard to the existing Callaway Plant Unit 1 switchyard,
- ◆ An extension of the Loose Creek 345 kV transmission line from a tie point on the Loose Creek transmission line near Chamois to the Callaway Plant Unit 1 switchyard resulting in approximately 6.7 miles (10.8 km) of new transmission line.

Due to the rural nature of the areas that would be transected by these transmission lines, and the use of environmental mitigation measures during construction, any impacts are expected to be SMALL in nature.

### 9.3.3 SUMMARY AND CONCLUSIONS

The advantages of the Callaway Plant Unit 2 site over the alternative sites are summarized as follows:

- ◆ The postulated consumptive use of water by a new unit at the Callaway Plant Unit 2 site would be no greater than water use at the alternative sites.
- ◆ The impacts of development of a new unit at the proposed site on endangered species are not greater than impacts postulated for the alternative sites.
- ◆ No Federal, State, or affected Native American tribal lands are affected by the proposed site.
- ◆ The Callaway Plant Unit 2 site does not contain spawning and/or nesting grounds for any threatened or endangered species. Thus, the impacts on spawning or nesting areas are not greater than impacts at the alternative sites.
- ◆ The Callaway Plant Unit 2 site impact review does not postulate effluent discharge beyond the limits of National Pollutant Discharge Elimination System (NPDES) permits or regulations. Based on the information available for the alternative sites, the impacts from effluent discharge at the proposed site would be no greater than impacts at the alternative sites.
- ◆ The siting of the new unit at the Callaway site would not require changes to any federal or state land use plans or county zoning ordinances.
- ◆ Co-locating Callaway Plant Unit 2 with the existing nuclear facility on land that is already largely disturbed and industrial in current use would have lesser land use effect than at the alternative greenfield or brownfield sites. Therefore, land impacts at the proposed site would be no greater than the impacts at the alternative sites.
- ◆ The potential impacts of a new nuclear facility on terrestrial and aquatic environments at the Callaway site would be no greater than the impacts at the alternative sites.
- ◆ The Callaway site is in a generally rural setting and has a population density that meets the population criteria of 10 CFR Part 100.

As summarized in Table 9.3-6, no alternative sites are environmentally preferable, and therefore cannot be considered obviously superior, to the Callaway Plant Unit 2 site. Development of a greenfield or brownfield site would offer no advantages and would increase both the severity of environmental impacts and the cost of the new facility.

The existing facility currently operates under an NRC license, and the proposed location has already been found acceptable under the requirements for that license. Further, operational experience at the Callaway site has shown that the environmental impacts are SMALL, and operation of a new unit at the site should have essentially the same or less environmental impacts.

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**Table 9.3-1—Profile of Demographic Characteristics Chamois Candidate Site (50 Mile Radius)**

Geographic Area	Race						
	One Race						Two or More Races
	White	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Other Race	
Chamois, MO 50 Mile (80 km) Radius	592,171 94.5%	16,724 2.7%	2,038 0.3%	5,647 0.9%	178 0.0%	2,083 0.3%	7,791 1.2%
Missouri	4,748,083 84.9%	629,391 11.2%	25,076 0.4%	61,595 1.1%	3,178 0.1%	45,827 0.8%	82,061 1.5%
U.S.	211,460,626 75.1%	34,658,190 12.3%	2,475,956 0.9%	10,242,998 3.6%	398,835 0.1%	15,359,073 5.5%	6,826,228 2.4%

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**Table 9.3-2—Profile of Demographic Characteristics Fred Weber Quarry Candidate Site (50 mile Radius)**

Geographic Area	Race						
	One Race						Two or More Races
	White	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Other Race	
Fred Weber Quarry, 50 Mile (80 km) Radius	909,783 79.8%	194,581 17.1%	2,950 0.3%	11,659 1.0%	426 0.0%	5,517 0.5%	14,797 1.3%
Missouri	4,748,083 84.9%	629,391 11.2%	25,076 0.4%	61,595 1.1%	3,178 0.1%	45,827 0.8%	82,061 1.5%
U.S.	211,460,626 75.1%	34,658,190 12.3%	2,475,956 0.9%	10,242,998 3.6%	398,835 0.1%	15,359,073 5.5%	6,826,228 2.4%

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**Table 9.3-3—Profile of Demographic Characteristics Callaway Site (50 mile Radius)**

Geographic Area	Race						
	One Race						Two or More Races
	White	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Other Race	
Callaway, MO, 50 Mile (80 km) Radius	590,206 94.5%	16,894 2.7%	1,987 0.3%	5,556 0.9%	178 0.0%	2,098 0.3%	7,801 1.2%
Missouri	4,748,083 84.9%	629,391 11.2%	25,076 0.4%	61,595 1.1%	3,178 0.1%	45,827 0.8%	82,061 1.5%
U.S.	211,460,626 75.1%	34,658,190 12.3%	2,475,956 0.9%	10,242,998 3.6%	398,835 0.1%	15,359,073 5.5%	6,826,228 2.4%

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**Table 9.3-4—Profile of Demographic Characteristics Lamine Candidate Site**

Geographic Area	Race						
	One Race						Two or More Races
	White	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Other Race	
Lamine, 50 Mile (80 km) Radius	401,297 89.5%	27,823 6.2%	2,049 0.5%	5,787 1.3%	242 0.1%	3,477 0.8%	7,695 1.7%
Missouri	4,748,083 84.9%	629,391 11.2%	25,076 0.4%	61,595 1.1%	3,178 0.1%	45,827 0.8%	82,061 1.5%
U.S.	211,460,626 75.1%	34,658,190 12.3%	2,475,956 0.9%	10,242,998 3.6%	398,835 0.1%	15,359,073 5.5%	6,826,228 2.4%

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**Table 9.3-5—Profile of Demographic Characteristics Paynesville Candidate Site**

Geographic Area	Race						
	One Race						Two or More Races
	White	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Other Race	
Paynesville, 50 Mile (80 km) Radius	972,568 76.3%	253,851 19.9%	3,087 0.2%	21,008 1.6%	533 0.0%	5,474 0.4%	18,250 1.4%
Missouri	4,748,083 84.9%	629,391 11.2%	25,076 0.4%	61,595 1.1%	3,178 0.1%	45,827 0.8%	82,061 1.5%
U.S.	211,460,626 75.1%	34,658,190 12.3%	2,475,956 0.9%	10,242,998 3.6%	398,835 0.1%	15,359,073 5.5%	6,826,228 2.4%

## References:

**USCB, 2000f.** U.S. Census Bureau, American FactFinder. Dp-1. Profile of General Demographic Characteristics: 2000: United States, Website:

[http://factfinder.census.gov/servlet/QTTable?\\_bm=y&-geo\\_id=01000US&-gr\\_name=DEC\\_2000\\_SF1\\_U\\_DP1&-ds\\_name=DEC\\_2000\\_SF1\\_U&-lang=en&-\\_sse=on](http://factfinder.census.gov/servlet/QTTable?_bm=y&-geo_id=01000US&-gr_name=DEC_2000_SF1_U_DP1&-ds_name=DEC_2000_SF1_U&-lang=en&-_sse=on), Date Accessed: December 19, 2007.

**USCB, 2000g.** U.S. Census Bureau, American FactFinder. Dp-1. Profile of General Demographic Characteristics: 2000: Missouri, Website:

[http://factfinder.census.gov/servlet/QTTable?\\_bm=n&-lang=en&-gr\\_name=DEC\\_2000\\_SF1\\_U\\_DP1&-ds\\_name=DEC\\_2000\\_SF1\\_U&-geo\\_id=04000US29](http://factfinder.census.gov/servlet/QTTable?_bm=n&-lang=en&-gr_name=DEC_2000_SF1_U_DP1&-ds_name=DEC_2000_SF1_U&-geo_id=04000US29), Date Accessed: December 19, 2007.

**MCDC, 2000e.** MCDC Demographic Profile 3, 2000 Census, Circular Area Profiles (CAPS), 50-mile radius of Sledd, Missouri, Missouri Census Data Center, Website:

[http://mcdc2.missouri.edu/cgi-bin/broker?\\_PROGRAM=websas.caps.sas&-SERVICE=appdev&latitude=39.11.52&longitude=90.53.40&sitename=Serengeti+Farms&radii=10+20+30+40+50&state=29&units=+&tablelist=all&cntypops=on&-debug=](http://mcdc2.missouri.edu/cgi-bin/broker?_PROGRAM=websas.caps.sas&-SERVICE=appdev&latitude=39.11.52&longitude=90.53.40&sitename=Serengeti+Farms&radii=10+20+30+40+50&state=29&units=+&tablelist=all&cntypops=on&-debug=), Date Accessed: April 28, 2008.

**Table 9.3-6—Summary Comparison of Candidate and Potential Sites**

<b>Location</b>	<b>Callaway Plant site</b>	<b>Chamois Brownfield</b>	<b>Fred Weber Quarry Brownfield</b>	<b>Lamine Greenfield</b>	<b>Paynesville Greenfield</b>
Land Use	Small	Moderate to Large	Moderate	Large	Large
Air Quality	Small	Small to Moderate (Beneficial)	Small	Small	Small
Water	Small	Small	Small to Large	Small to Moderate	Small
Terrestrial Ecology	Small	Small	Small	Large	Large
Aquatic Ecology	Small to Moderate	Moderate	Small	Small to Moderate	Small to Moderate
Socioeconomics	Small (Beneficial)	Small	Small	Moderate (Beneficial)	Moderate (Beneficial)
Historic, Cultural, and Archaeological Resources	Small	Small	Small	Small	Small
Environmental Justice	Small	Small	Small	Moderate	Small
Transmission Corridors	Small	Small	Large	Large	Large
Transportation	Small to Moderate	Small to Moderate	Small to Large	Moderate to Large	Small to Large
Is this Site a Candidate Site? (Yes or No)	Yes	Yes	Yes	Yes	Yes
Is this Candidate Site a Good Alternative Site to the Proposed Site?	Yes	Yes	Yes	Yes	Yes
Is the Site Obviously Superior?	Preferred Alternative	No	No	No	No
Is the Site Environmentally Preferable?	Preferred Alternative	No	No	No	No

**Table 9.3-7—Summary of LoopNet Greenfield Sites**

Criterion	Missouri River						Mississippi River		
	Highway 94	30543 Hwy N	Pheasant Hunting Farm	Tower Road	Fayette	14636 Z Hwy	Hwys 79 & 47	Eolia	Paynesville
Population per Sq Mile within 10 Miles	14.8	14.3	64.7	31.9	23.9	8	66.3	13.9	3.1
Population per Sq Mile within 50 Miles	71.7	51.5	57	124.2	55.4	29.3	437.5	162.1	282.2
Distance From the River (Miles)	0.5	15	7.5	5	15	15	3	10	7.5
Distance to 345 kV Line (Miles)	10	10	10	3	15	30	13	43	20
Distance to St. Louis (Miles)	85	160	145	60	145	190	40	60	55
Distance to Park/ Federal Land (Miles)	7.5	7.5	10	3	7.5	10	3	5	7.5
Distance to Closest Airport (Miles) (STL/KC)	70 STL	93 KC	112.5 KC	52 STL	115 KC	70 KC	25 STL	60 STL	42.5 STL
Distance to Hwy 70 (Miles)	10	6	7.5	6	15	42.5	15	28	28
Acreage	357	534	400	305	340	218	662	355	850

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**Table 9.3-8—Greenfield Site Comparison Matrix**  
(Page 1 of 3)

**SITE LEGEND**

Site Code	Site Name	Site Code	Site Name
C-2	Annada	R-6	Fayette
C-9	Lamine	R-7	14636 Z Hwy
R-1	Hwys 79 & 47	R-8	Eolia
R-2	Highway 94	R-9	Paynesville
R-3	30543 Hwy N	A-1	Callaway
R-4	Pheasant Hunting Farm	A-2	Fred Weber
R-5	Tower Road	A-3	Chamois

**Criterion**  
Weighting Factor (see legend)

Criterion	Weighting Factor	Missouri River										Mississippi River					Value Range
		C9	R2	R3	R4	R5	R6	R7	A-1	A-3	C2	R1	R8	R9	A-2		
Pop. Per SQ Mi w/ 10 mi	Data (#/sq. mi)	48.9	25.6	14.7	61.5	31.9	23.9	9.2	31.5	30	24.6	60.7	13.9	30.1	15.1	5 = 0 - 24 #/sq mi	
	Value	3	3	5	1	3	5	5	3	3	5	1	5	3	5	3 = 25 - 49 #/sq mi	
	Weighted Value	24	24	40	8	24	40	40	24	24	40	8	40	24	40	1 = 50 - 75 #/sq mi	
Pop. Per SQ Mi w/ 50 mi	Data (#/sq. mi)	57.6	82.2	51.5	97	124.2	55.4	29.3	79.1	79	209.4	234.7	162.1	262.2	148.3	5 = 0 - 149 #/sq mi	
	Value	5	5	3	5	5	5	5	5	5	3	3	3	3	5	3 = 150 - 299 #/sq mi	
	Weighted Value	10	10	10	10	10	10	10	10	10	6	6	6	6	10	1 = 300 - 450 #/sq mi	
Dist To Major Water Source	Data (miles)	3	5	15	7.5	5	15	15	0	0	5	3	10	7.5	12.5	5 = 0 - 4 mi	
	Value	5	3	1	3	3	1	1	5	5	3	5	1	3	1	3 = 5 - 9 mi	
	Weighted Value	40	24	8	24	24	8	8	40	40	24	40	8	24	8	1 = 10 - 15 mi	
Within Floodplain	Data (In or Out)	Out	Out	Out	Out	Out	Out	Out	Out	In	Out	In	Out	Out	Out	5= Outside of Floodplain	
	Value	5	5	5	5	5	5	5	5	-5	5	-5	5	5	5	Negative 5= Within Floodplain	
	Weighted Value	40	40	40	40	40	40	40	40	-40	40	-40	40	40	40		
Total Length of Transmission Line Needed	Data (miles)	130	23	144	130	64	130	148	6.7	1	103	65	78	83	72	5 = 0 - 50 mi	
	Value	1	5	1	1	3	1	1	5	5	1	3	3	3	3	3 = 51-100 mi	
	Weighted Value	8	40	8	8	24	8	8	40	40	8	24	24	24	24	1 = 100-150 mi	
Dist to STL	Data (miles)	150	85	160	145	60	145	190	77	83.4	50	40	60	55	52.8	5 = 0 - 64 mi	
	Value	1	3	1	1	5	1	1	3	3	5	5	5	5	5	3 = 65 - 129 mi	
	Weighted Value	3	9	3	3	15	3	3	9	9	15	15	15	15	15	1 = 130 - 195 mi	

**Table 9.3-8—Greenfield Site Comparison Matrix**  
(Page 2 of 3)

Criterion		Weighting Factor (see legend)														Value Range
Dist to State and National Park, Land, or Conservation Areas	Data (miles)	Missouri River							Mississippi River							Value Range
		C9	R2	R3	R4	R5	R6	R7	A-1	A-3	C2	R1	R8	R9	A-2	
		8.6	0.5	8.6	6.1	0.6	7.5	8.6	0	2	3	1.9	3.5	5.8	3.5	1 = 0 - 3 mi
	Value	5	1	5	5	1	5	5	1	1	1	1	3	3	3	3 = 3,1-6 mi
8	Weighted Value	40	8	40	40	8	40	40	8	8	8	8	24	24	24	5 = 6,1-9 mi
Dist to Airport STL/KC	Data (miles)	Missouri River							Mississippi River							Value Range
		C9	R2	R3	R4	R5	R6	R7	A-1	A-3	C2	R1	R8	R9	A-2	Value Range
		115 KC	70 STL	93 KC	112.5 KC	52 STL	115 KC	70 KC	70 STL	75 STL	48 STL	25 STL	60 STL	42.5 STL	40.3 STL	1 = < 10 mi
	Value	5	3	3	5	3	5	3	3	3	3	3	3	3	3	3 = 11 - 100 mi
3	Weighted Value	15	9	9	15	9	15	9	9	9	9	9	9	9	9	5 = > 100 mi
Dist to Major HWY	Data (miles)	Missouri River							Mississippi River							Value Range
		C9	R2	R3	R4	R5	R6	R7	A-1	A-3	C2	R1	R8	R9	A-2	Value Range
		3 (I-70)	13 (I-70)	6 (I-70)	5 (Hwy40)	4 (I-70)	11 (Hwy40)	4 (Hwy65)	11 (I-70)	15 (Hwy50)	11 (Hwy61)	13 (Hwy61)	3 (Hwy61)	5 (Hwy 61)	1 (Hwy61)	1 = 1-4 mi
	Value	1	5	3	3	1	5	1	5	5	5	5	1	3	1	3 = 5-8 mi
3	Weighted Value	3	15	9	9	3	15	3	15	15	15	15	3	9	3	5 = >9 mi
Acreage 500 AC	Data (acres)	Missouri River							Mississippi River							Value Range
		C9	R2	R3	R4	R5	R6	R7	A-1	A-3	C2	R1	R8	R9	A-2	Value Range
		1,300	357	534	400	305	340	218	2,765	210	1,400	662	355	850	262	1 = < 400 acres
	Value	5	1	5	3	1	1	1	5	1	5	5	1	5	1	3 = 400 - 500 acres
8	Weighted Value	40	8	40	24	8	8	8	40	8	40	40	8	40	8	5 = > 500 acres
Brownfield vs. Greenfield	Data (BF or GF)	Missouri River							Mississippi River							Value Range
		C9	R2	R3	R4	R5	R6	R7	A-1	A-3	C2	R1	R8	R9	A-2	Value Range
		GF	GF	GF	GF	GF	GF	GF	BF	BF	GF	GF	GF	GF	BF	5= Brownfield
	Value	-5	-5	-5	-5	-5	-5	-5	5	5	-5	-5	-5	-5	5	Negative 5= Greenfield
8	Weighted Value	-40	-40	-40	-40	-40	-40	-40	40	40	-40	-40	-40	-40	40	
Environmental Diversity	Data (Yes or No)	Missouri River							Mississippi River							Value Range
		C9	R2	R3	R4	R5	R6	R7	A-1	A-3	C2	R1	R8	R9	A-2	Value Range
		Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	0= Environmentally Diverse
	Value	0	-5	0	0	-5	0	0	0	-5	0	0	0	0	0	Negative 5= Not Environmentally Diverse
8	Weighted Value	0	-40	0	0	-40	0	0	0	-40	0	0	0	0	0	
Value Range Total	Weighted Total	Missouri River							Mississippi River							
		C9	R2	R3	R4	R5	R6	R7	A-1	A-3	C2	R1	R8	R9	A-2	
		31	24	29	27	20	29	23	45	26	31	21	25	31	37	
		183	107	167	141	85	147	129	275	123	165	85	137	175	221	

**Table 9.3-8—Greenfield Site Comparison Matrix**

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Criterion  
Weighting Factor (see legend)

Weight *	Weighted Scale	Rationale Definition of "better" or "more important"
8	Population Per Square Mile (Within 10 Miles)	Fewer people for emergency evacuation
2	Population Per Square Mile (Within 50 Miles)	Fewer people impacted by aesthetics, etc.
8	Distance to Major Water Source (In Miles)	Closer - easier to obtain water
8	Within Floodplain (In or Out)	Out - smaller possibility of flooding
8	Total Length of Transmission Line Needed (In Miles)	Smaller - less env. impact to connect
3	Distance to Center of St. Louis (In Miles)	Closer to load center
8	Distance to Nearest Edge of Significant Areas (Parks, etc.)	Further to env. sensitive property
3	Distance to Airport (STL or KC)	Further - less impact to aviation routes
3	Distance to Major Highway	Further - less potential for disruption during emergency
8	Acresage	More - less need to acquire additional acresage
8	Brownfield v. Greenfield	Brownfield - previously disturbed land
8	Environmental Diversity	Environmentally diverse as compared with Proposed site - with respect to Geography and Geomorphology

\* Higher number is more important criterion.

Calculation

Value Range x Weight = Weighted Value

Note: This matrix reflects the original effort made to locate brownfield sites (previously disturbed sites) as potential sites  
Note: The distance to the river for site R2 was extended because the nearshore environment is not immediately conducive to installing the collector well system.

**Table 9.3-9—Alternative Site Exclusions**

<b>Site Location</b>	<b>Site Location</b>
A-1	Necessity to relocate Highway 19
A-4	Outside of ROI and AmerenUE service area
A-6	Outside of ROI and AmerenUE service area
B-2	Not located within the State of Missouri
C-4	Outside of ROI and AmerenUE service area
C-8	Located within urban cluster plus 10-mile buffer zone

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Figure 9.3-1—Potential Alternatives Region of Interest

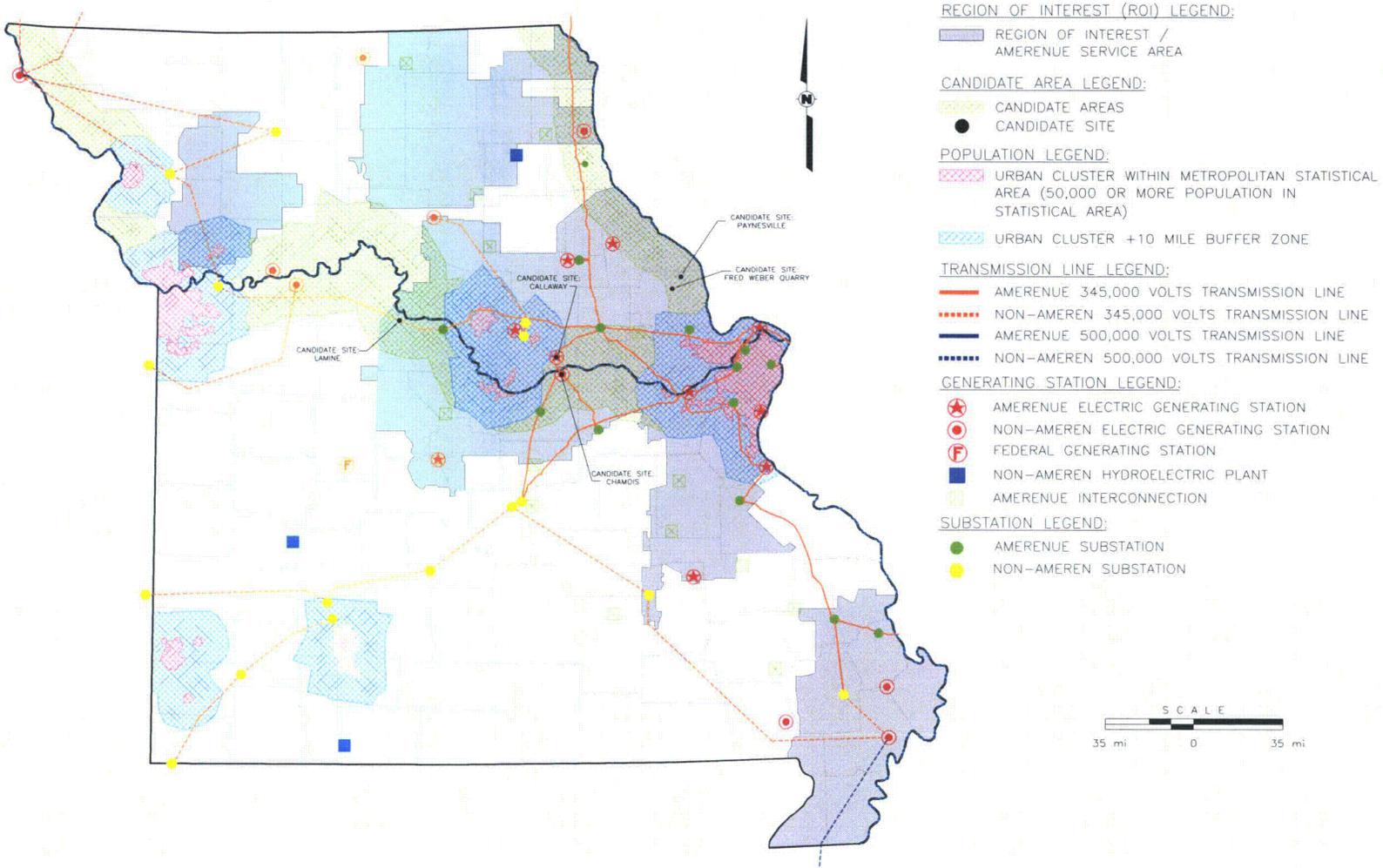


Figure 9.3-2—Candidate Areas

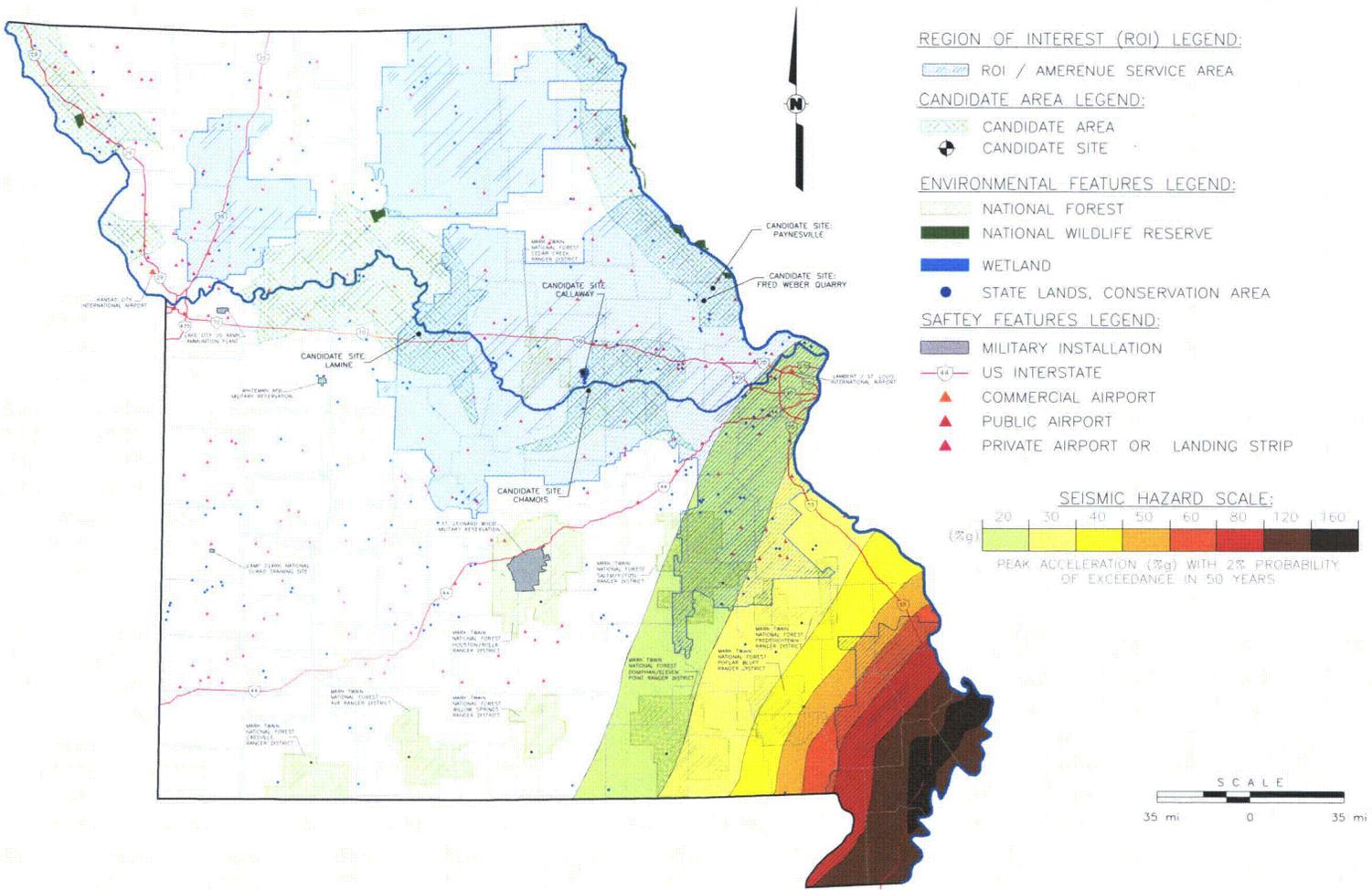


Figure 9.3-3—Preferred and Candidate Site Locations Near Wabash Valley and New Madrid Seismic Sources

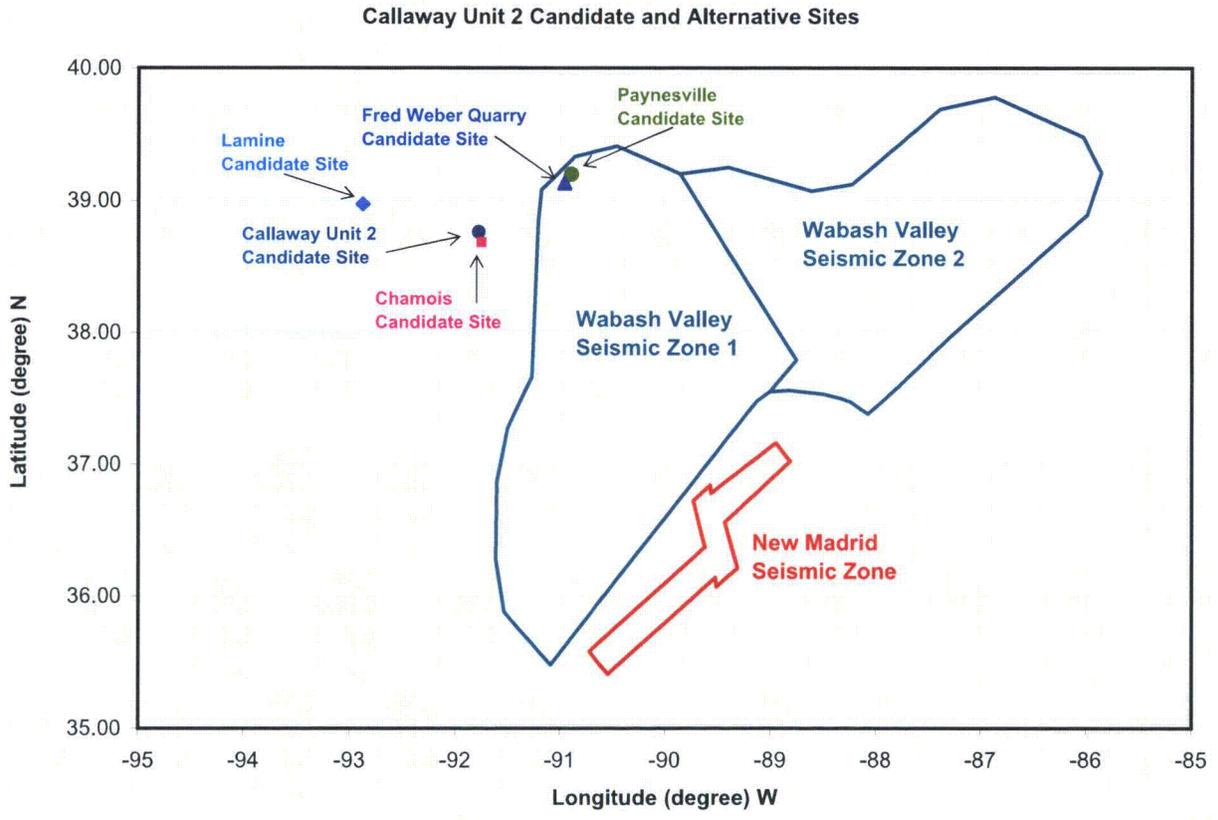
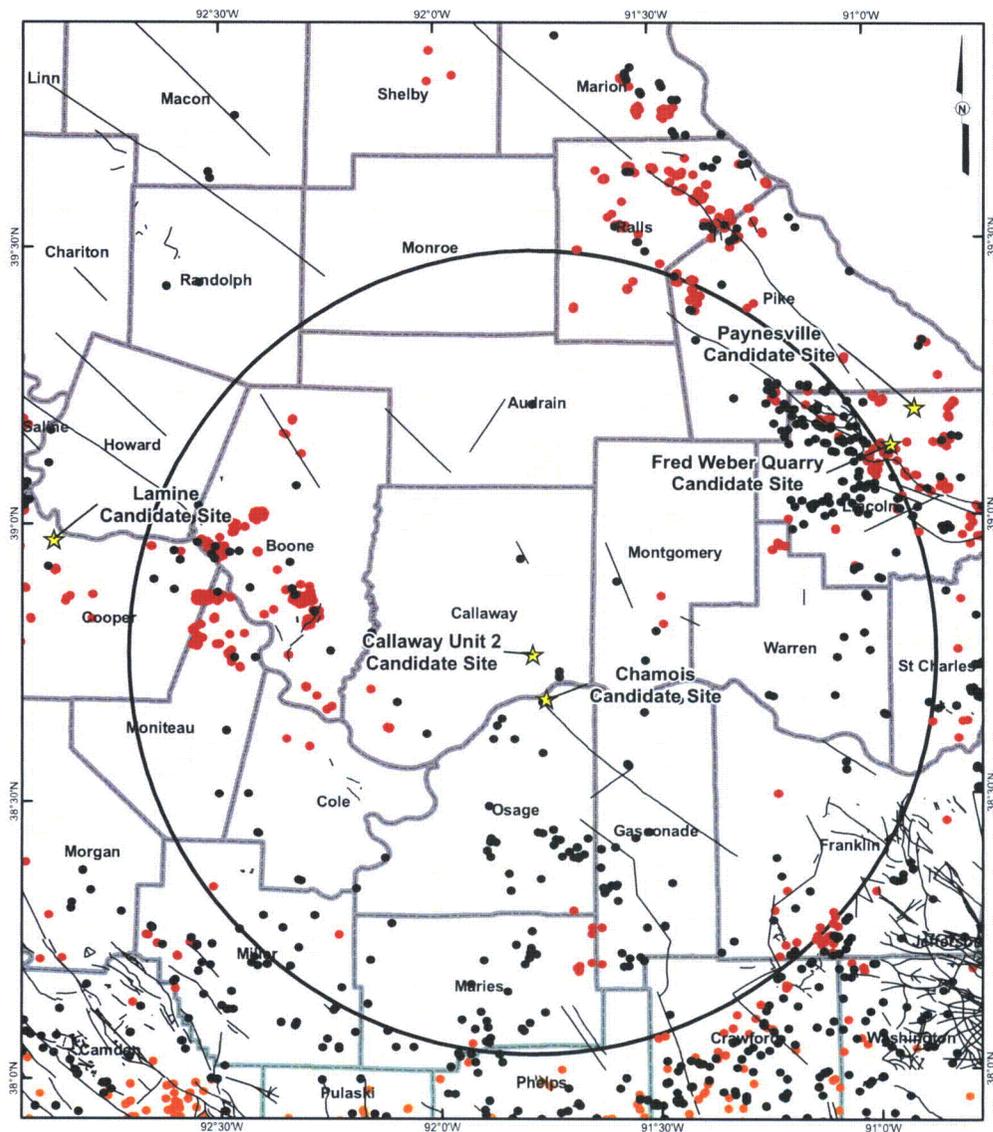


Figure 9.3-4—Surface Faulting and Deformation Comparison



**LEGEND**

- Spring
- Sinkholes
- ★ Candidate Site
- Geologic Structures (FAULTS AND FOLDS)

**NOTE:**

REFERENCE CENTER POINT OF PLANT SITE IS DEFINED AS THE MIDPOINT BETWEEN EXISTING REACTOR FOR CALLAWAY PLANT UNIT 1 AND REACTOR FOR CALLAWAY PLANT UNIT 2.

REFERENCE: MODNR, 2007. Missouri Environmental Geology Atlas (MEGA 2007).

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Figure 9.3-5—Site Comparison Geologic Map

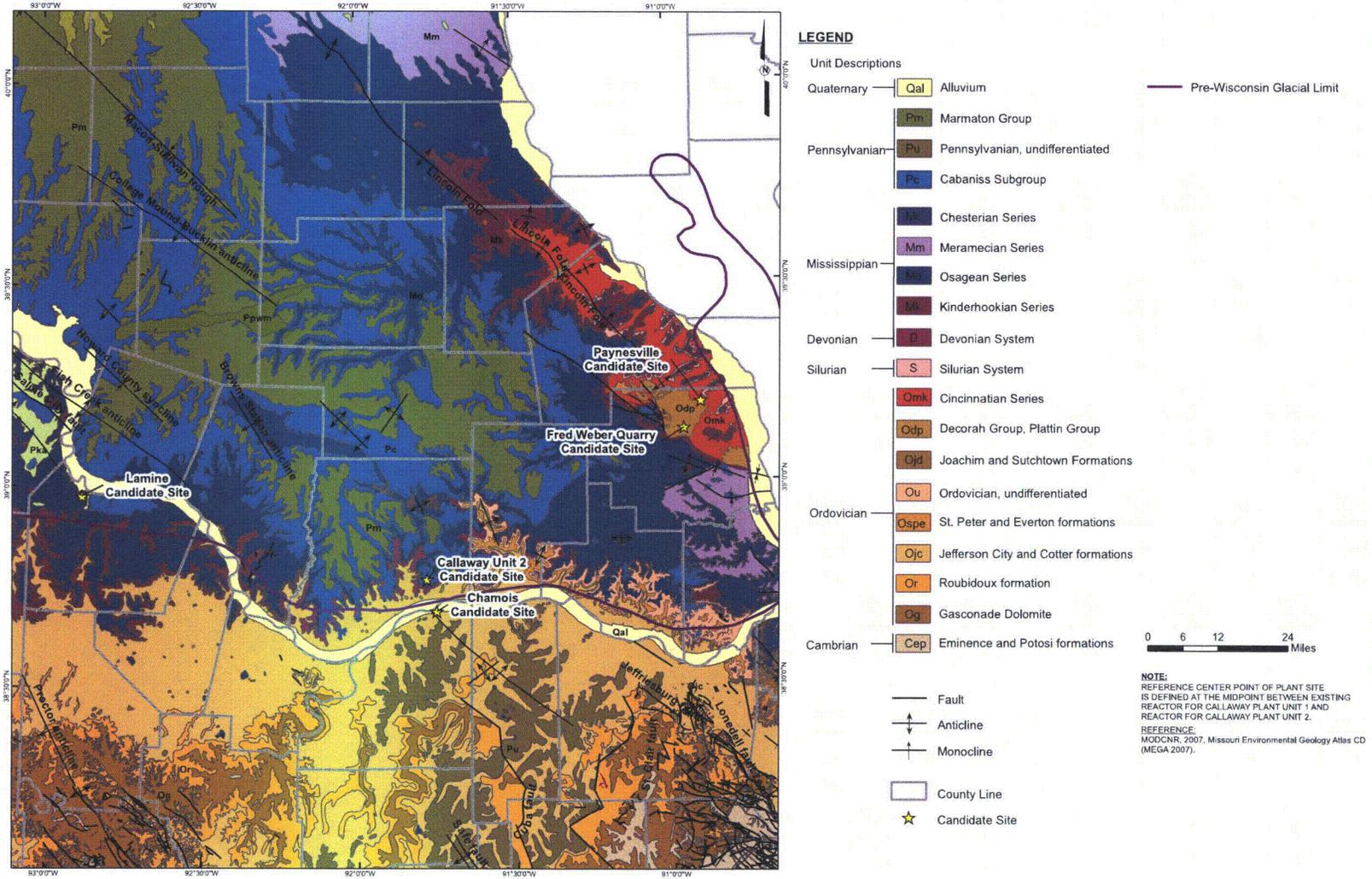


Figure 9.3-6—Site Comparison Soils Map

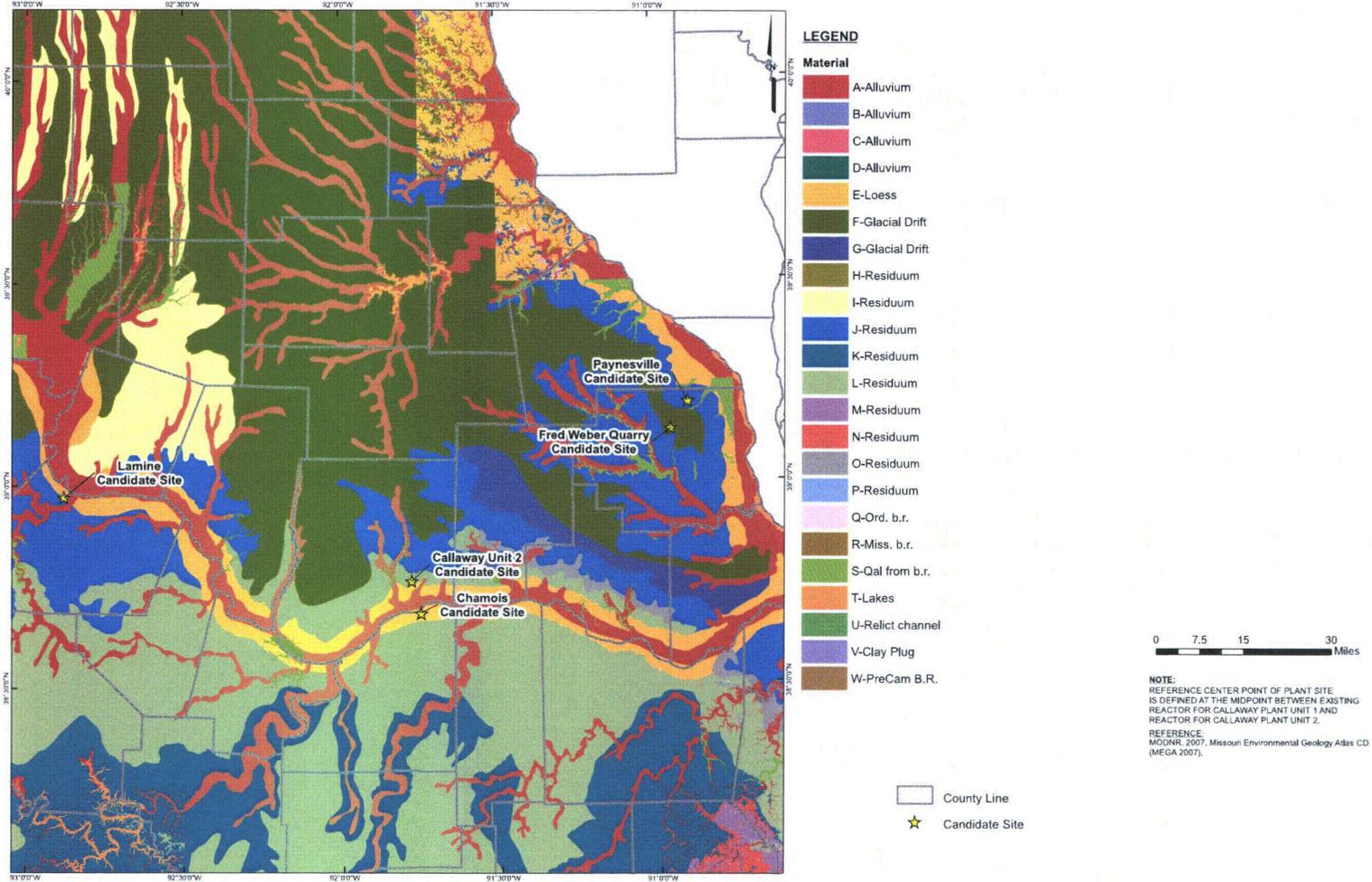


Figure 9.3-7—Candidate Site – Chamois

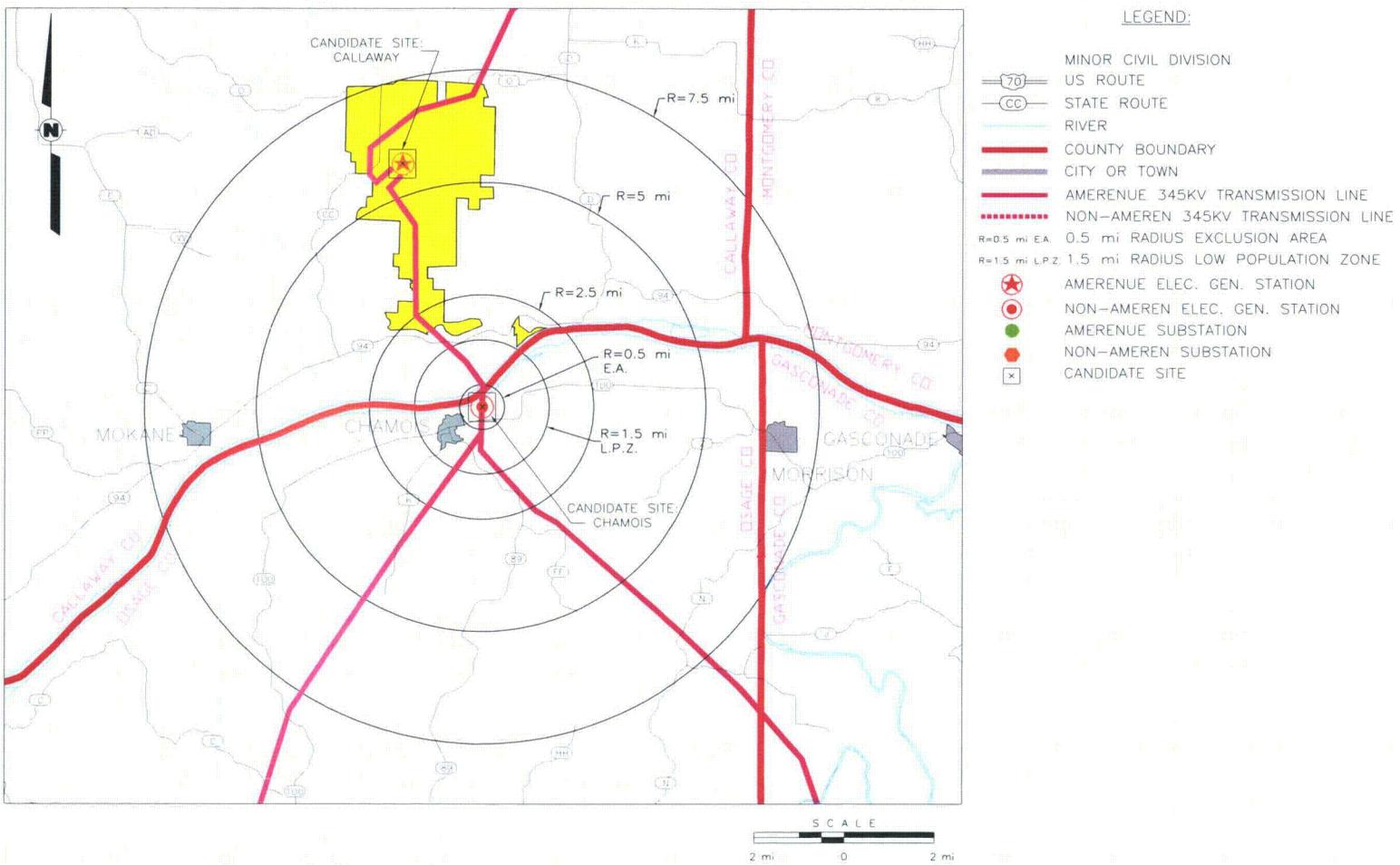


Figure 9.3-8—Candidate Site – Chamois USGS

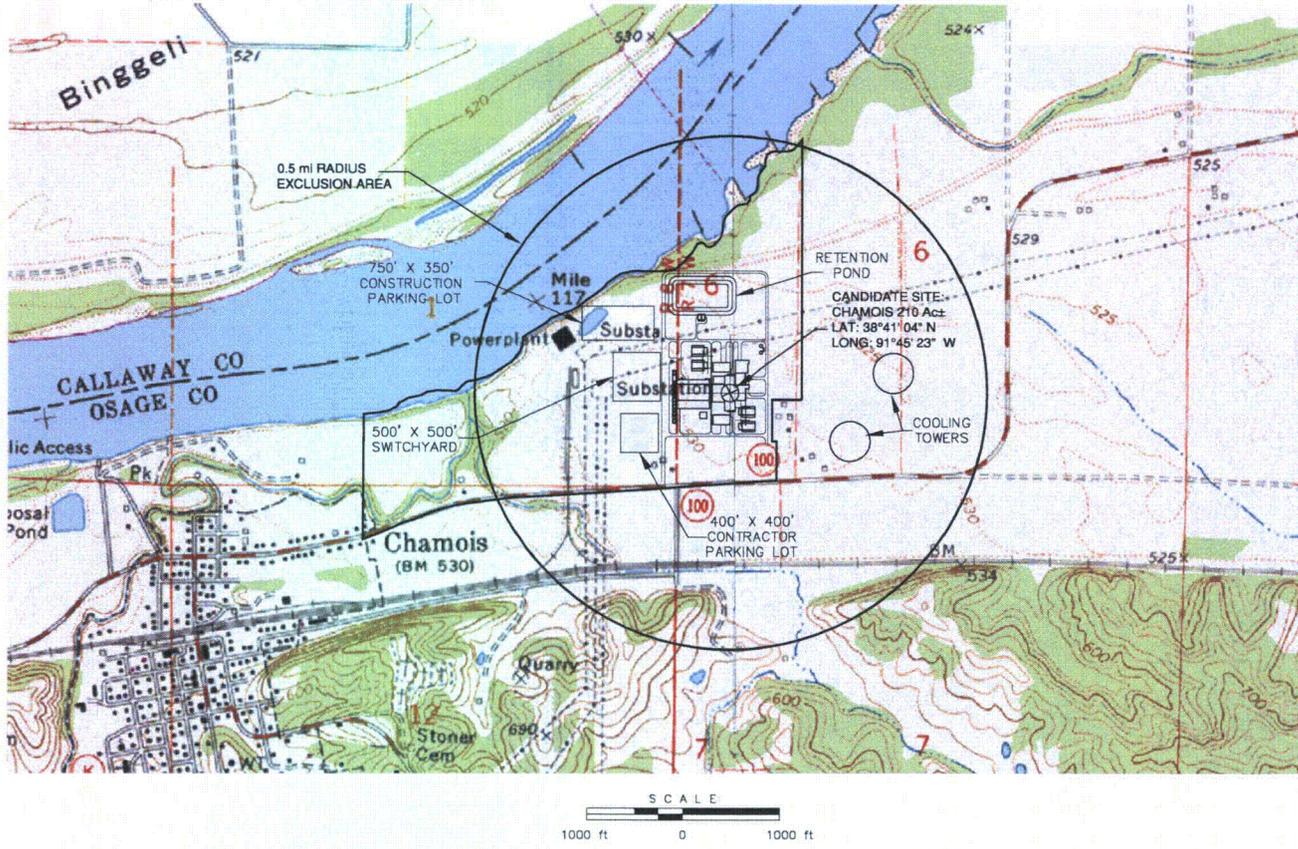
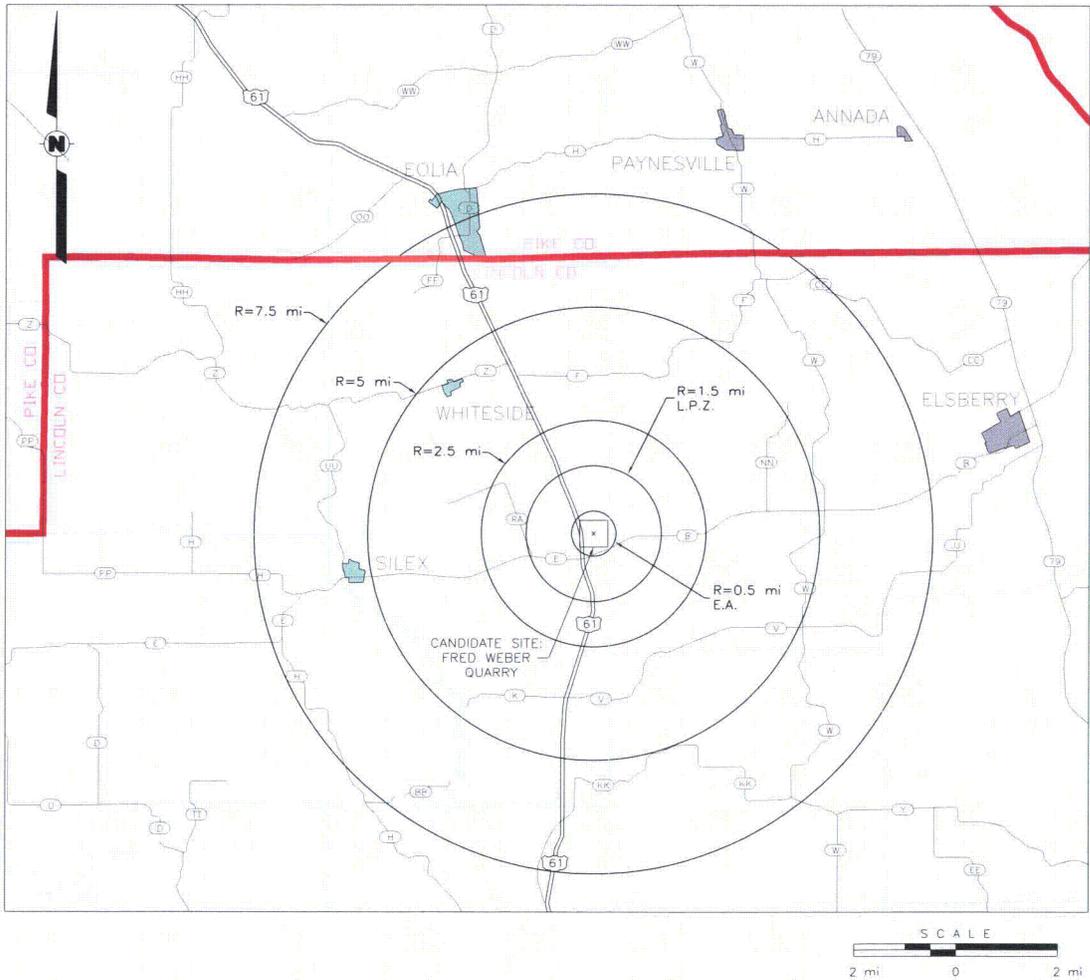


Figure 9.3-9—Candidate Site – Fred Weber Quarry

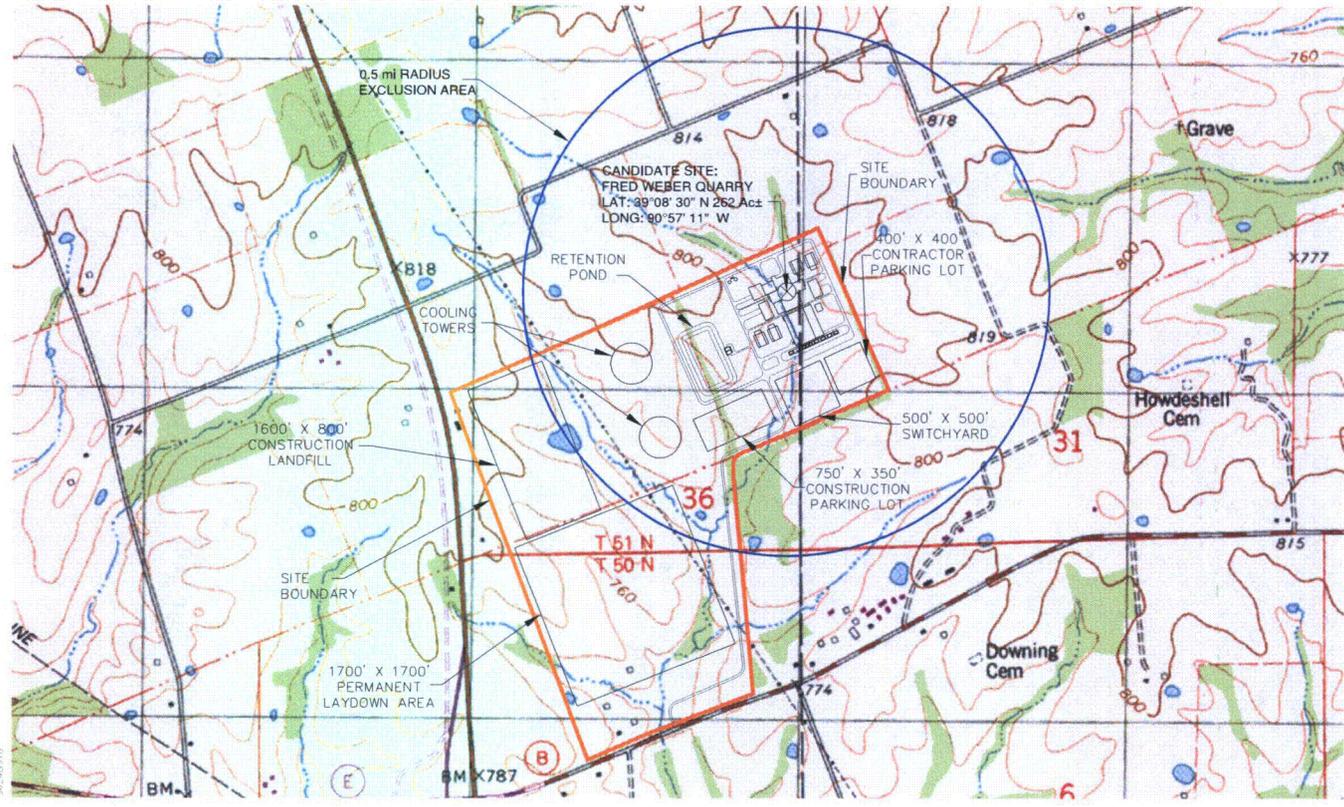


LEGEND:

- MINOR CIVIL DIVISION
- US ROUTE
- STATE ROUTE
- RIVER
- COUNTY BOUNDARY
- CITY OR TOWN
- AMERENUE 345KV TRANSMISSION LINE
- NON-AMEREN 345KV TRANSMISSION LINE
- 0.5 mi RADIUS EXCLUSION AREA
- 1.5 mi RADIUS LOW POPULATION ZONE
- AMERENUE ELEC. GEN. STATION
- NON-AMEREN ELEC. GEN. STATION
- AMERENUE SUBSTATION
- NON-AMEREN SUBSTATION
- CANDIDATE SITE



Figure 9.3-10—Candidate Site – Fred Weber Quarry USGS



REFERENCES

- 1. USGS TOPOGRAPHIC MAP, 7.5 MINUTE SERIES, OKETE QUADRANGLE, PHOTOREVISED 1984.
- 2. USGS TOPOGRAPHIC MAP, 7.5 MINUTE SERIES, AUBURN QUADRANGLE, PHOTOREVISED 1984.

Figure 9.3-11—Candidate Site - Lamine

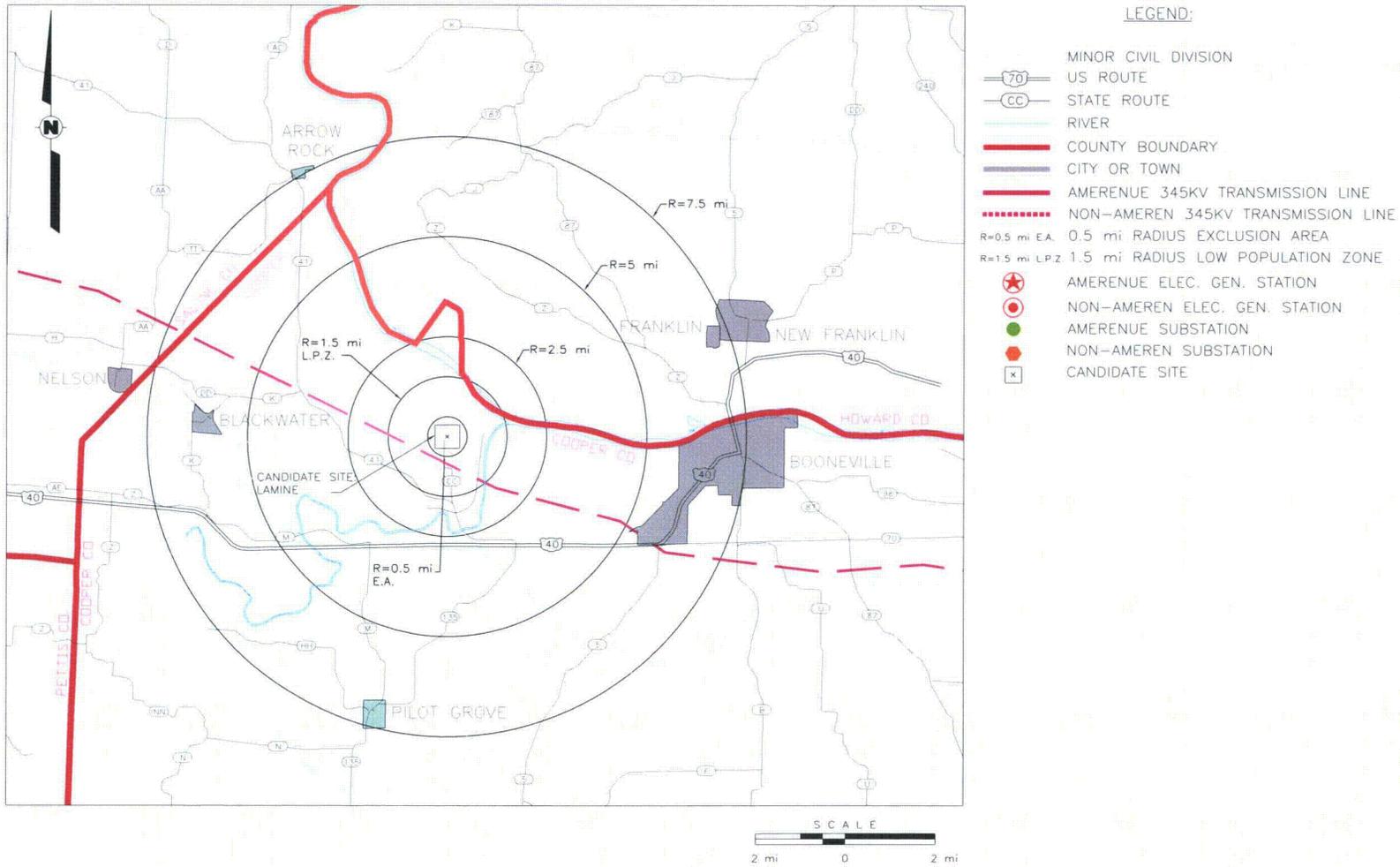


Figure 9.3-12—Candidate Site – Lamine USGS

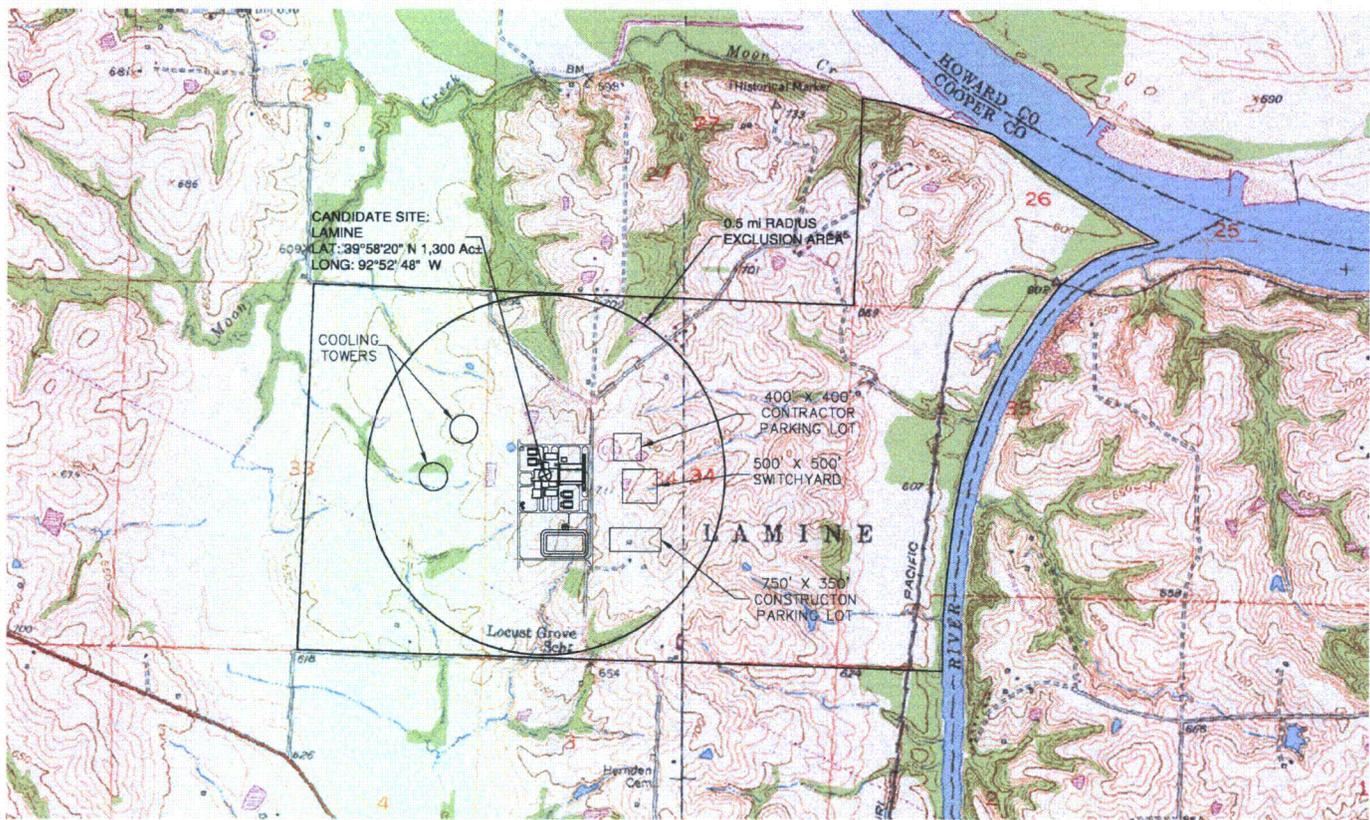


Figure 9.3-13—Candidate Site – Paynesville

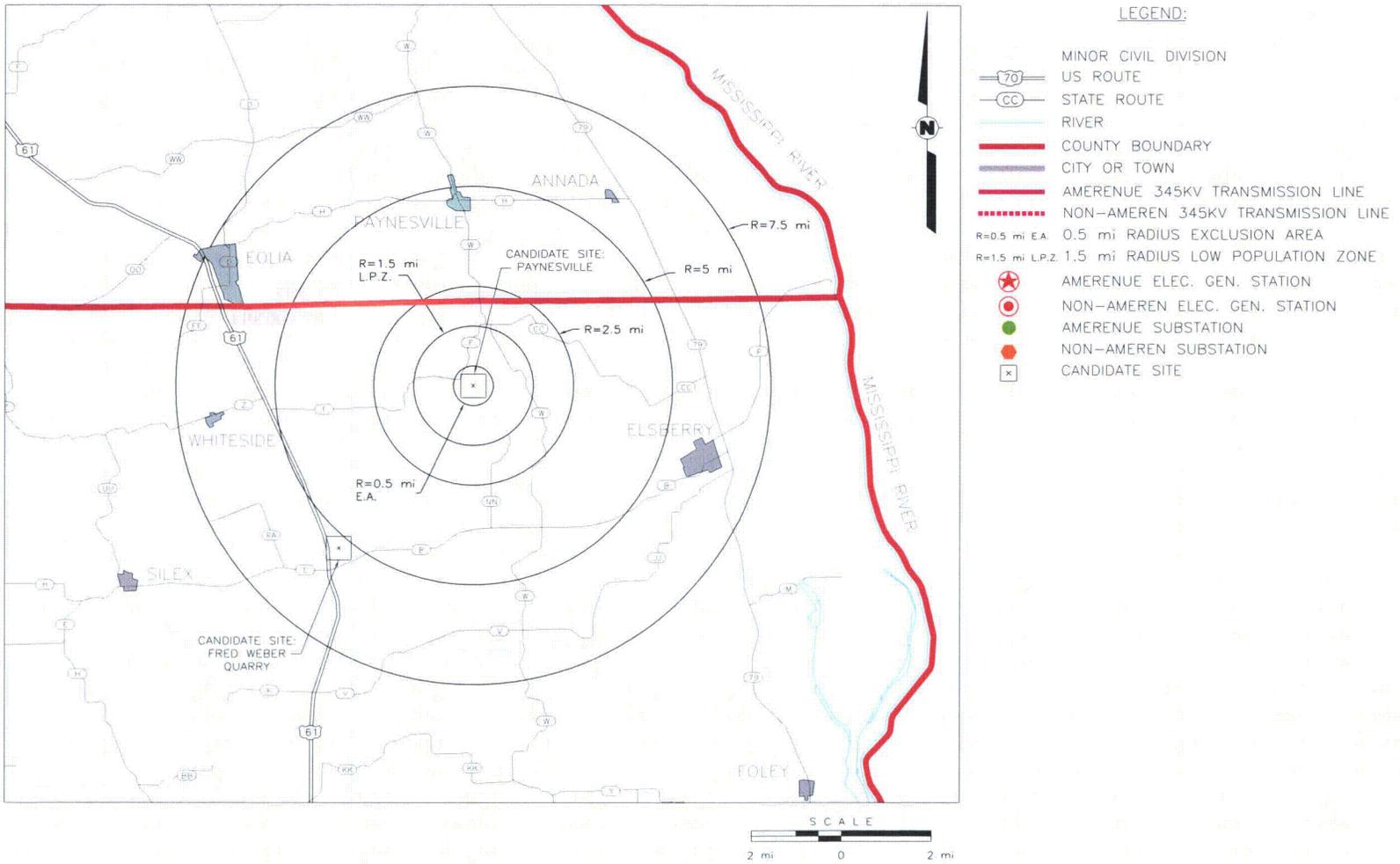




Figure 9.3-14—Candidate Site – Paynesville USGS



Figure 9.3-15—Candidate Site – Callaway

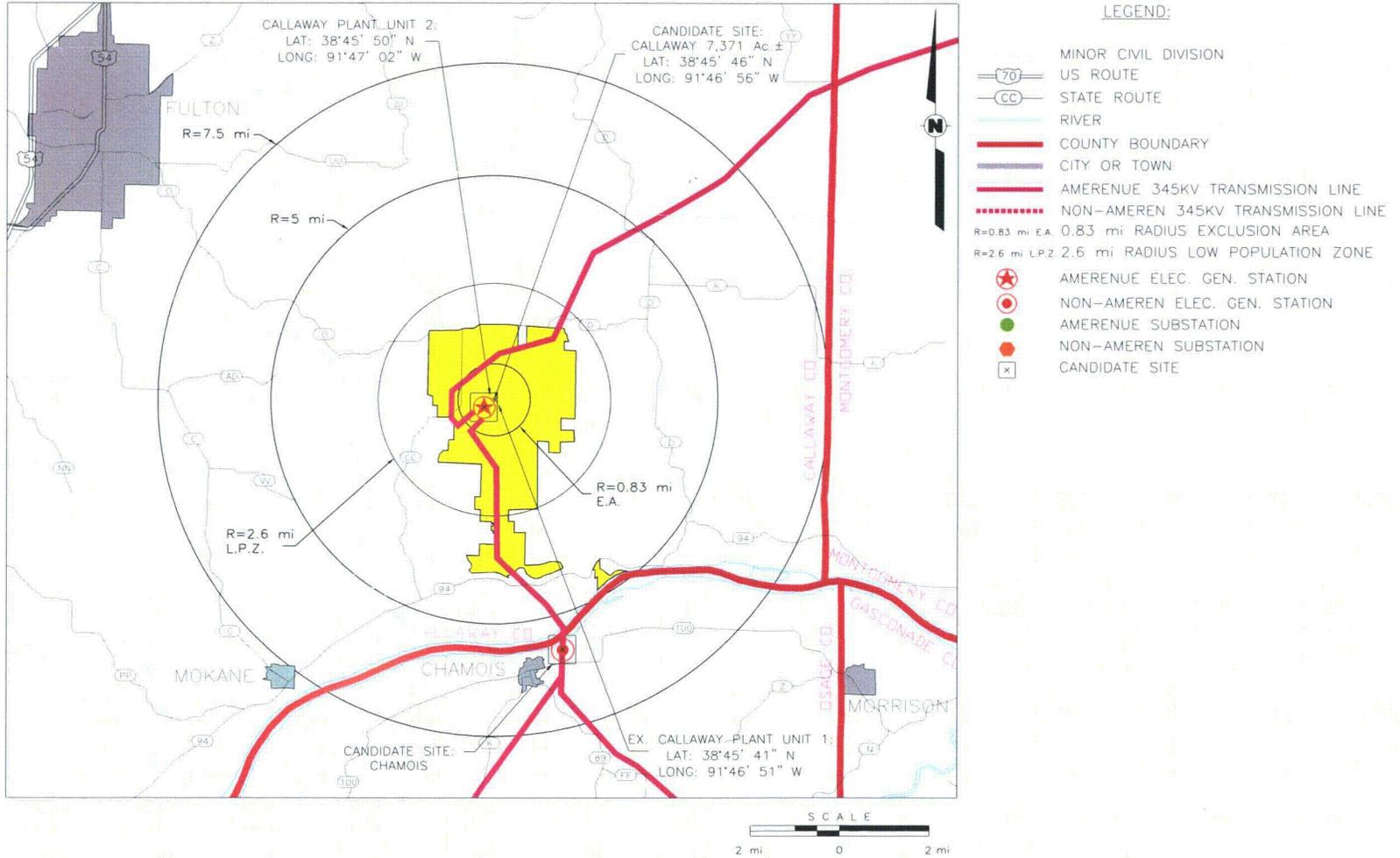


Figure 9.3-16—Candidate Site – Callaway USGS

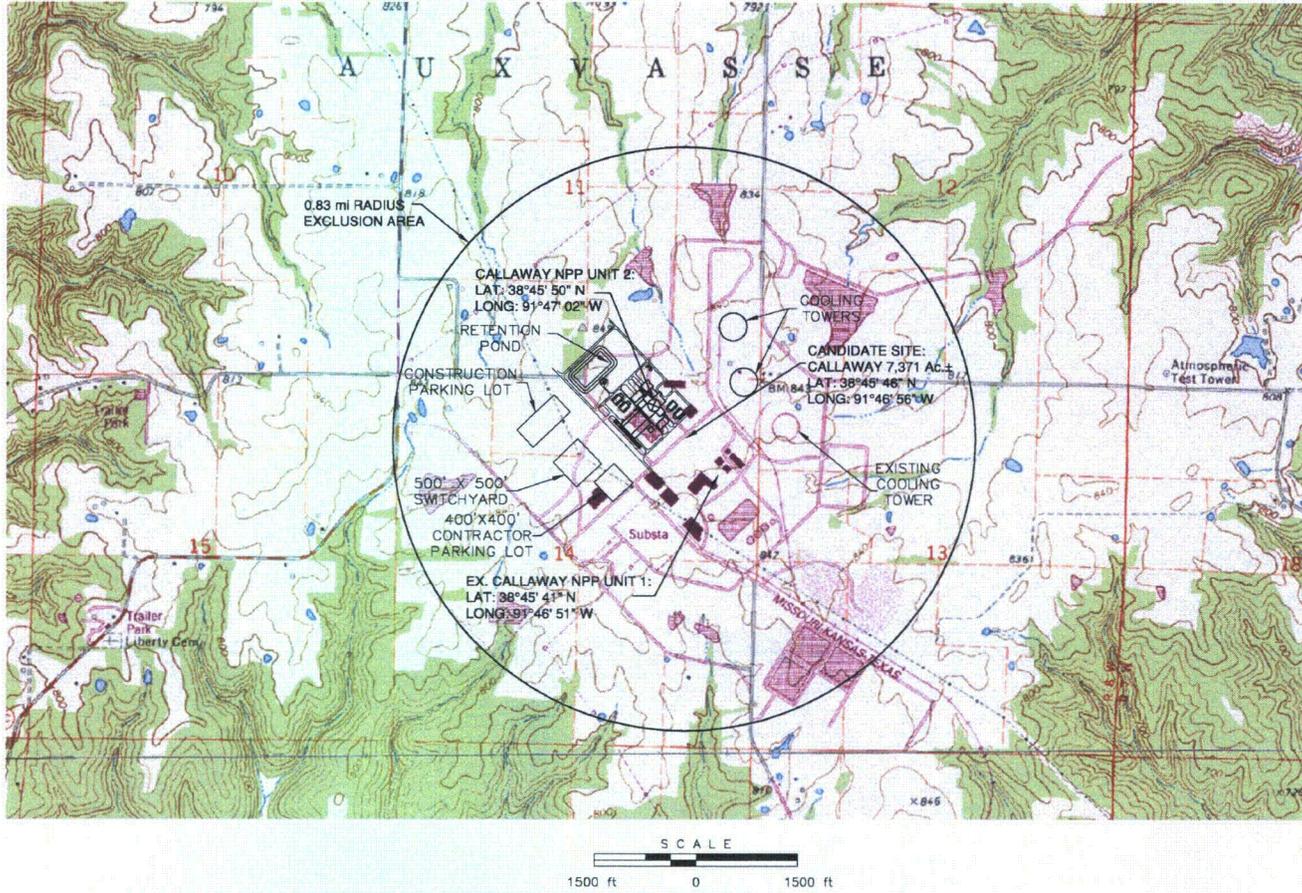
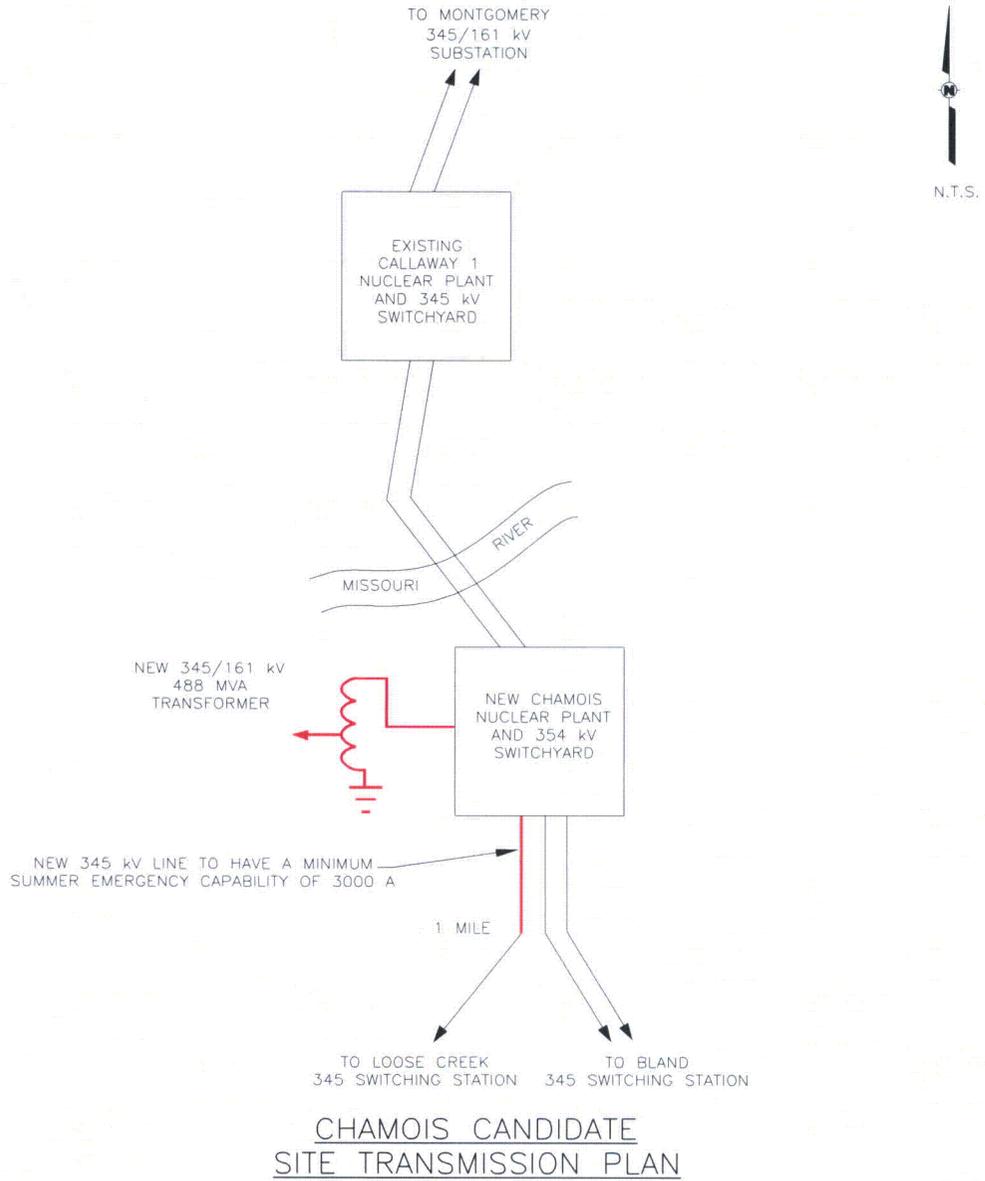
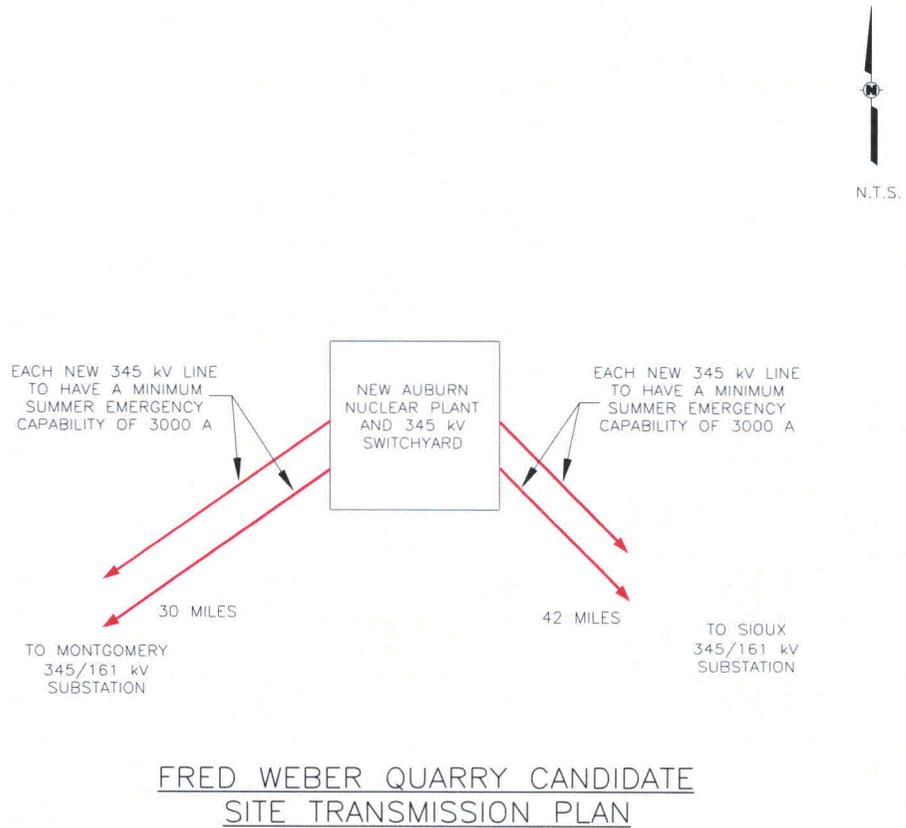


Figure 9.3-17—Chamois Candidate Site Transmission Plan



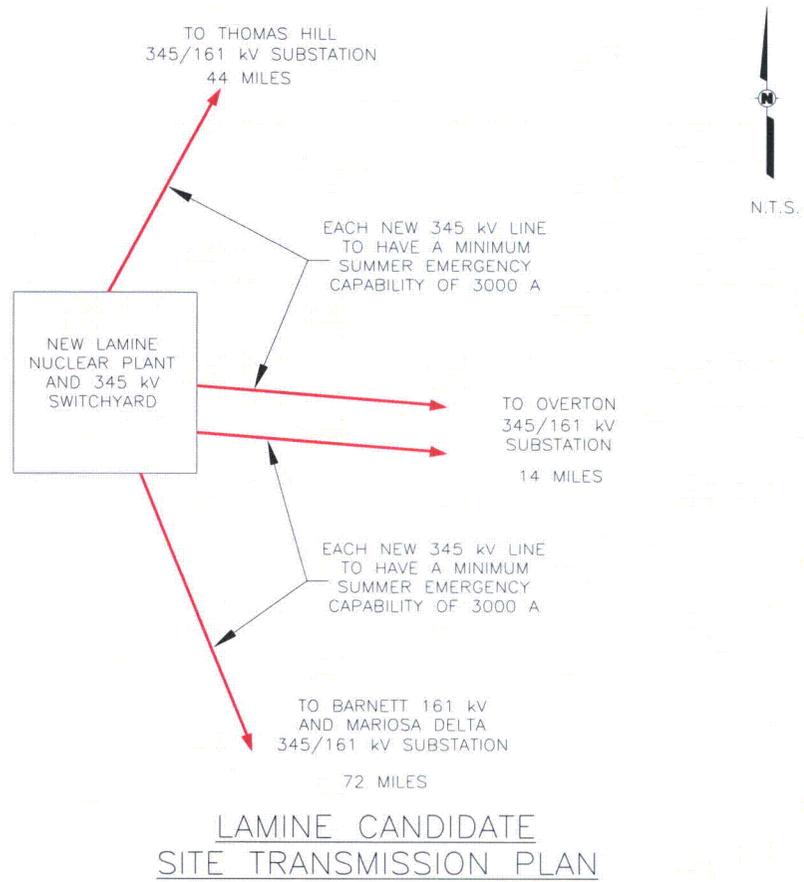
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**Figure 9.3-18—Fred Weber Quarry Candidate Site Transmission Plan**



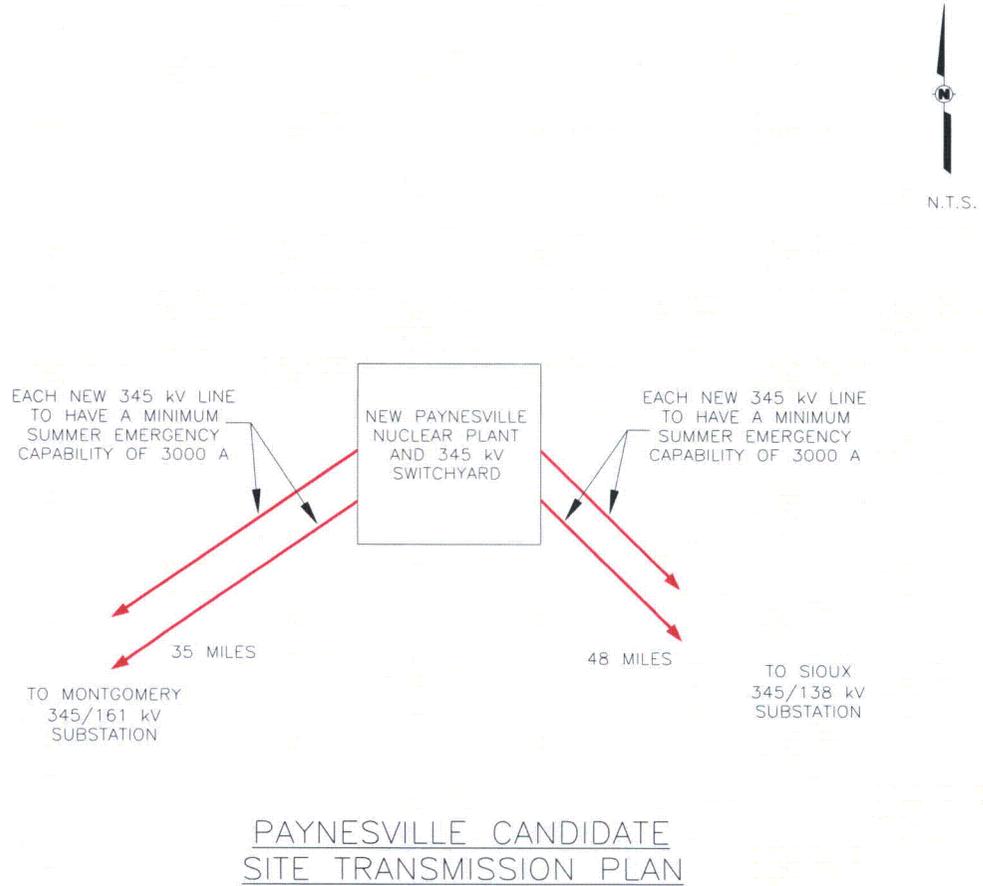
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Figure 9.3-19—Lamine Candidate Site Transmission Plan



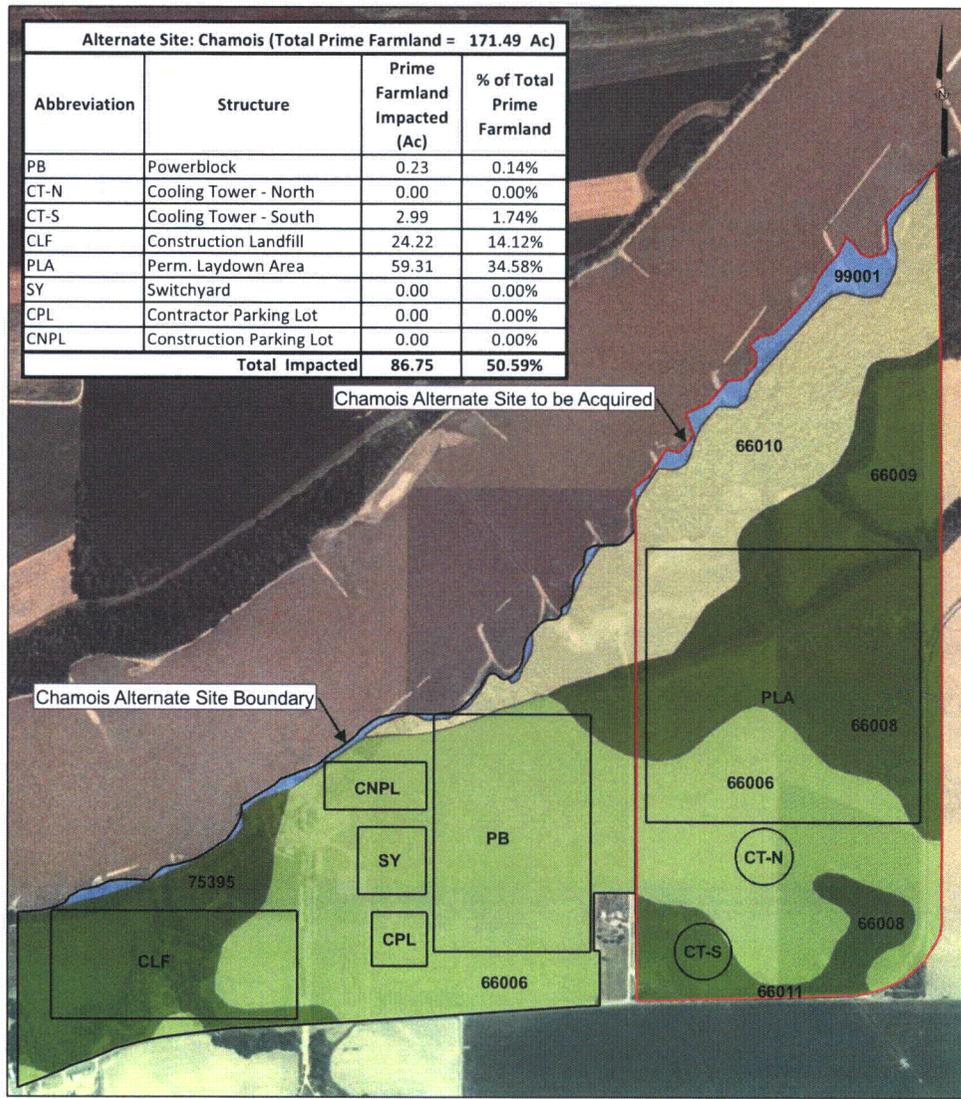
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**Figure 9.3-20—Paynesville Candidate Site Transmission Plan**



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Figure 9.3-21—Farmland on the Chamois Site

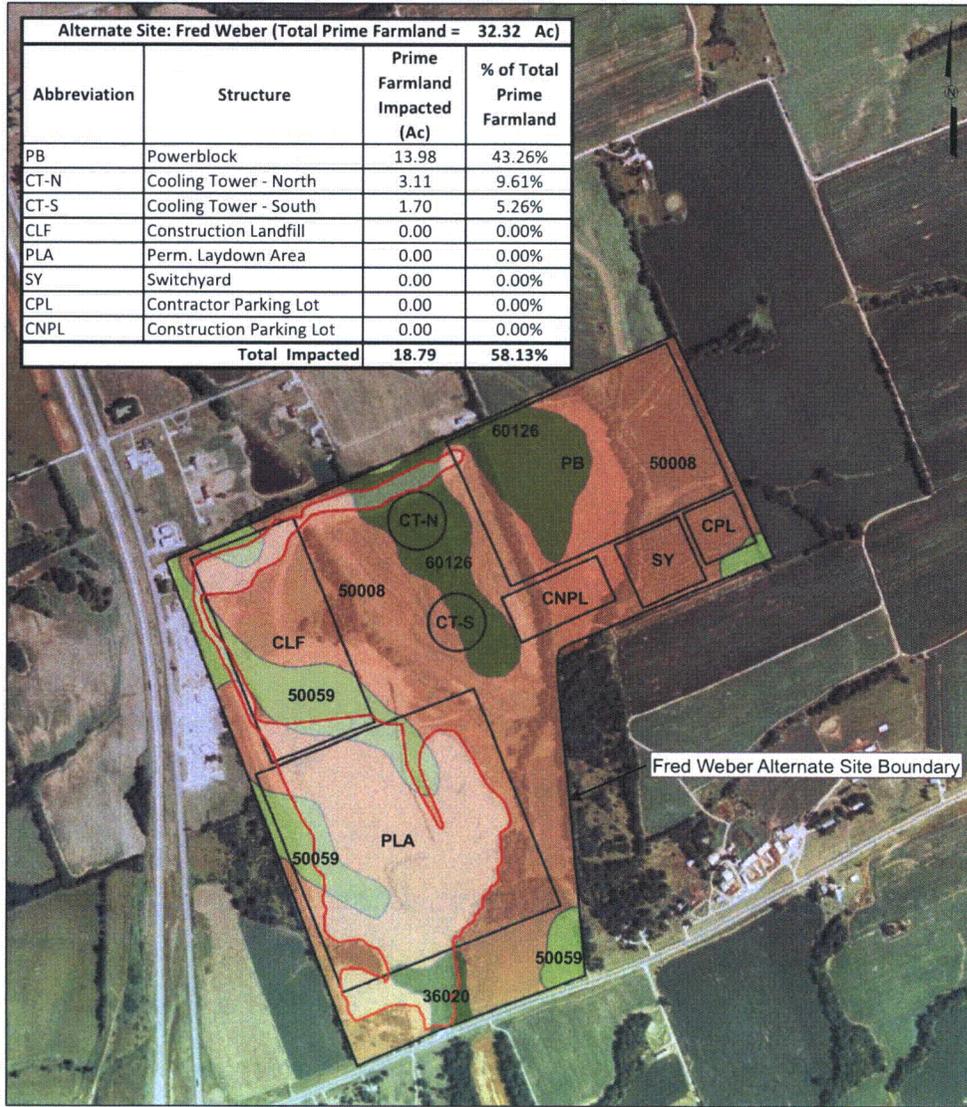


**LEGEND**  
 Not Prime Farmland  
 Prime Farmland  
 Prime Farmland, if drained  
 Water

**REFERENCE:**  
 Soil Survey Geographic Database for Osage County, Missouri.  
 US Department of Agriculture (USDA), Natural Resources Conservation Service, June 2008.  
 2006 Missouri USDA NAIP Data.

0 1,000 2,000 Feet

Figure 9.3-22—Farmland on the Fred Weber Site



**LEGEND**

- Prime Farmland
- Prime Farmland, if drained
- Farmland of Statewide Importance
- Quarry Area (No Longer Farmland)

**REFERENCE:**

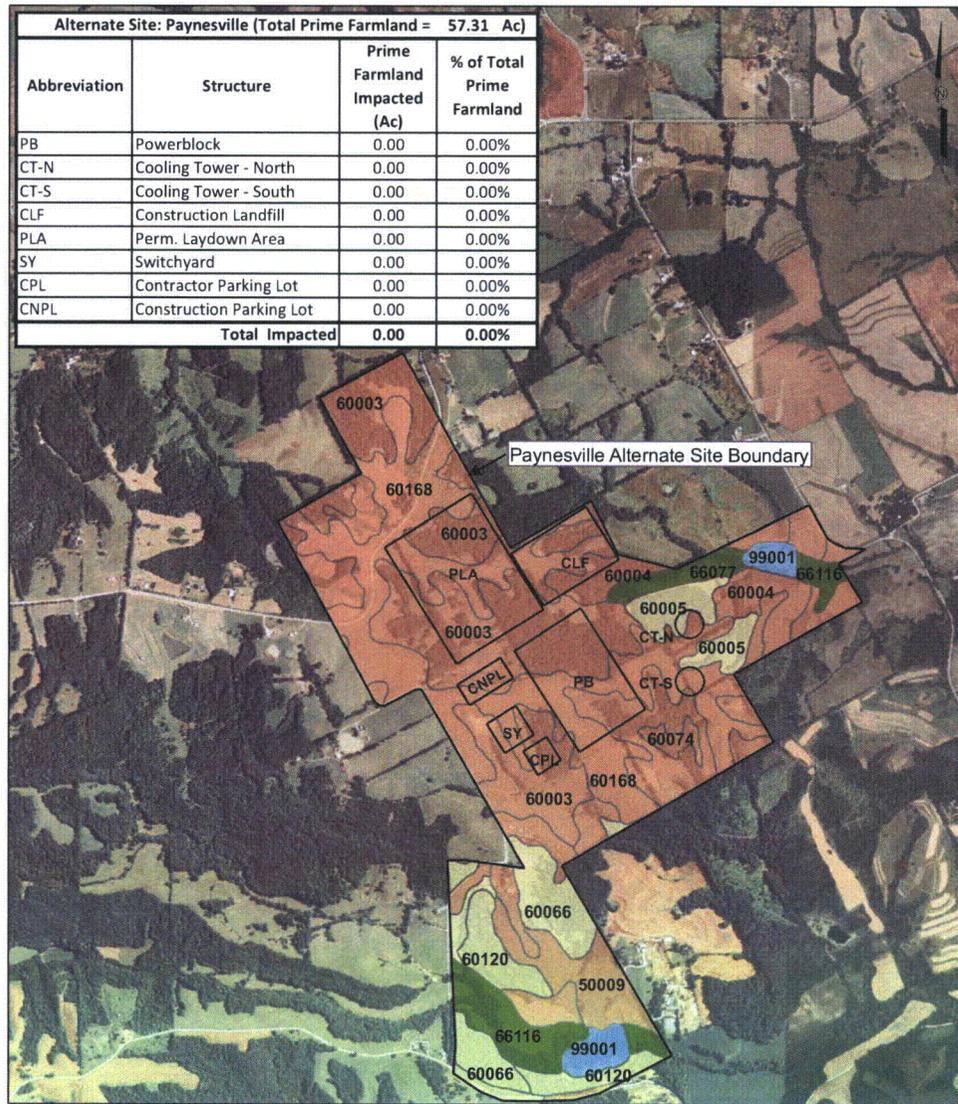
Soil Survey Geographic Database for Lincoln County, Missouri.  
 US Department of Agriculture (USDA), Natural Resources Conservation Service, June 2008.  
 2006 Missouri USDA NAIP Data.

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Figure 9.3-24—Farmland on the Paynesville Site



**LEGEND** NO PRIME FARMLAND IMPACTED

Not Prime Farmland  
 Prime Farmland  
 Farmland of Statewide Importance  
 Water

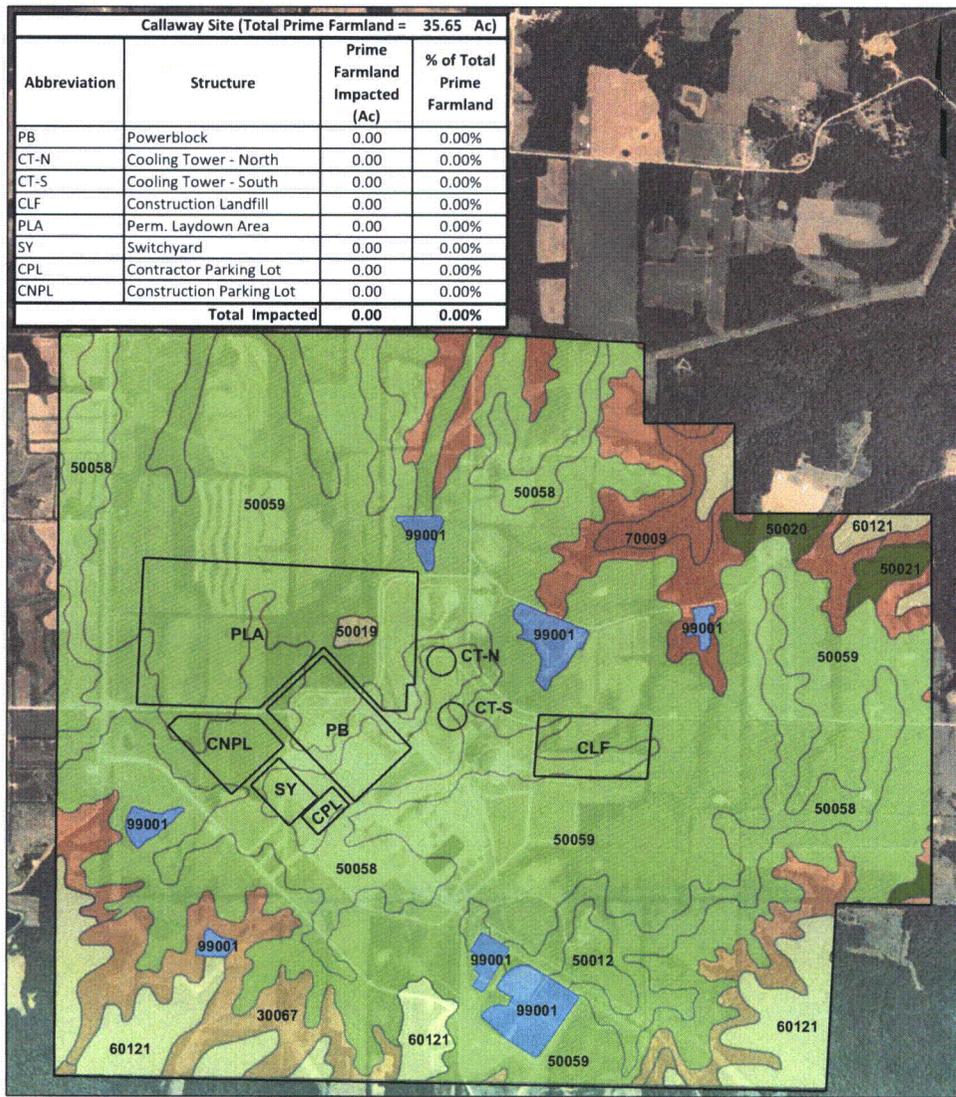
REFERENCE:  
 Soil Survey Geographic Database for Lincoln County, Missouri.  
 US Department of Agriculture (USDA), Natural Resources Conservation Service, June 2008.  
 2006 Missouri USDA NAIP Data.

0      2,000      4,000 Feet

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Figure 9.3-25—Farmland on the Callaway Site



**LEGEND** NO PRIME FARMLAND IMPACTED

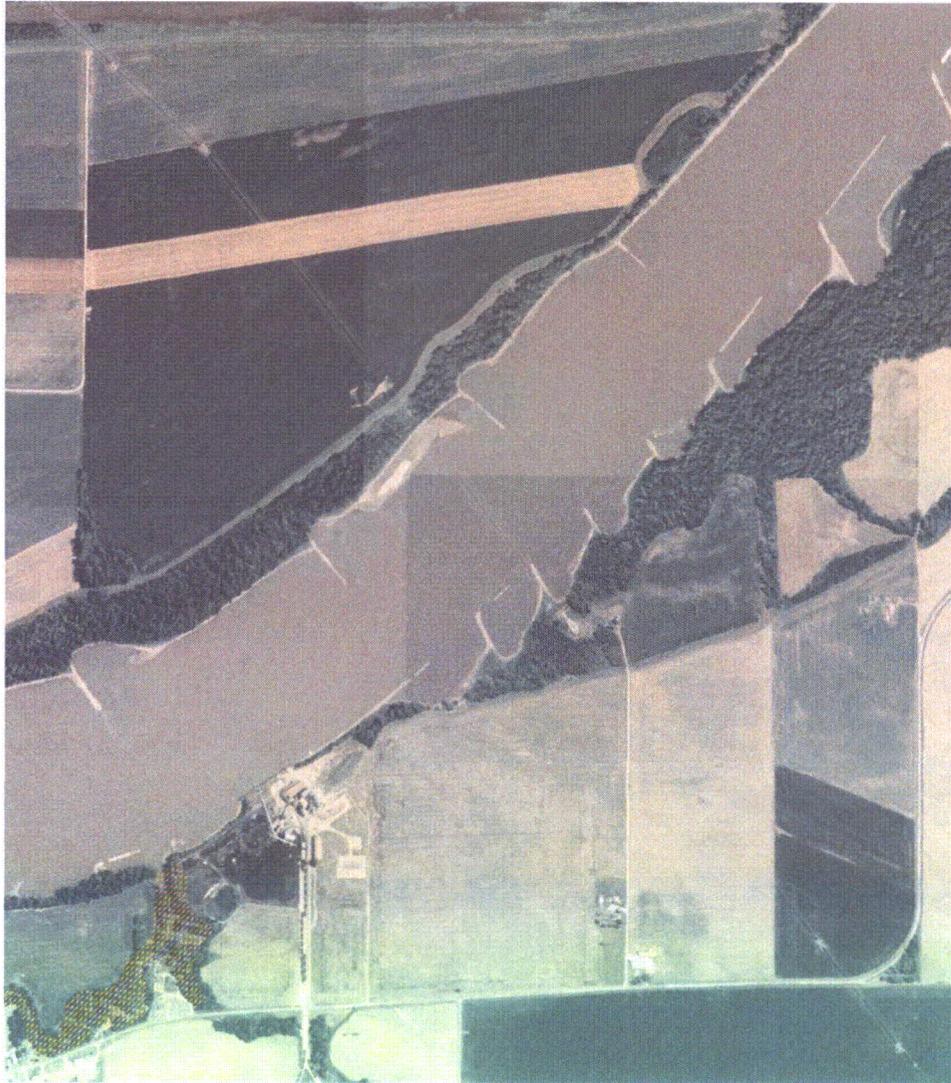
Not Prime Farmland      Water  
 Prime Farmland  
 Prime Farmland, if drained  
 Farmland of Statewide Importance

**REFERENCE:**  
 Soil Survey Geographic Database for Callaway County, Missouri.  
 US Department of Agriculture (USDA), Natural Resources Conservation Service, June 2007.  
 2006 Missouri USDA NAIP Data.

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Figure 9.3-26—NWI Wetlands on the Chamois Site



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