Macro-Corridor Study

Smith to West Garrard 345-kV Transmission Project

East Kentucky Power Cooperative

June 2006

Table of Contents

List of Figures

List of Tables

PART I: INTRODUCTION

East Kentucky Power Cooperative (EKPC) is a generation and transmission electric cooperative based in Winchester, Ky. EKPC serves 16 member distribution cooperatives, which, in turn, serve nearly 500,000 homes, farms and businesses in Kentucky. Founded in 1941, EKPC operates power plants located in Mason, Clark and Pulaski counties of Kentucky, and renewable energy plants in Boone, Laurel, Greenup and Hardin counties, along with gas peaking units, hydro power and more than 2,800 miles of transmission lines.

To finance the electric transmission line project described in this report, East Kentucky Power Cooperative (EKPC) is applying for loan funding from the Rural Utilities Service, which administers the U.S. Department of Agriculture's Rural Development Utilities Programs, including making direct loans and loan guarantees to electric utilities to serve customers in rural areas. The loans and loan guarantees finance the construction of electric distribution, transmission, and generation facilities, including system improvements and replacement required to furnish and improve electric service in rural areas, as well as demand side management, energy conservation programs, and on-grid and off-grid renewable energy systems.

This project must comply with the National Environmental Policy Act (NEPA), which requires federal agencies to integrate environmental values into their decision-making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions. To comply with the standards of NEPA and related regulations, EKPC has developed this Macro-Corridor Study, which defines the project study area and shows the end points. Alternative corridor routes were developed based on environmental, engineering, economic, land use and permitting constraints.

PART II: PROJECT DESCRIPTION

To accommodate load growth among its member cooperatives, EKPC plans to construct generating units at its J.K. Smith Power Station, located in the community of Trapp, Ky., in Clark County. The site currently contains seven combustion turbine (CT) units with a total generating capacity of 826 MW at winter capacity. Four existing 138-kilovolt transmission lines currently are connected to the J.K. Smith Substation. These lines are insufficient to accommodate delivery of any additional generation at an expanded J.K. Smith Power Station.

EKPC has proposed to construct five additional CT's at J.K. Smith. The first of these units is scheduled to become operational in March of 2008. The addition of this generation has created the necessity for additional transmission outlets from the facility. The Smith-West Garrard transmission line will provide the outlet necessary for the addition of the five combustion turbines proposed for construction at J.K. Smith Station.

J.K. Smith Station has been the subject of two environmental impact statements (EIS) and three environmental assessments throughout the facility's history. Typically, the addition of CTs on an existing generation site has required the preparation of an environmental assessment with scoping requirements per USDA Rural Development regulations (7 CFR 1794). Due to the high level of environmental work that has been conducted on the J.K. Smith Station site and the amount of disturbance that has occurred on the site, USDA Rural Development has waived the scoping requirements associated with the preparation of an environmental assessment for the CTs (per 7 CFR 1794).

The Smith – West Garrard transmission line project is being evaluated in a separate environmental assessment with scoping requirements than the CTs. USDA Rural Development allowed this classification of the project since the J.K. Smith site has already been studied extensively and the level of environmental review remains at the same level. USDA Rural Development has not waived the scoping requirements for this project.

Therefore, EKPC has prepared a Macro-Corridor Study of route alternatives and conducted an Alternative Evaluation Study. This Macro-Corridor Study was conducted to develop options for transmission line routing and to assess potential environmental, social and cultural impacts. The Electrical Alternative Evaluation Study examines the various transmission expansion options needed to support the total expected output of the expanded J.K. Smith site through 2010.

The Electrical Alternative Evaluation Study resulted in plans for a 345-kV transmission line extending from J.K. Smith Power Station that taps into the existing Brown-to-Pineville double-circuit 345-kV line owned by Kentucky Utilities. At the junction of the two lines, EKPC plans to construct the West Garrard Substation. (As a result, this project is named the Smith-West Garrard transmission line project.)

Once constructed, the Smith – West Garrard 345kV transmission line will provide sufficient capacity for the CT units proposed for the J.K. Smith Power Station. In fact, construction of these transmission facilities will provide EKPC enough capacity to handle the addition of a coal-fired power plant that has also been proposed for construction at J.K. Smith Station.

PART III: STUDY AREA DESCRIPTION

1. Study Area Location

The Smith-West Garrard 345-kV transmission line project Study Area is located in Central Kentucky, approximately 20 to 30 miles south of the Lexington urban area. (See map of Study Area in Figure 1 on Page 4.) The Study Area includes 174,917 total acres. Notable features within or adjacent to the Study Area include the Kentucky River, Interstate 75, the city of Richmond and the city of Lancaster. The Study Area includes parts of five Kentucky counties: Clark, Fayette, Garrard, Jessamine and Madison. The primary impacts are in Madison and Garrard counties.

TABLE 1: Analysis of Study Area Acres by County

County	Total Acres	Acres of Study Area	% of County in Study Area
Clark	163,305	10,278	6.29%
Fayette	182,743	1,142	0.62%
Garrard	149,744	51,394	34.32%
Jessamine	111,704	4,648	4.16%
Madison	283,711	107,454	37.87%
TOTAL	**891,207**	**174,917**	

Source: Aerial, GIS information

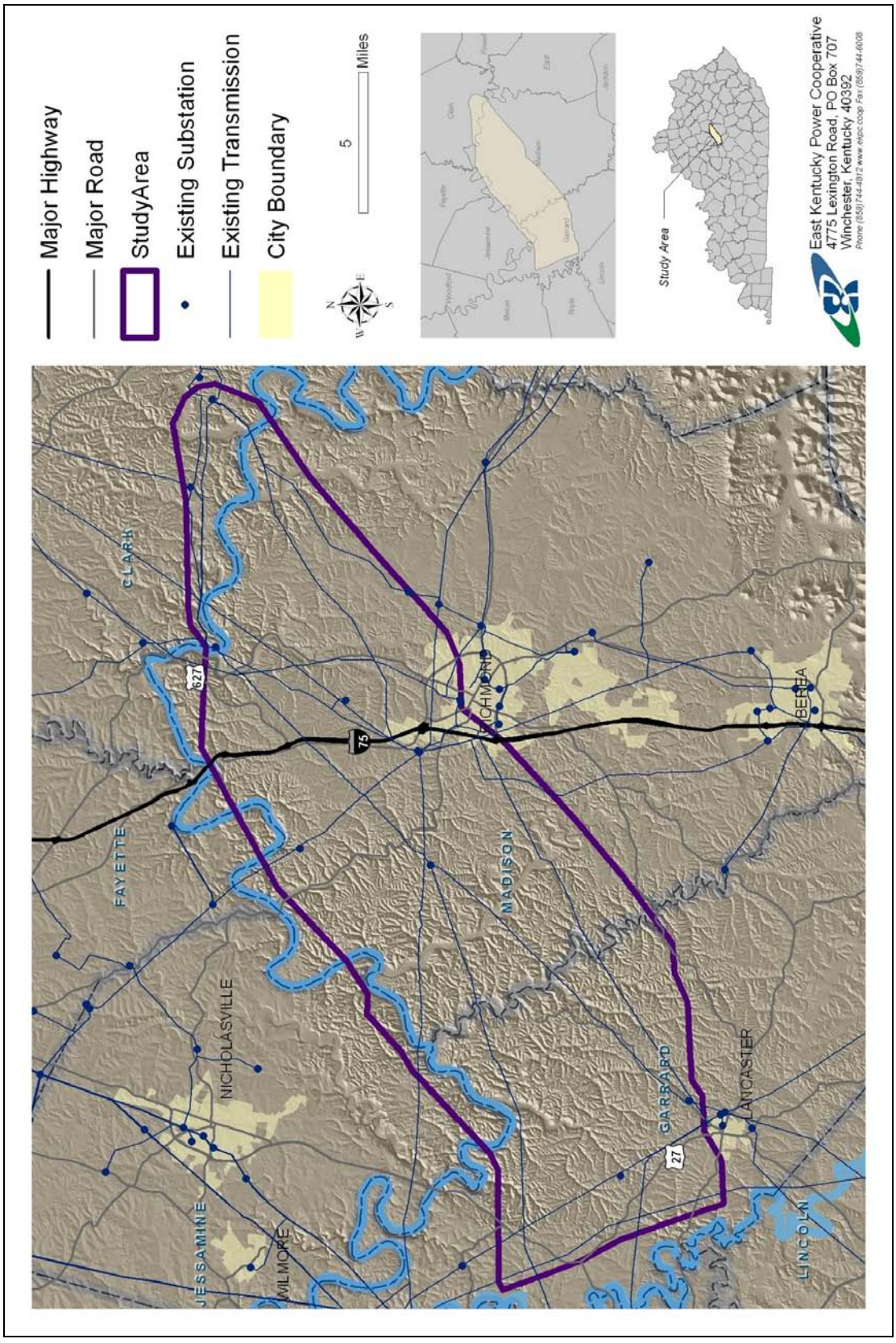
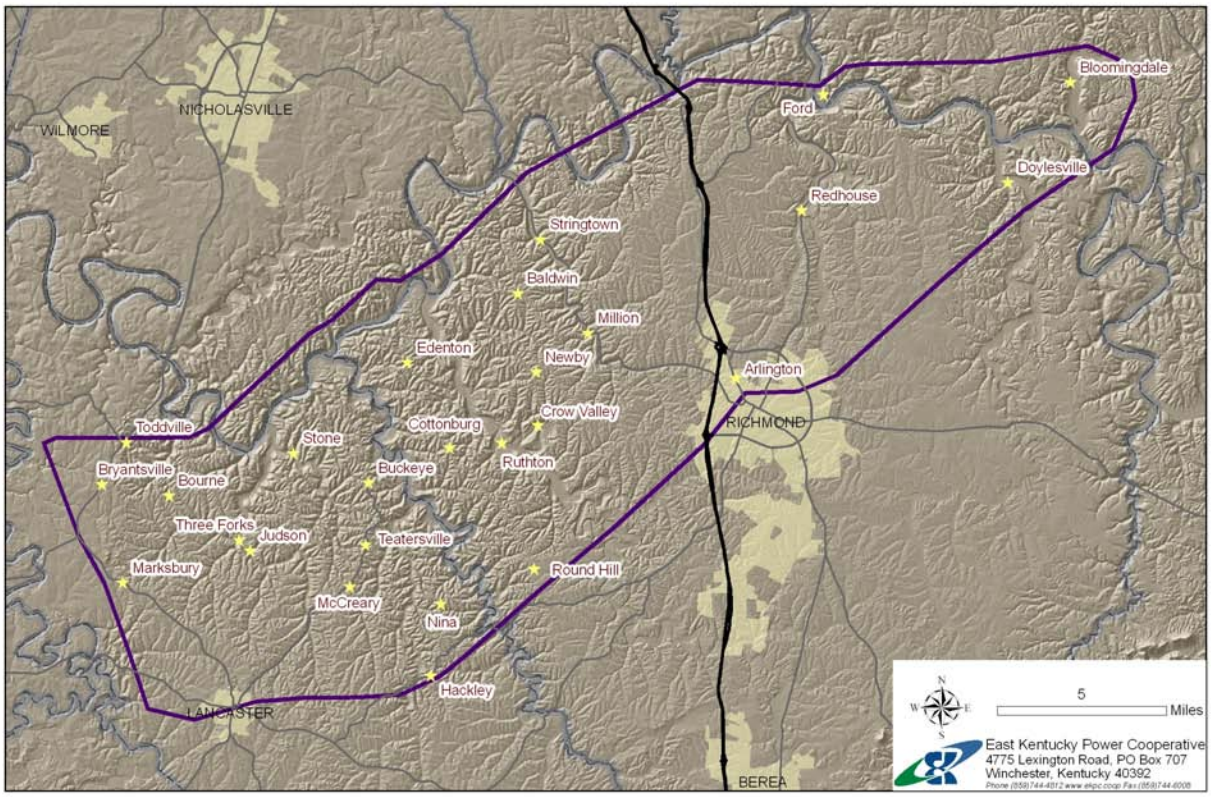


FIGURE 1: Smith-West Garrard Study Area

In addition, the Study Area impacts a number of unincorporated rural towns, including:

- Arlington, Madison County
- Baldwin, Madison County
- Bloomingdale, Clark County
- Bourne, Garrard County
- Bryantsville, Garrard County
- Buckeye, Garrard County
- Cottonburg, Madison County
- Crow Valley, Madison County
- Doylesville, Madison County
- Edenton, Madison County
- Ford, Clark County
- Hackley, Jessamine County
- Judson, Garrard County
- Marksbury, Garrard County
- McCreary, Garrard County
- Million, Madison County
- Newby, Madison County
- Nina, Jessamine County
- Redhouse, Madison County
- Round Hill, Madison County
- Ruthton, Madison County
- Stone, Garrard County
- Stringtown, Madison County
- Teatersville, Garrard County
- Three Forks, Garrard County
- Toddville, Garrard County

FIGURE 2: Rural Towns in Study Area



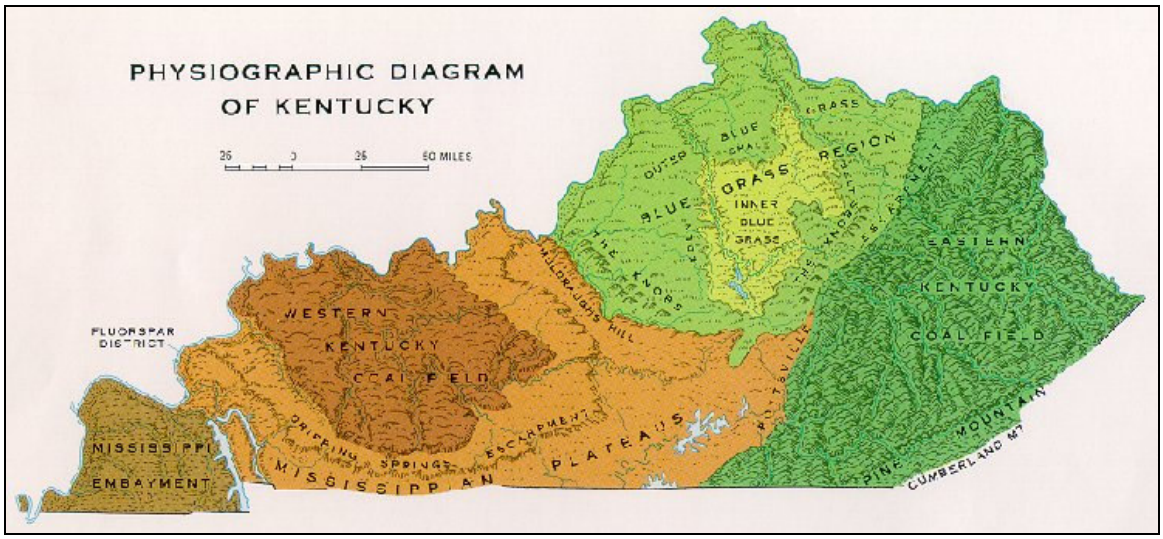
2. Study Area Characteristics

Physiography

The project area lies within the Inner Blue Grass and Outer Blue Grass Physiographic Regions of Kentucky. The Inner Blue Grass is characterized by gently rolling hills and rich, fertile soils. The hills are caused by the weathering of relatively rick-bedded limestone that characterize the Ordovician strata of central Kentucky that has been pushed up along the crest of the Cincinnati Arch. Weathering of the limestones produces sink holes, sinking streams, springs, caves and soils. The soils are fertile because the Ordovician limestones contain phosphate minerals (e.g., apatite), which are natural fertilizers. An interesting feature situated in the project area is the Kentucky River Palisades. The palisades consist of the cliffs in the gorge or canyon along the Kentucky River where it cuts through resistant massive limestones and dolostones. These massive limestones and dolostones are the oldest strata exposed at the surface in Kentucky. The Outer Bluegrass is characterized by deeper valleys, with little flat land, because the bedrock in this area is mostly composed of interbedded Ordovician limestones and shales that are more easily eroded than the limestones of the Inner Bluegrass. (University of Kentucky, Kentucky Geological Survey, http://www.uky.edu/KGS/geoky/pages/regionbluegrass.html)

The Kentucky River and Paint Lick Creek are the primary waterways that occur in the project area. The average annual rainfall for the area is around 45 inches. Winters tend to be long, damp, and cold while the summers tend to be warm with periods of 80 - 90° weather.

Figure 3: Physographic Diagram of Kentucky



Source: Kentucky Geological Survey (http://www.uky.edu/KGS/geoky/pages/physiographic.html)

Land Use/Land Cover

The Study Area for the proposed project consists primarily of agricultural lands in the form of pastureland for livestock other than horses. Approximately 29 percent of the area is forested. The majority of forest lands occur in the northern half of the study area and are associated with the Kentucky River corridor and major tributaries. The pastureland occurs on the flat, broad ridgetops associated with the Bluegrass region. Row cropping is typically confined to the alluvial plains in the major tributaries of the Kentucky River.

The urban areas are concentrated in the south-central portion of the study area, and they are associated with the city of Richmond and points surrounding the Interstate 75 corridor. Urban areas also are prevalent along the western edge of the study corridor in conjunction with the city of Lancaster to the southwest and the U.S. 27 corridor. There are scattered rural communities throughout the study area. See Figure 4 on Page 8 for a detailed land use/land cover map.

TABLE 2: Land Use/Land Cover of Study Area

Land Cover Type	Acres	% 0f Area
Apartment/High Density	195	0.11%
Commercial/Industrial	499	0.29
Forested	50,227	28.72
Horse Farms	355	0.20
Hydrography	2,030	1.16
Other*	239	0.14
Other Livestock	100,878	57.67
Planted Pine	393	0.22
Recreational	245	0.14
Residential	8,479	4.85
Road ROW	2,671	1.53
Row Crop	6,522	3.73
Transportation	1,310	0.75
Utility R/W	873	0.50
TOTAL	**174,917**	**100.00%**

Source: Photo Science Inc.

* land cover types with less that 0.01% of area, classified as Other

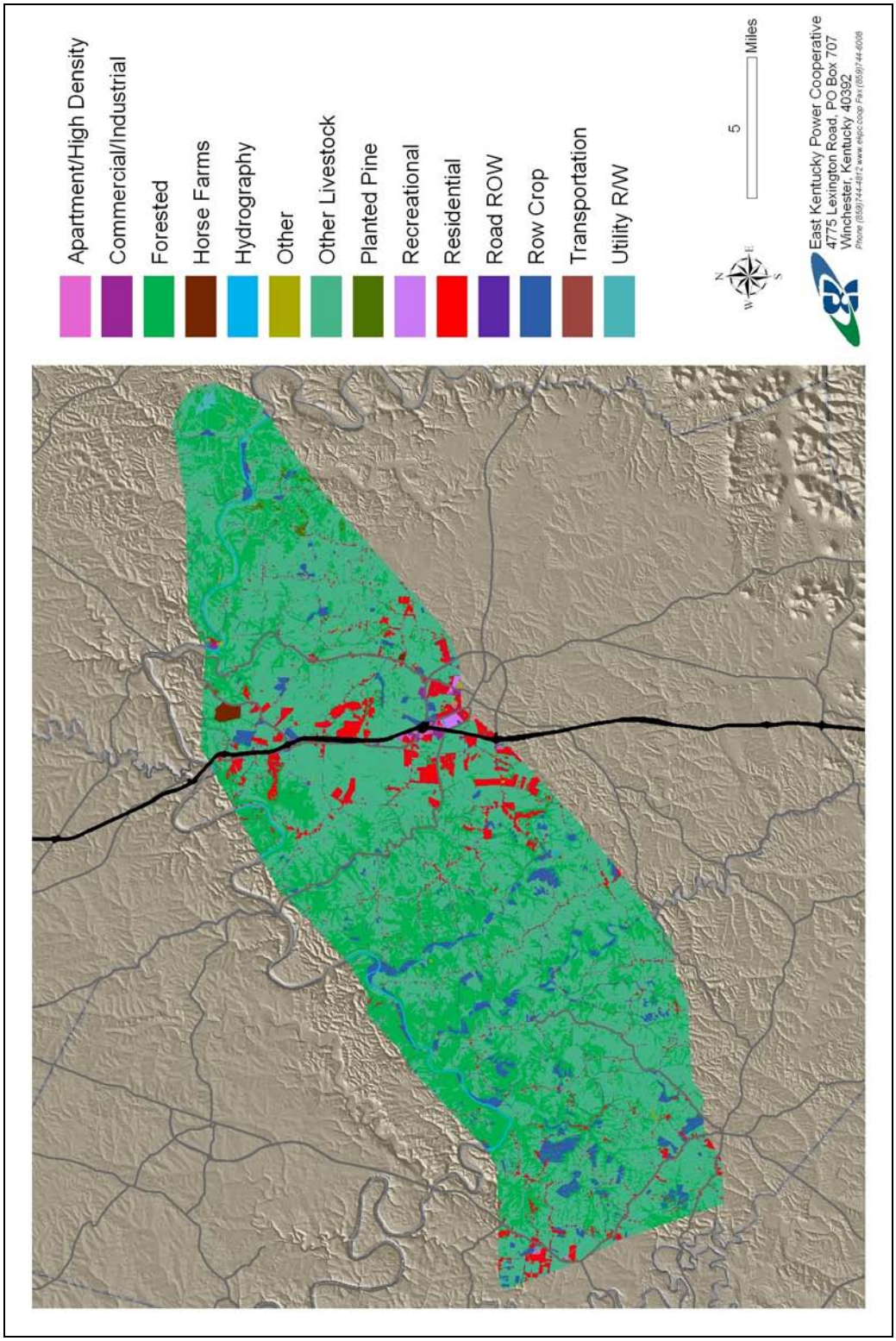


FIGURE 4: Study Area Land Use/Land Cover

Socioeconomic Data

The populations of the counties included in the Study Area, like much of Central Kentucky, have seen moderate to considerable growth in recent years. (See Table 3 on Page 10 for a detailed look at socioeconomic statistics, by county).

On the eastern end of the Study Area, particularly around Richmond and the I-75 corridor, agriculture has been eclipsed in recent decades by the manufacturing and service industries as mainstays of the local economy, and residential development has begun replacing farmland. The western portion of the Study Area retains its agricultural character. Counties in the Study Area enjoy relatively low unemployment rates.

The Study Area impacts two incorporated cities, Richmond and Lancaster. Richmond, with a 2001 population of 29,080, is the county seat of Madison County and is the location of Eastern Kentucky University, with total 2005 enrollment of approximately 14,000 undergraduate and graduate students. Lancaster, with a 2001 population of 3,734, is the county seat of Garrard County.

The Study Area includes a small portion of Fayette County in the county's Rural Service Area, miles from the city proper. Fayette County features a combined city/county government, called urban county government. Lexington in Fayette County is a regional hub of commerce, industry and transportation. It is the location of the University of Kentucky.

TABLE 3: Socioeconomic Profiles of Study Area Counties

	Clark County	Fayette County	Garrard County	Jessamine County	Madison County
POPULATION					
County population, 2000	33,144	260,512	14,792	39,041	70,872
Population within Study Area (a)	806	610	6,032	613	23,983
Percent of county's population within Study Area (a)	2.43%	0.23%	40.78%	1.57%	33.84%
County population, percent change, 1990 to 2000	12.4%	15.6%	27.7%	28.0%	23.2%
HOUSHOLDS					
Households, 2000	13,015	108,288	5,741	13,867	27,152
Households within Study Area (a)	299	222	2,220	208	9,772
Percent of county's households within Study Area (a)	2.30%	0.21%	38.67%	1.50%	35.99%
AGE					
Persons under 18 years old, percent, 2000	24.8%	21.3%	24.4%	26.4%	21.9%
Persons 65 years old and over, percent, 2000	12.4%	10.0%	13.0%	9.5%	9.8%
RACE					
White persons, percent, 2000 (b)	93.6%	81.0%	95.7%	94.4%	93.0%
Black or African American persons, percent, 2000 (b)	4.8%	13.5%	3.1%	3.1%	4.4%
American Indian and Alaska Native persons, percent, 2000 (b)	0.2%	0.2%	0.1%	0.2%	0.3%
Persons of Hispanic or Latino origin, percent, 2000 (c)	1.2%	3.3%	1.3%	1.3%	1.0%
EDUCATION					
High school graduates, percent of persons age 25+, 2000	75.0%	85.8%	69.4%	79.1%	75.2%
Bachelor's degree or higher, pct of persons age 25+, 2000	15.6%	35.6%	10.5%	21.5%	21.8%
HOME OWNERSHIP					
Housing units, 2002	14,415	120,496	6,501	15,718	30,484
Homeownership rate, 2000	68.7%	55.3%	76.4%	67.1%	59.7%
Median value of owner-occupied housing units, 2000	$93,700	$110,800	$81,300	$102,100	$93,500
INCOME					
Median household income, 1999	$39,946	$39,813	$34,284	$40,096	$32,861
Per capita money income, 1999	$19,170	$23,109	$16,915	$18,842	$16,790
Persons below poverty, percent, 1999	10.6%	12.9%	14.7%	10.5%	16.8%
EMPLOYMENT					
Average unemployment, 2005	5.5%	4.6%	6.1%	4.6%	4.8%

Source: U.S. Census Bureau, Kentucky Labor Cabinet

(a) Study Area-specific data based on Census blocks; some portions of some Census blocks may lie outside of Study Area

(b) Includes persons reporting only one race.

(c) Hispanics may be of any race, so also are included in applicable race categories.

Transportation

Significant transportation features in the Study Area consist of north-south highway corridors. These include:

- A portion of Interstate 75, a principal highway artery between the Midwest and Southeast United States. The Study Area encompasses a 10.72-mile section of I-75 from near the Kentucky River to the western edge of the city of Richmond.
- A portion of U.S. 25/421, which runs immediately parallel to I-75 through most of the Study Area then forms the northern portion of the Richmond Bypass.
- A portion of U.S. 27 north of Stanford.
- A portion of Ky. 627 from near the Kentucky River to I-75.

Water Resources

The Study Area encompasses nearly 175,000 acres, 1.16 percent of which is comprised of water. (See Table 4 below for a list of significant water resources.) The Kentucky River is the largest body of water in the Study Area. The Kentucky River system drains much of the central region of the state. Numerous perennial and intermittent streams associated with this watershed are found in the Study Area. Wetlands primarily are limited to the stream corridors due to the karst topography in the area. There are many unconsolidated ponds and lakes identified as wetlands through the U.S. Fish and Wildlife Service's National Wetland Inventory maps.

TABLE 4: Water Resources Within Study Area
Major Rivers/Streams
Kentucky River
Paint Lick Creek
Sugar Creek
Tate Creek
Silver Creek
East Fork Otter Creek
Scotch Fork
West Creek
Otter Creek
Shallow Ford Creek
West Fork
Boone Creek
Jackson Branch
Long Branch
Hicks Branch
West Fork Creek
Middle Fork
Jacks Creek

Source: USGS National Hydrography Dataset

Recreation Resources

Recreational resources in the Study Area include city parks and Arlington Country Club in Richmond, and other scattered small parks associated with the rural communities within the Study Area.

Cultural Resources

The study area is rich in cultural historic resources. Six historic districts, several listed sites, as well as numerous eligible and potentially eligible sites for listing on the National Register of Historic Places exist in the study area.

Federal and State Lands

State lands in the Study Area include White Hall State Historic Site and a portion of the Tom Dorman Kentucky River Palisades.

Sensitive Wildlife Resources

There are three federally listed species—one plant and two bats—that occur or may occur in the proposed Study Area that could be impacted by the proposed project. The project area also is host to several species of birds, mammals, and plants that are monitored by the Kentucky State Nature Preserve Commission (KSNPC).

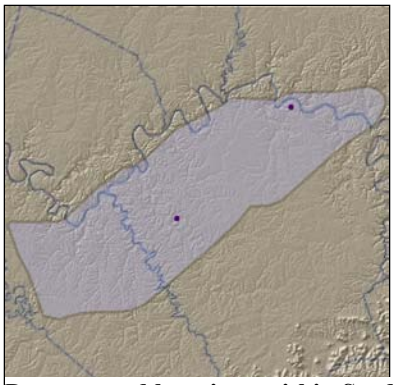
Running Buffalo Clover (*Trifolium stoloniferum*)

(Photo courtesy of Kentucky State Nature Preserve Commission Staff)

Running Buffalo Clover (*Trifolium stoloniferum*) is a federally endangered species of plant that occurs in flood plains, streambanks, lawns, grazed bottomlands, mesic woodlands, old trails, traces, roads, shoals, cemeteries with native vegetation, prairies, and well-drained mesic soils. The plant needs filtered to partial light, and it is usually found where some disturbance occurs such as mowing, trampling, or grazing, and in areas underlain with calcareous bedrock such as limestone. Trees commonly associated with running buffalo clover include: box elder, sugar maple, white ash, black walnut, and American elm. Running buffalo clover usually produces erect flowering stems 10-30 cm (4-12") tall. The petals are usually

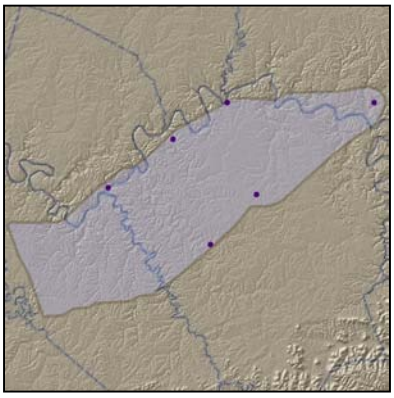
white tinged with purple, and it flowers from April – June and fruits between May and July. There are two documented records for this species in the Study Area.

There are two federally endangered species of bats, the Indiana bat (*Myotis sodalis)* and the Gray bat (*Myotis grisescens*) that may occur in the proposed study corridor. Indiana bats live beneath the bark of dead or live trees during the summer and caves in the winter. Gray bats occupy caves year round. Potential winter and/or summer habitat for these two species may exist in the area.



Documented locations within Study Area of Running Buffalo Clover (*Trifolium stoloniferum*)

Through Kentucky's natural heritage program, the KSNPC monitors species of concern as well as exemplary ecological communities throughout the state. There are five occurrences of species of concern and one example of an exemplary ecological community within the Study Area. All are on the fringes of the area. The species of concern and exemplary ecological communities that occur in the Study Area are listed in Table 5 below. This information was obtained from the Natural Heritage Program database maintained by the KSNPC.



Documented occurrences of species of concern, exemplary communities

TABLE 5: Species of Concern, Exemplary Communities	
Scientific Name	**Common Name**
Aimophila aestivalis	Bachman's Sparrow
Viburnum rafinesquianum var. rafinesquianum	Downy Arrowwood
Elodea nuttallii	Western Waterweed
Elymus svensonii	Svenson's Wildrye
Mustela nivalis	Least Weasel
Limestone slope glade	Limestone slope glade

Source: Kentucky State Nature Preserves Commission

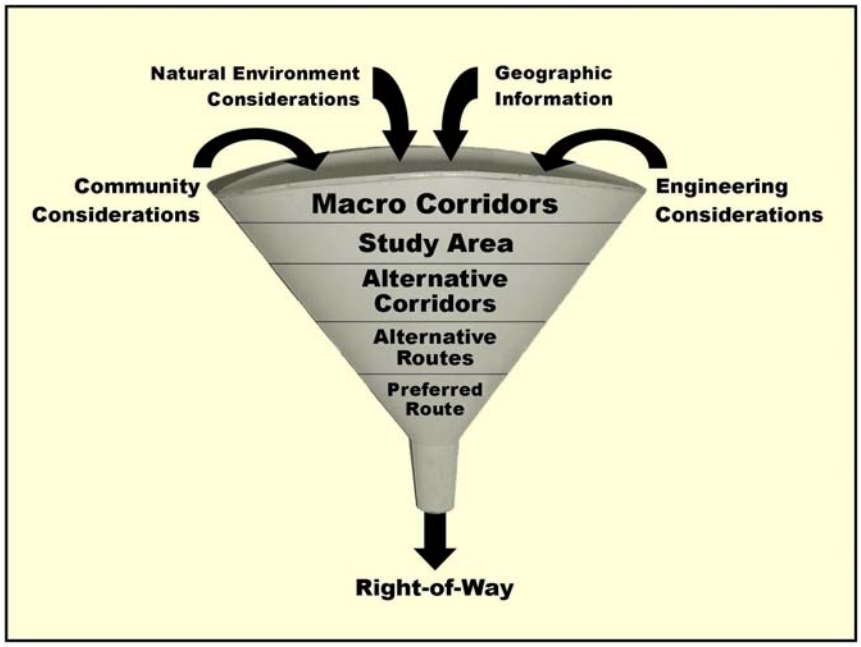
PART IV: OVERVIEW OF SUITABILITY ANALYSIS

1. EPRI-GTC Methodology

For projects of this scope, EKPC incorporates a computer-based methodology that was developed by the Electric Power Research Institute (EPRI) and Georgia Transmission Corporation (GTC). EKPC uses the EPRI-GTC methodology as a tool to evaluate the suitability of individual land tracts, or "grid cells," for locating transmission facilities. Based on analysis of a large area between and in the vicinity of the endpoints for the line, a Macro-Corridor and Study Area are developed. Then, using more-detailed information about the grid cells within the Study Area, Alternate Corridors are developed for further evaluation.

Among its advantages, the EPRI-GTC methodology is objective, comprehensive and consistent. Employing increasingly detailed data, it allows the utility to take into consideration vast amounts of information and to quantitatively consider stakeholder input in developing Alternative Corridors by using the Kentucky Siting Model discussed in the next section. Figure 5 below represents the EPRI-GTC methodology.

FIGURE 5: EPRI-GTC Siting Methodology



The EPRI-GTC methodology approaches corridor development by considering three broad perspectives or "environments":

- **Built Environment**, which is concerned with minimizing the impact on people places and cultural resources;
- **Natural Environment**, which is concerned with protecting water resources, plants and animals; and
- **Engineering Environment**, which is concerned with maximizing co-location and considering physical restraints.

Features within each of these environments are identified and evaluated to map the suitability of grid cells in each environment and develop Alternative Corridors for each. And simple average Alternative Corridors are developed to account for all three environments at once. These processes are discussed in detail in following sections.

2. About the Kentucky Siting Model

In order to calibrate the EPRI-GTC methodology for use in Kentucky, a siting model was developed using data collected from a group of Kentucky stakeholders during a workshop conducted in February 2006. The workshop was conducted and the model developed and tested by a project team of independent experts. Stakeholders at the workshop represented a range of interests from around the state, such as environmental concerns, historic preservation, homeowners associations, agricultural groups and government agencies, as well as EKPC personnel and representatives of other utilities. The resulting model (see Figure 6 on Page 18) includes data layers, features, layer weights and suitability values that are specific to Kentucky.

Based on the interest he or she represented, each stakeholder was assigned to a breakout group for each of the three environments—Built, Natural or Engineering. Guided by an independent expert from the project team, each of these groups developed a set of data layers (in green on Figure 6) with component features (in yellow), as well as avoidance areas (in red). For example, one of the data layers in the Built Environment is floodplains, which has two component features: background and 100-year floodplain.

For each feature, the stakeholders then used consensus-building techniques to develop a relative suitability value. Numbers between 1 and 9 were used to represent degrees of suitability, with 1 being most suitable for locating a transmission line and 9 being least suitable for locating a line. These values are described in the EPRI-GTC Project Report (2006) as follows:

> **Areas that have High Suitability for an Overhead Electric Transmission Line (1, 2, 3)** - These are areas that do not contain known sensitive resources or physical constraints, and therefore should be considered as suitable areas for the development of corridors.

Moderate Suitability for an Overhead Electric Transmission Line (4, 5, 6) - These are areas that contain resources or land uses that are moderately sensitive to disturbance or that present a moderate physical constraint to overhead electric transmission line construction and operation. Resource conflicts or physical constraints in these areas can generally be reduced or avoided using standard mitigation measures.

Low Suitability for an Overhead Electric Transmission Line (7, 8, 9) - These are areas that contain resources or land uses that present a potential for significant impacts that cannot be readily mitigated. Locating a transmission line in these areas would require careful siting or special design measures. Note that these areas can be crossed but it is not desirable to do so if other alternatives are available.

After assigning suitability values to features, stakeholders then weighted each data layer based on their view of its relative importance in the siting process. This was accomplished by conducting pair-wise comparisons. The result is a percentage weighting for each data layer within each environment, totaling 100 percent within each environment.

The EPRI-GTC methodology recognizes it is prohibitive to locate overhead transmission lines on or around some features, because, for example, of physical constraints or permitting delays. These areas are termed “avoidance areas” because the methodology seeks to avoid entering them, if possible. Features that constitute avoidance areas were determined by the stakeholder groups and are listed in red in Figure 6. One of the first steps in implementing the EPRI-GTC methodology is identifying avoidance areas on the Study Area surface to avoid locating transmission in those areas, if possible.

A final note—in each data layer where “background” appears, this feature represents areas that are not the location of any of the other features in that layer. For example, in the Floodplain data layer of the Natural Environment, all areas that are not within a 100-year floodplain are considered background.

FIGURE 6: Kentucky Siting Model

Co-location / Engineering	
Linear Infrastructure	86.2%
Parallel Existing Transmission Lines	1
Rebuild Existing Transmission Lines (good)	2.2
Background	4.4
Parallel Interstates ROW	4.7
Parallel Roads ROW	5.4
Parallel Pipelines	5.6
Future DOT Plans	5.6
Parallel Railway ROW	6.1
Road ROW	7.2
Rebuild Existing Transmission Lines (bad)	8.6
Scenic Highways ROW	9
Slope	13.8%
Slope 0-15%	1
Slope 15-30%	4
Slope 30-40%	6.7
Slope >40%	9
AVOIDANCE AREAS	
Non-Spannable Waterbodies	
Mines and Quarries (Active)	
Buildings	
Airports	
Military Facilities	
Center Pivot Irrigation	

Natural Environment	
Floodplain	4.6%
Background	1
100 Year Floodplain	9
Streams/Wetlands	29.2%
Background	1
Streams < 5cfs+ Regulatory Buffer	6.2
Rivers/Streams > 5cfs+ Regulatory Buffer	7.1
Wetlands + 30' Buffer	8.7
Outstanding State Resource Waters	9
Public Lands	17.7%
Background	1
WMA - Not State Owned	5.1
USFS (proclamation area)	6.2
Other Conservation Land	7.8
USFS (actually owned)	9
State Owned Conservation Land	9
Land Cover	19.8%
Developed Land	1
Agriculture	4.6
Forests	9
Wildlife Habitat	28.7%
Background	1
Species of Concern Habitat	9
AVOIDANCE AREAS	
EPA Superfund Sites	
State and National Parks	
USFS Wilderness Area	
Wild/Scenic Rivers	
Wildlife Refuge	
State Nature Preserves	
Designated Critical Habitat	

Built Environment	
Proximity to Buildings	16.8%
Background	1
900-1200	3.4
600-900	5.7
300-600	8
0-300	9
Building Density	8.4%
0 - 0.05 Buildings/Acre	1
0.05 - 0.2 Buildings/Acre	3
0.2 - 1 Buildings/Acre	5.6
1 - 4 Buildings/Acre	8.5
> 4 Buildings/Acre	9
Proposed Development	3.9%
Background	1
Proposed Development	9
Spannable Lakes and Ponds	4.0%
Background	1
Spannable Lakes and Ponds	9
Land Use	35.9%
Commercial/Industrial	1
Agriculture (crops)	3.5
Agriculture (other livestock)	4.6
Silviculture	6
Other (forest)	6.7
Agriculture (horse farms)	8
Residential	9
Proximity to Eligible Historic and Archeological Sites	31.0%
Background	1
900-1200	4.6
600-900	7.9
0-300	8.6
300-600	9
AVOIDANCE AREAS	
Listed Archaeology Sites & Dist.	
Listed NRHP Districts and Buildings	
City and County Parks	
Day Care Parcels	
Cemetery Parcel s	
School Parcels (K-12)	
Church Parcels	

- **Data layers (green cells):** Percentages represent relative importance, or weighting, of each layer in the siting process, as determined by stakeholders.
- **Features (yellow cells):** Numbers between 1 and 9 represent degrees of suitability, as determined by stakeholders, with 1 being most suitable for locating a transmission line and 9 being least suitable for locating a line.
- **Avoidance Areas (red cells):** Features to avoid siting transmission lines, if possible, as determined by stakeholders.

3. Suitability Mapping

The methodology begins with two endpoints as the basis for creating transmission line corridors. For this project, the endpoints are Smith Substation at J.K. Smith Station and the site of the planned West Garrard Substation near Lancaster. A large area in the vicinity of and between the endpoints is divided into grid cells.

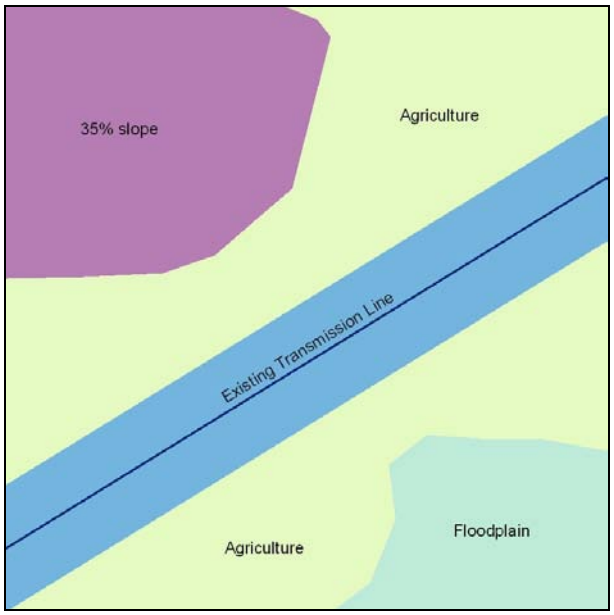
Data from aerial photography, geographic information systems, publicly available datasets and other sources are used to identify features within each grid cell. Based on these features and the values and data layer weights determined in the Kentucky Siting Model, the methodology then assigns a suitability value to each cell. More-detailed data is employed by the methodology as corridor locations are narrowed down more precisely

Because cells deemed to have lower suitability for locating a transmission line are assigned higher values, the methodology employs an algorithm that seeks to minimize the sum of values as it works its way from one endpoint to the other. The resulting corridor is referred to the "least-cost path." In this sense, "least cost" refers not to economic costs, but to the fact that low values indicate greater suitability for locating transmission facilities.

Figures 7-9 on Pages 20 and 21 demonstrate the development of a sample "least-cost path" using information from a hypothetical situation.

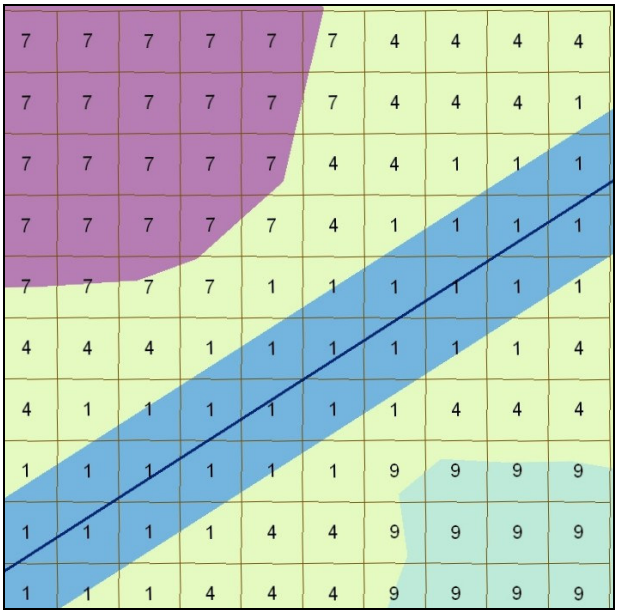
Figure 7 displays an example area that has four features: an existing transmission line through the center of the area, surrounded by agricultural land with an area of steep slopes to the northwest and a floodplain to the southeast.

FIGURE 7: Feature Map of Example Area



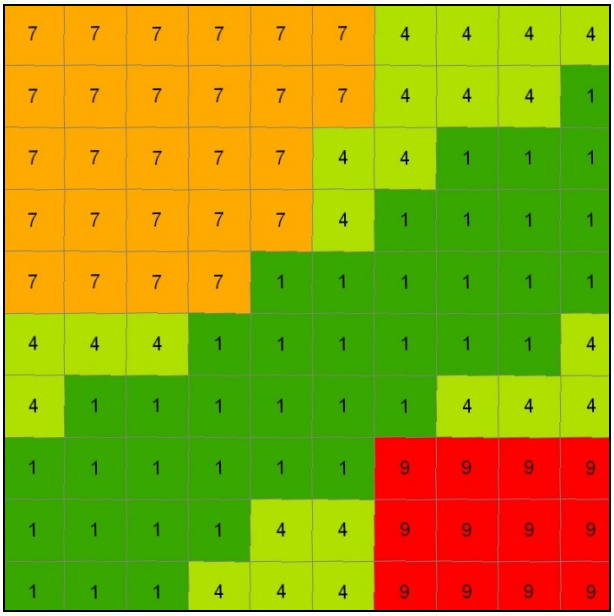
In Figure 8, grid cells are overlain and assigned suitability values based on the features. (The suitability values used in this example do not necessarily correspond to the Kentucky Siting Model.) The area of the existing line is considered highly suitable. Agricultural land is moderately suitable. Steep slopes and floodplains have low suitability values.

FIGURE 8: Grid Cell Map of Example Area, With Suitability Values



Finally, Figure 9 shows in green the most suitable corridor through the area for locating a transmission line. Light green areas are moderately suitable. The orange area has a low suitability value and the red area is highly unsuitable. The most suitable corridor from east to west in this example is the one that follows the existing transmission line.

FIGURE 9: Suitability Map of Example Area



4. Developing Macro-Corridors and Alternative Corridors

Beginning with a large area around and between the endpoints, the EPRI-GTC methodology analyzes land tracts, or "grid cells," within that area to develop a Macro-Corridor. This initial analysis is based on satellite and GIS information that is readily available from public sources. Using a minimum ground resolution of 30 meters, this information, the resulting corridor is referred to as the Macro-Corridor, which represents the top 3 percent most suitable routes of all possible routes in the initial area. (See Figure 10 on Page 23 for a map of the Macro-Corridor for the Smith-West Garrard project.)

The Macro-Corridor then is widened slightly to fully account for possible significant features on the fringes. The result is the Study Area. (See Figure 11 on Page 24 for a map of the Study Area for the Smith-West Garrard project.) A second round of analysis, based on more-detailed data with a minimum ground resolution of 15 meters, is used to develop Alternative Corridors. These corridors represent the top 3 percent—that is, the most suitable 3 percent—of possible corridors within the Study Area.

Alternative Corridors are generated for each of the three environments. It should be noted that, when generating Alternative Corridors for each environment, data layers from the other two environments are taken into account. While the target environment is weighted much more heavily, values and weights from the other environments can affect Alternative Corridors generated for that respective environment.

The final step in generating Alternative Corridors is to average the three environments and generate a Simple Average Alternative Corridor. Figure 12 on Page 25 displays the Alternative Corridors generated for each environment, as well as the Simple Average Alternative Corridor.

The following sections of this report provide information about features that were found within the Study Area based on available information, and about the Alternative Corridors that were generated.

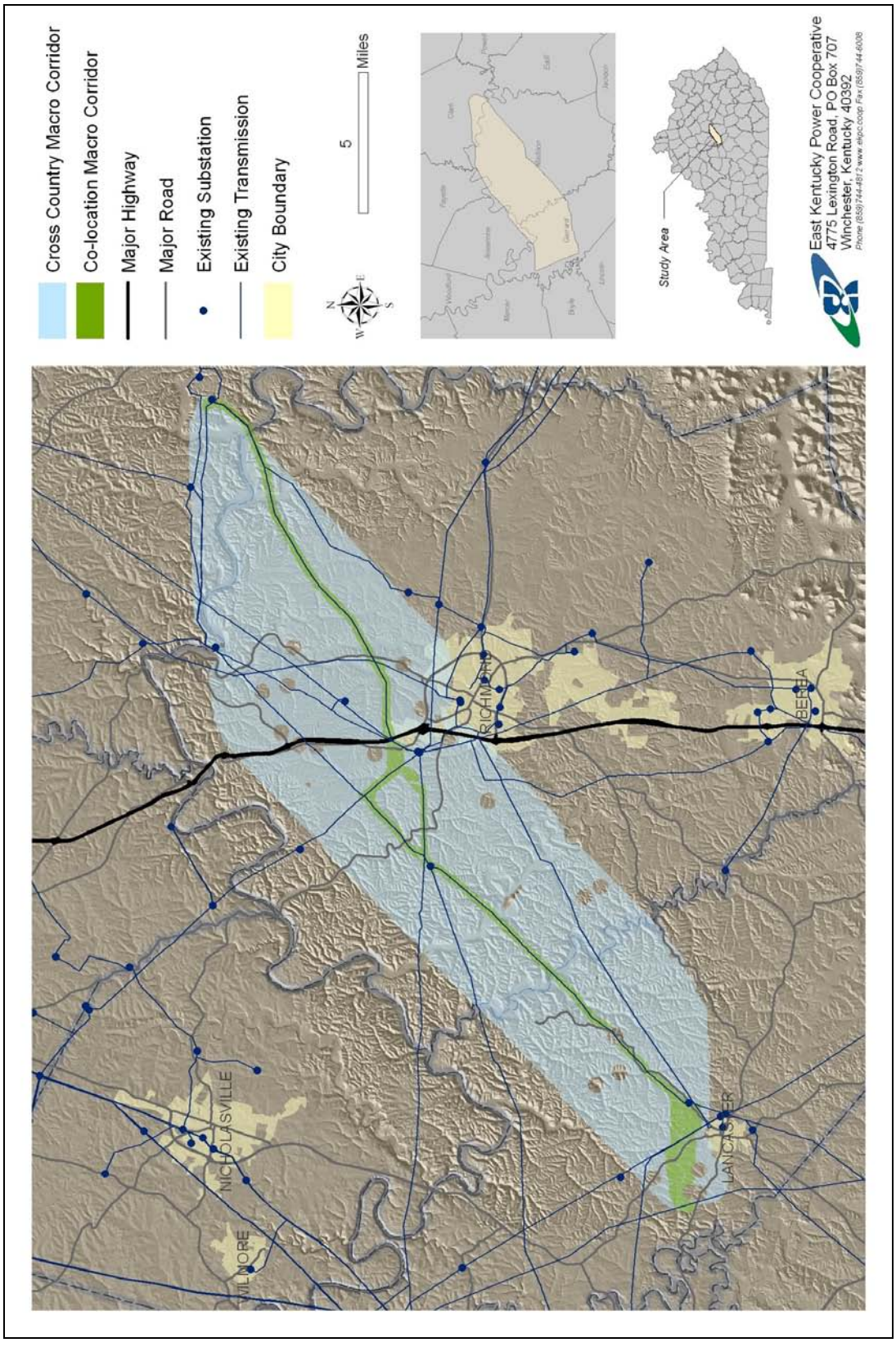


FIGURE 10: Smith-West Garrard Macro-Corridor

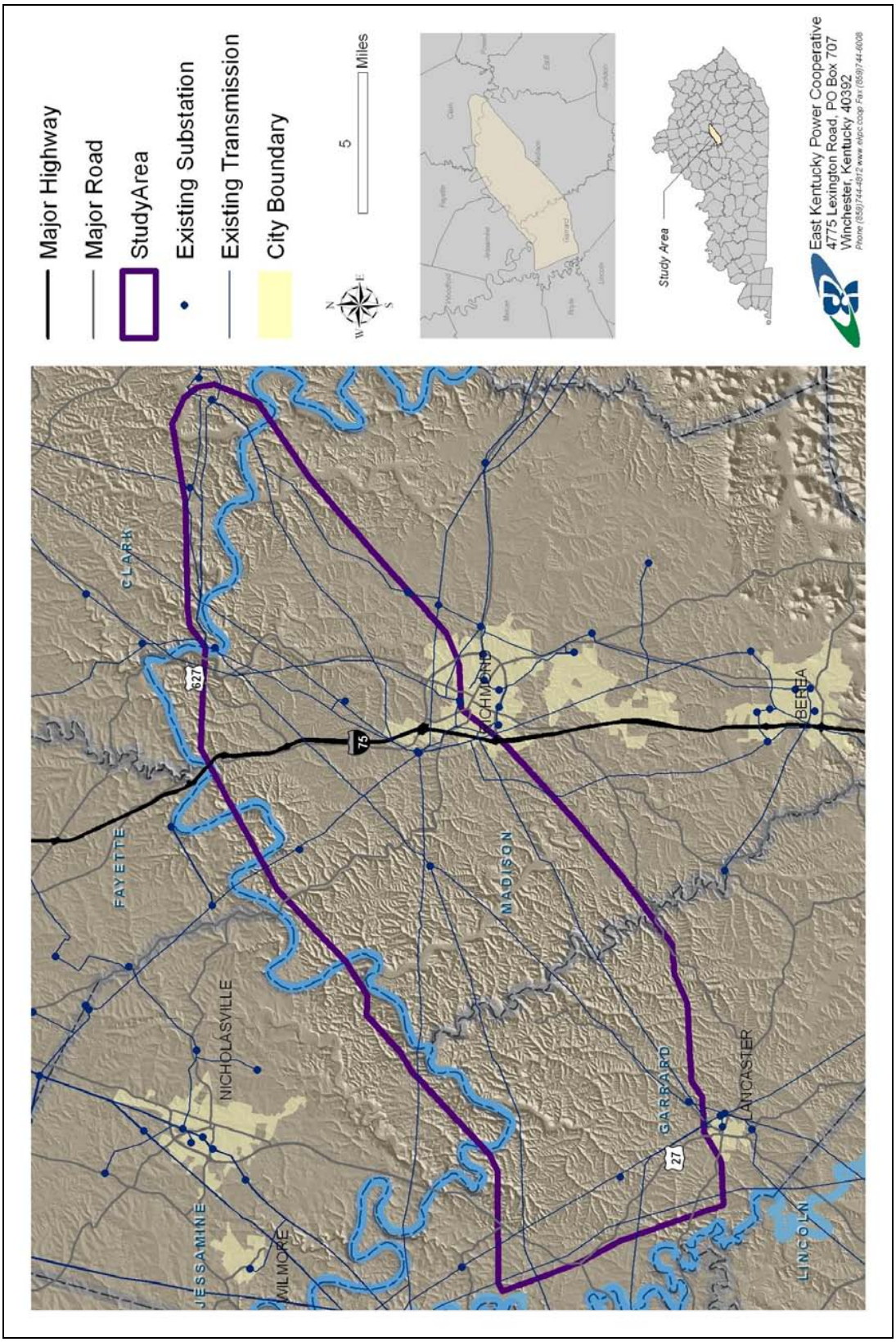


FIGURE 11: Smith-West Garrard Study Area

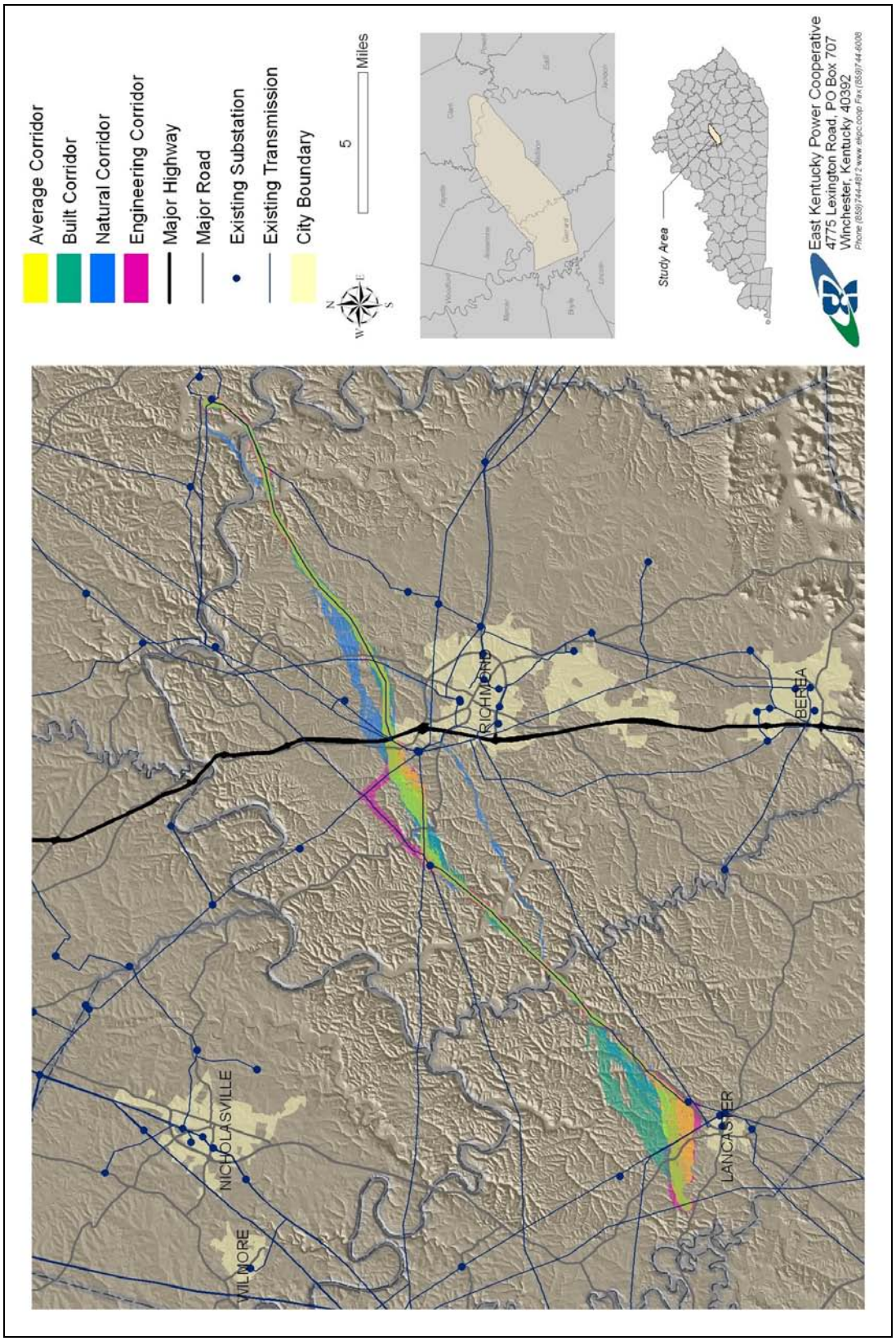


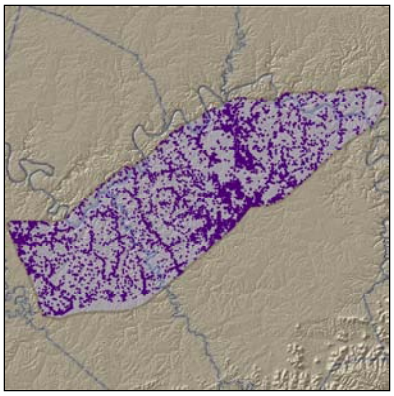
FIGURE 12: Built, Engineering, Natural and Simple Average Alternative Corridors , Smith-West Garrard

PART V: ENGINEERING ENVIRONMENT

1. Avoidance Areas

Avoidance Area: Buildings

Buildings are designated as Avoidance Areas within the Engineering Environment. In the Study Area, there are numerous existing structures, with notable concentrations near the I-75 corridor, around Richmond and near U.S. 27 in Garrard County. This information was developed from aerial photography conducted by Photo Science Inc.



Other Avoidance Areas

In the available datasets, there were no records of the following features in the Study Area:

- Non-spannable water bodies;
- Active mines or quarries;
- Airports;
- Military facilities; or
- Center-pivot irrigation.

2. Linear Infrastructure Features

The available datasets indicated no scenic highways in the Study Area.

High Suitability (1.0): Parallel Existing Transmission Lines

In the Engineering Environment, the model gives high suitability to paralleling existing transmission lines. Several existing transmission lines traverse the Study Area. (See Figure 13 on Page 28 for a map of existing lines. Below is a list of EKPC's lines and voltages within the Study Area.

- Dale - Hunt (2 circuits), 69kv
- Dale - Newby (2 circuits), 69kv
- Fawkes – Hickory Plains, 69kv
- Hunt - Stanton 69kv
- Lancaster - Highland, 69kv
- Newby - Lancaster, 69kv
- Newby - Perryville, 69kv
- Dale - Fawkes, 138kv
- Dale - Smith, 138kv
- Fawkes - West Berea, 138kv
- Smith - Fawkes 138kv
- Smith - KU Lake Reba Tap, 138kv
- Three Fork Tap, 138kv

In addition, Kentucky Utilities (KU) has several transmission lines in the Study Area. These include:

- Brown-Pineville (2 circuits), 345 kV
- Fawkes-Brown, 138 kV
- Fawkes-Clark County, 138 kV
- Fawkes-Lake Reba Tap, 138 kV
- Fawkes-Higby Mill, 69 kV
- Fawkes-Okonite, 69 kV
- Fawkes-Red House, 69 kV
- Fawkes-Richmond, 69 kV
- Lancaster-Danville East, 69 kV
- Lancaster-Dix Dam, 69 kV
- Richmond-Lake Reba, 69 kV

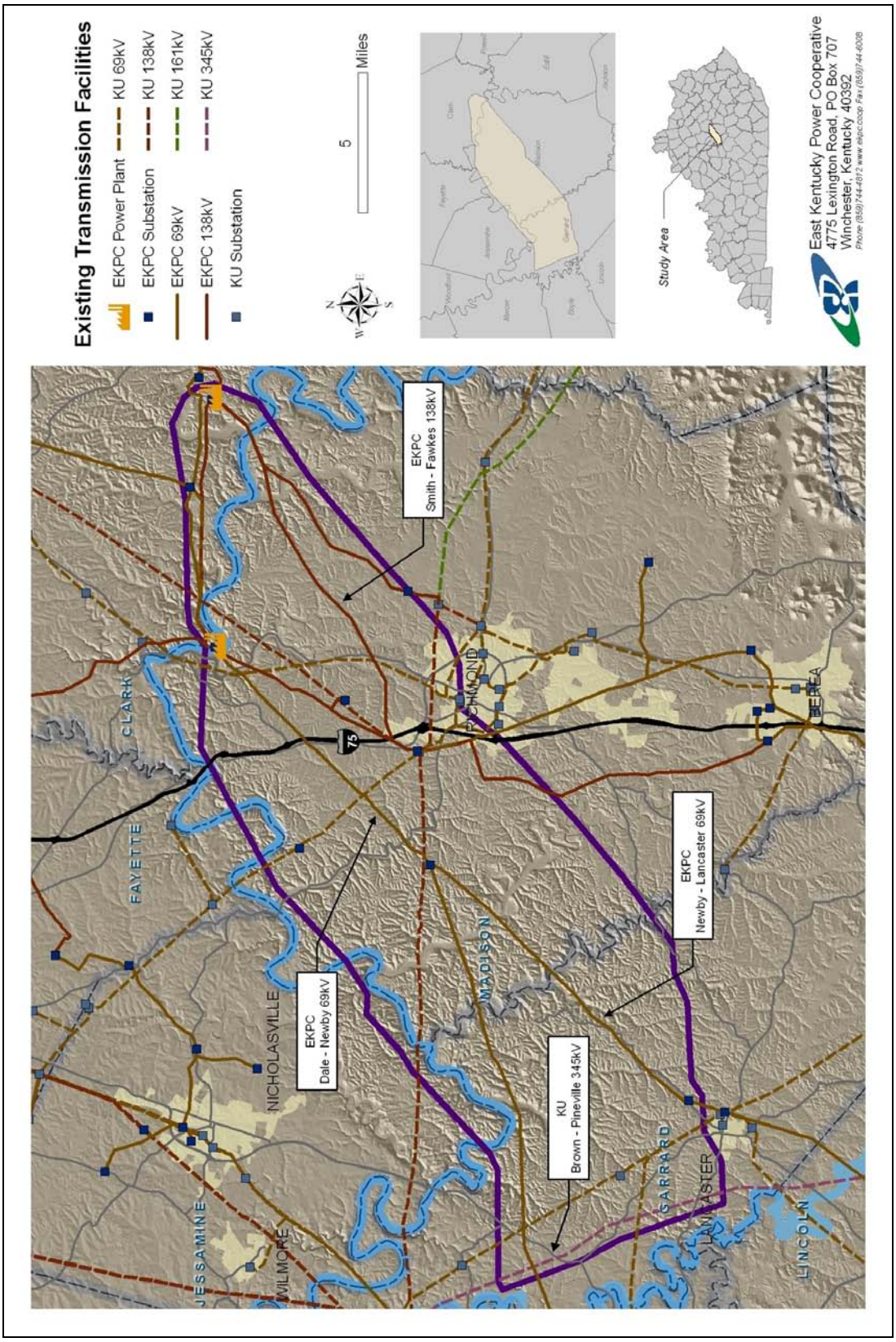


FIGURE 13: Existing Transmission Lines in Study Area

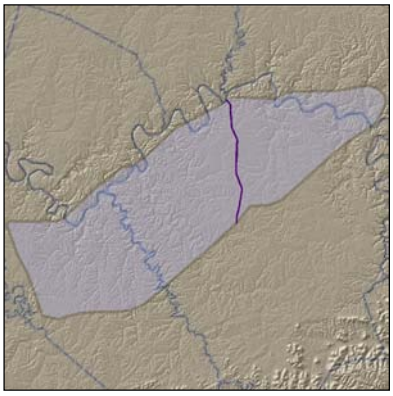
High Suitability (2.2): Rebuild Existing Transmission Lines (Good)

The Kentucky Siting Model recognizes that it is often desirable to rebuild an existing transmission line rather than creating a new corridor where one does not already exist. Nevertheless, the model distinguishes between "good" and "bad" rebuild opportunities based on the significance of the disruption and/or cost that would result from an extended outage during rebuilding. EKPC personnel evaluated the cooperative's transmission lines. Lines designated as "good" rebuild opportunities in the Study Area include:

- Dale-Newby 69-kV double-circuit
- Hunt-Stanton 69-kV
- Lancaster-Highland 69-kV
- Newby-Lancaster 69-kV
- Newby-Perryville 69-kV

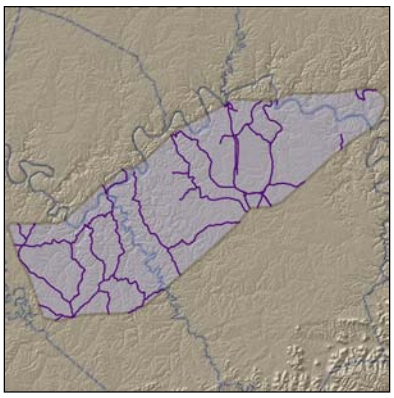
Moderate Suitability (4.7): Parallel Interstate Rights of Way

Paralleling interstate highways is deemed moderately suitable in the Engineering Environment of the Kentucky Siting Model. Because Interstate 75 bisects the Study Area from north to south, and the Study Area runs generally east to west, there is little opportunity for paralleling. The Study Area encompasses a 10.72-mile section of I-75 from near the Kentucky River to the western edge of the city of Richmond. Data was obtained from records on file with county Property Valuation Administrators and from commercially available datasets.



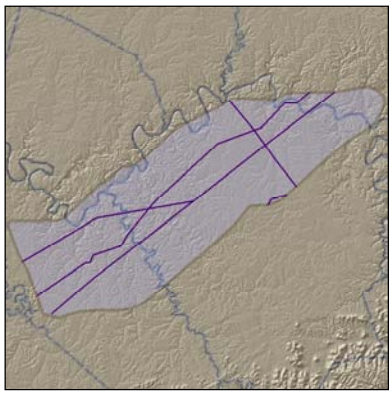
Moderate Suitability (5.4): Parallel Road Rights of Way

The Engineering Environment model assigns moderate suitability to paralleling existing roads. Existing roadways in the Study Area tend to run north-south rather than east-west. Data was obtained from records on file with county Property Valuation Administrators.



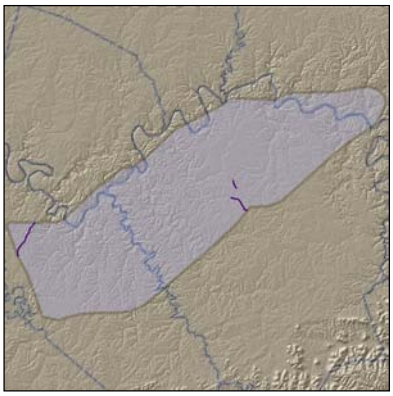
Moderate Suitability (5.6): Parallel Pipelines

Locating parallel to existing pipelines is given a moderate suitability in the Engineering Environment. There are a number of natural gas pipelines in the Study Area. These include lines owned by Tennessee Gas, Columbia Gas and Texas Eastern. Data was obtained from the U.S. Geological Survey.



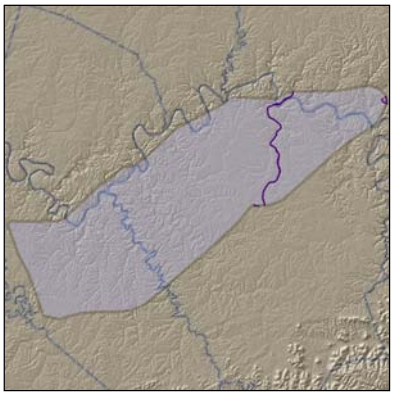
Moderate Suitability (5.6): Future Department Of Transportation Plans

Locating on the site of future planned road projects is moderately suitable in the Engineering Environment. According to information received from Transportation officials, several future road projects are planned in the Study Area, but these tend to be on the fringes of the Study Area. Data was obtained from the Kentucky Department of Transportation.



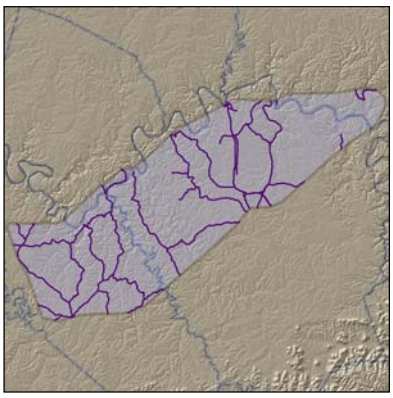
Moderate Suitability (6.1): Parallel Railway Rights of Way

Locating transmission lines parallel to railroads is deemed to be moderately suitable in the Engineering Environment of the Kentucky Siting Model. A significant portion of a railroad owned by CSX Corp. exists in the Study Area. But, because it runs generally north to south, there is little opportunity to parallel. Data was obtained from records on file with county Property Valuation Administrators and from commercially available datasets.



Low Suitability (7.2): Road Rights of Way

The Engineering Environment of the model gives low suitability to locating a transmission line on road rights of way. There are numerous roads in the Study Area, although they tend to run north to south. Data was obtained from records on file with county Property Valuation Administrators.



Low Suitability (8.6): Rebuild Existing Transmission Lines (Bad)

As noted above, the Kentucky Siting Model distinguishes between "good" and "bad" rebuild opportunities based on the significance of the disruption and/or cost that would result from an extended outage during rebuilding. The following EKPC lines were designated as "bad" rebuild opportunities based on an evaluation by EKPC personnel:

- Dale-Hunt 69-kV double circuit
- Fawkes-Hickory Plains 69-kV
- Dale-Fawkes 138-kV
- Dale-Smith 138-kV
- Fawkes-West Berea 138-kV
- Smith-Fawkes 138-kV
- Smith-KU Lake Reba Tap 138-kV
- Three Forks Tap 138 kV

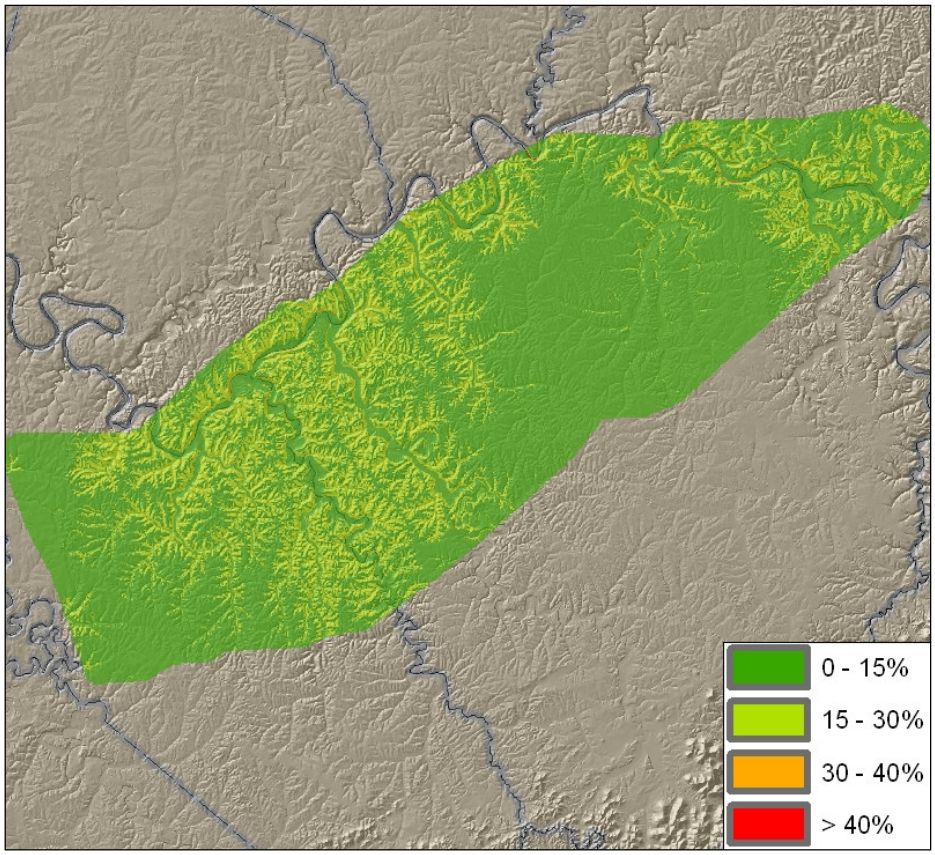
3. Slope Features

Recognizing the challenges of constructing a transmission line on steep slopes, the Engineering Environment of the Kentucky Siting Model categorizes slopes, and slopes become less suitable as they become steeper. Table 5 below summarizes the suitability of slope categories in the model.

TABLE 6: Categories, Suitability Values of Slopes		
Angle of Slope	**Suitability Value from Model**	**Suitability**
Slope 0-15%	1.0	High
Slope 15-30%	4.0	Moderate
Slope 30-40%	6.7	Moderate
Slope >40%	9.0	Low

Figure 14 below displays categories of slopes as they occur in the Study Area, according to the available data. Slopes of 0-15% and 15-30% dominate the Study Area, with the latter concentrated in the western portion. Slope information was obtained from the U.S. Geological Survey.

FIGURE 14: Slope Categories in Study Area



4. Engineering Environment Data Layer Weights

The Engineering Environment data layers and their relative weights are summarized in Table 6 below.

TABLE 7: Engineering Environment Data Layers and Relative Weights	
Layer	**Weight**
Linear Infrastructure	86.2%
Slope	13.8%

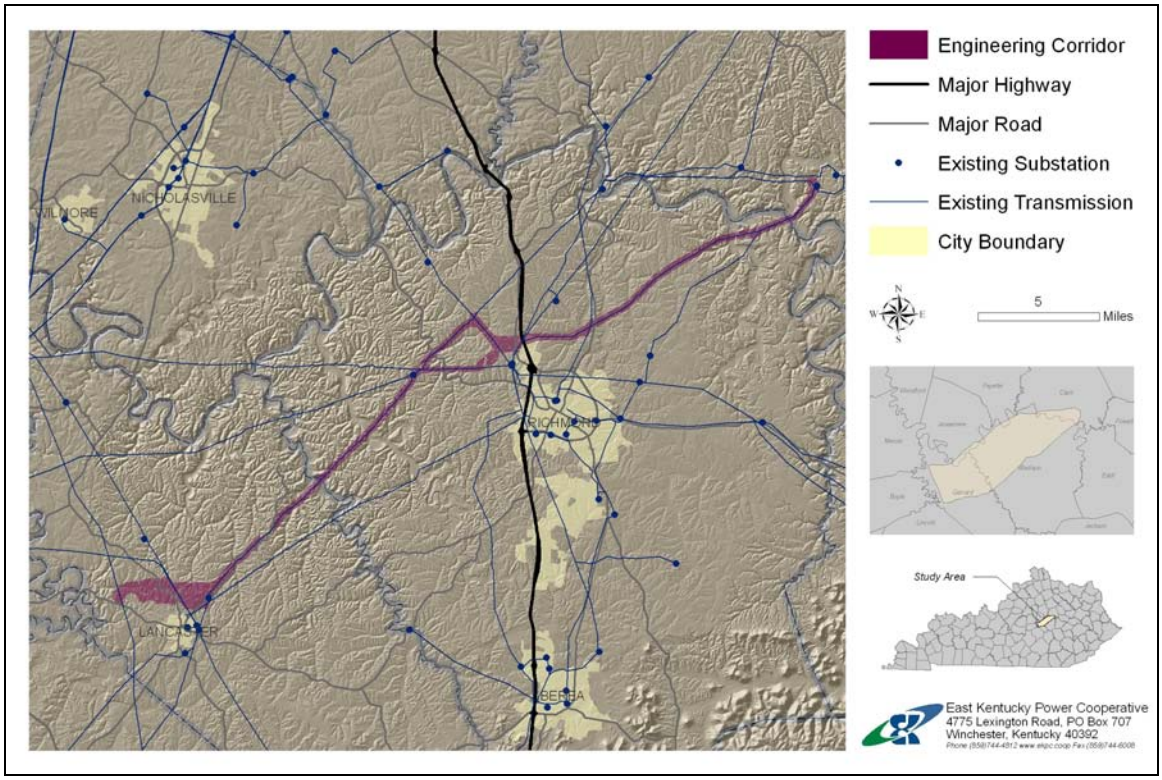
5. Engineering Alternative Corridors

When the feature suitability values and data layer weightings were combined and the least-cost path algorithm was applied to the available datasets, the result was the Engineering Alternative Corridors displayed in Figure 15 below. The Engineering Environment of the Kentucky Siting Model is heavily weighted toward co-location. As a result, it is not surprising that the Engineering corridors primarily are located along the paths of existing transmission lines.

Beginning at Smith Station to the east, the corridor follows EKPC's 138-kV Smith-Fawkes line west to Richmond. It then forks into two options:

- Co-locate along the existing Fawkes-Higby Mill 69-kV transmission line owned by Kentucky Utilities (KU) and head north to EKPC's Dale-Newby 69-kV line. Then co-locate along that line to Newby Substation. From there, co-locate along EKPC's Newby-Lancaster line to just east of Lancaster where a new transmission line would be built to the West Garrard substation.
- The second option differs in its path to Newby Substation. It would take a southerly corridor along KU's Fawkes-Brown 138-kV line, to reach the substation, then pick up the same path as described above.

FIGURE 15: Engineering Environment Alternative Corridors



PART VI: NATURAL ENVIRONMENT

1. Avoidance Areas

In the available datasets, there were no records of the following features within the Study Area. These features are deemed avoidance areas in the Natural Environment of the Kentucky Siting Model:

- EPA Superfund Sites;
- USFS Wilderness Areas;
- Wild/scenic rivers;
- Wildlife refuges; or
- Designated critical habitats.

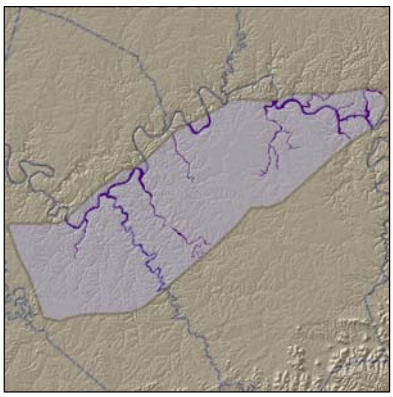
Avoidance Areas: State & National Parks and State Nature Preserves

White Hall State Historic Site is located along the I-75 corridor near the northern edge of the Study Area. A portion of the Tom Dorman Kentucky River Palisades State Nature Preserve is located on the northwestern edge. Data obtained from Kentucky GAP Land Stewardship.

2. Floodplains

Low Suitability (9.0): 100-Year Floodplain

The Natural Environment of the Kentucky Siting Model gives very low suitability to locating transmission lines in the 100-year floodplain. The corridors of several waterways include areas that are included in the 100-year floodplain, notably areas along the Kentucky River, Paint Lick Creek, Sugar Creek, Tate Creek, Silver Creek, Otter Creek, Fourmile Creek, Dry Fork Creek and Muddy Creek. Data was obtained from the Federal Emergency Management Agency and the U.S. Geological Survey.

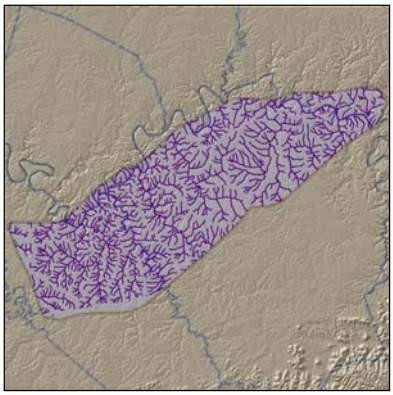


3. Streams/Wetlands

Available datasets indicate no Outstanding State Resource Waters in the Study Area.

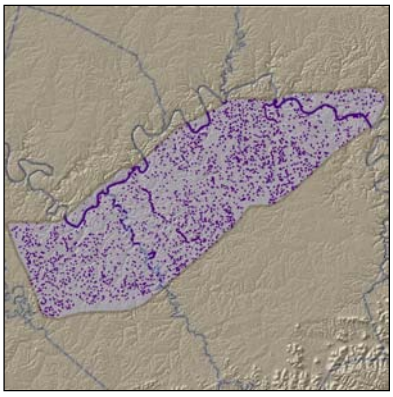
Moderate to Low Suitability (6.2 & 7.1): Streams & Rivers

The Natural Environment categorizes streams as those that flow with either less than or more than 5 cubic feet of water per second (cfs). It is moderately suitable (6.2) to locate a transmission line in the regulatory buffer of a stream that flows with less than 5 cfs. The model gives low suitability (7.1) to locating a line in the regulatory buffer of a stream or river that flows with greater than 5 cfs. There are numerous streams throughout the study area. Information was obtained from the U.S. Geological Survey.



Low Suitability (8.7): Wetlands

Wetlands have a low suitability value for locating transmission lines in the Natural Environment of the Kentucky Siting Model. There are numerous wetlands areas throughout the Study Area. Information was obtained from the U.S. Geological Survey.



4. Public Lands

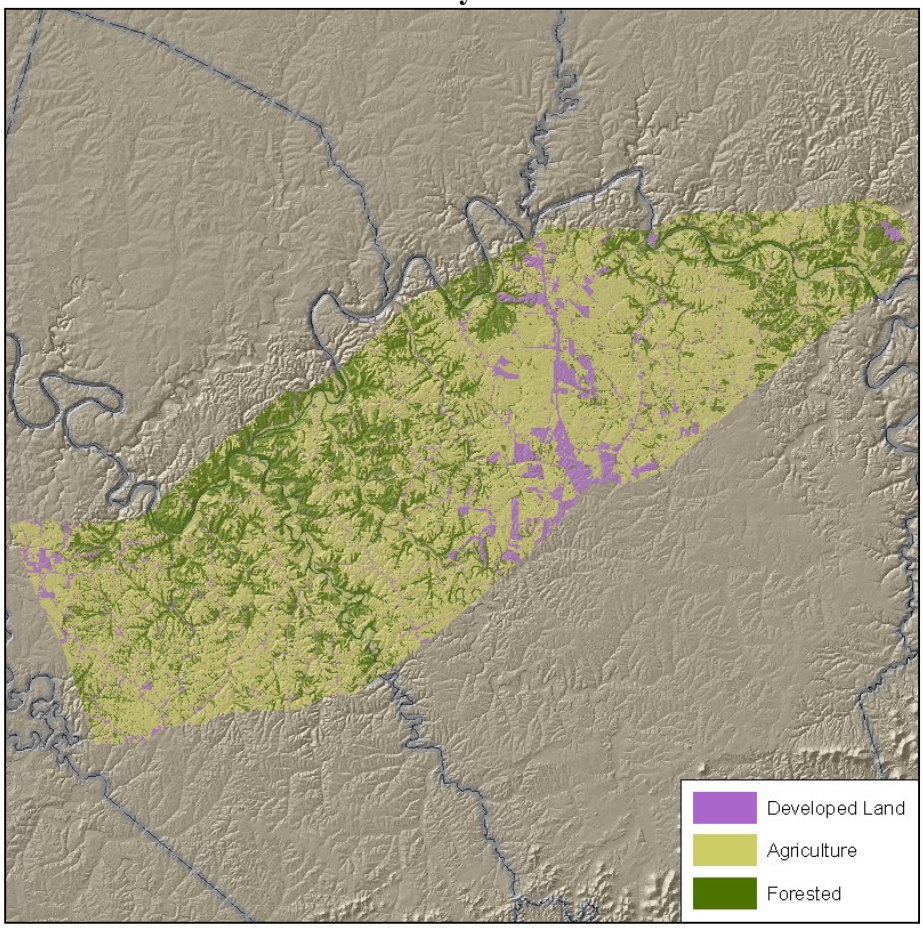
Available datasets have no records of the following features in the Study Area:

- Wildlife Management Areas (not state-owned);
- U.S. Forest Service (proclamation area);
- Other conservation land;
- U.S. Forest Service (actually owned); and
- State-owned conservation land.

5. Land Cover

Figure 16 below shows land cover in the Study Area.

FIGURE 16: Land Cover in Study Area



High Suitability (1.0): Developed Land

In the Natural Environment, which is concerned with protecting water resources, plants and animals, the Kentucky Siting Model finds developed land to be highly suitable for transmission lines. It should be noted that this value is offset to a certain degree by some of the feature suitability values in the Built Environment, which is concerned with protecting people places. Developed lands in Figure 16 on Page 37 include apartment/high-density, commercial/industrial, residential, etc. Most developed land is concentrated along the I-75 corridor in the Study Area, particularly in the vicinity of Richmond on the southern edge. Residential land makes up just under 5 percent of the Study Area acreage. This information was obtained from aerial photography analysis conducted by Photo Science Inc.

Moderate Suitability (4.6): Agriculture

In the Natural Environment of the Kentucky Siting Model, agricultural land is deemed moderately suitable for transmission lines. There is a significant amount of agricultural land in the Study Area. Agricultural land in Figure 15 includes horse farms, other livestock and row crops. Agricultural land for livestock constitutes most of the land within the Study Area, nearly 58 percent. It is particularly concentrated in the central portion of the Study Area on both sides of the I-75 corridor. This information was obtained from aerial photography analysis conducted by Photo Science Inc.

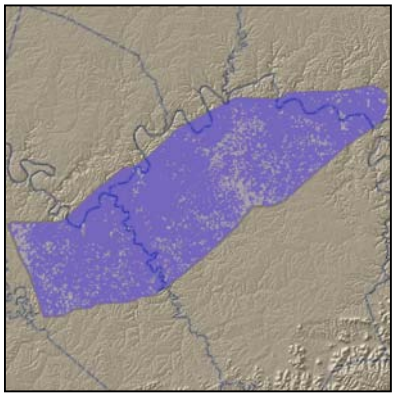
Low Suitability (9.0): Forests

In the Natural Environment, forested land is considered unsuitable for locating transmission lines. There is a significant amount of forested land in the Study Area with particular concentrations in the eastern tip and along the northwestern edge. Forested land makes up approximately 29 percent of the Study Area. This information was obtained from aerial photography analysis conducted by Photo Science Inc.

6. Wildlife Habitats

Low Suitability (9.0): Species of Concern

In the Natural Environment of the Kentucky Siting Model, habitats for species of concern have low suitability for locating transmission lines. Such habitats encompass a large portion of the Study Area. Data was obtained from Kentucky GAP Analysis.



7. Natural Environment Data Layer Weights

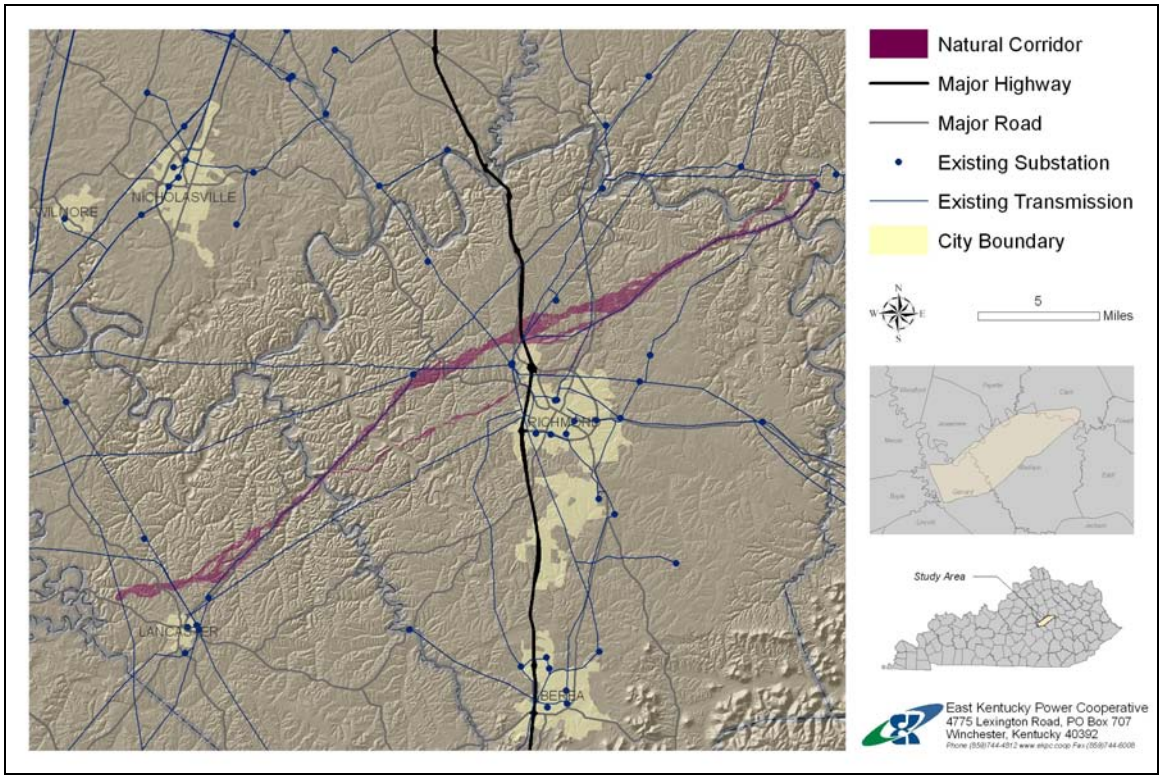
The Natural Environment data layers and their relative weights are summarized in Table 8 below.

TABLE 8: Natural Environment Data Layers and Relative Weights	
Layer	**Weight**
Floodplain	4.6%
Streams/Wetlands	29.2%
Public Lands	17.7%
Land Cover	19.8%
Wildlife Habitat	28.7%

8. Natural Environment Alternative Corridors

When the "least-cost path" algorithm was applied to the available datasets in the Natural Environment, the result was the Natural Environment Alternative Corridors displayed in Figure 17 below. The corridor follows the same general path as the Engineering Alternative Corridor, with some exceptions. On the eastern end, coming out of Smith Substation, there are two options following separate existing transmission lines. The southern option follows the Smith-Fawkes corridor. The northern options follows an existing line west for a short distance, then breaks away to cross the Kentucky River and join the Smith-Fawkes corridor. In the area north of Richmond and east of I-75, the corridor splits into two options that are fairly close together, and those join together again in the vicinity of Fawkes Substation. West of I-75, there is a southern option that splits from the main corridor at Richmond and does not follow an existing transmission line corridor. It appears this option was generated because of forested land that is located in the center of the study area close to the co-location corridor to the north. (The Natural Environment model gives forested land the lowest suitability value of 9.)

FIGURE 17: Natural Environment Alternative Corridors



PART VII: BUILT ENVIRONMENT

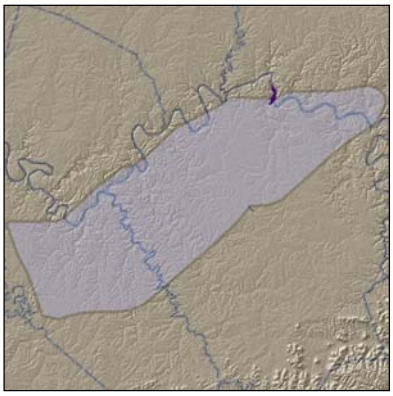
1. Avoidance Areas

Avoidance Area: Listed Archaeology Sites and Districts

There are 40 listed archaeological sites within the Study Area. A map of these sites is not presented here because of disclosure concerns. Nevertheless, this information was considered as part of the mapping process. Information about the sites was obtained from the Kentucky State Historic Preservation Office.

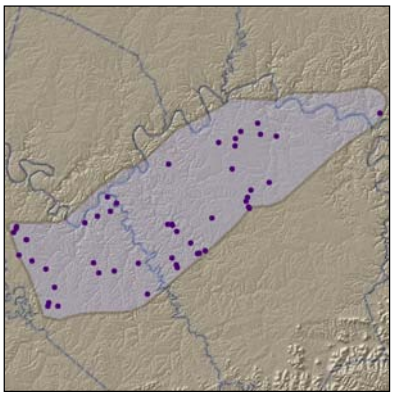
Avoidance Area: Listed National Register of Historic Places Districts

There are two historic districts in the Study Area that are listed on the National Register of Historic Places. They are Fort Boonesboro Townsite, located on the northeastern edge of the Study Area and West Richmond Historic District located on the southeastern edge. Information was obtained from the Kentucky State Historic Preservation Office.



Avoidance Area: Listed National Register of Historic Places Sites

There are 47 sites in the Study Area that are listed on the National Register. For a full list of sites, see Page 42. Information was obtained from the Kentucky State Historic Preservation Office.

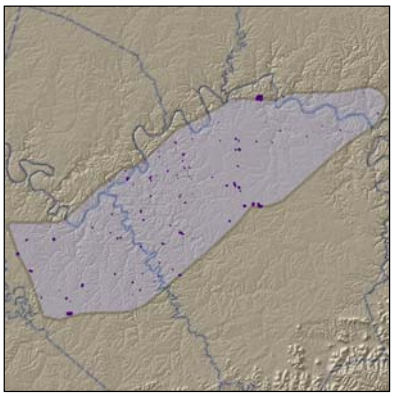


Sites listed on the National Register of Historic Places that are in the Smith-West Garrard Study Area include:

- Andrew Bogie House
- Arlington/Hanger-Arnold House
- Barlow House
- Blair Park/Singleton P. Walters House
- Bonta-Owsley House
- Brock House
- Brutus & Pattie Field Clay House
- Bryantsville Bank & Post Office
- Bryantsville Methodist Church
- Burnamwood/William Embry House
- Chenault House
- Dozier-Guess House
- Dunn--Watkins House
- Gulley Farm
- Hawkins/Stone/Hagen/Curtis House
- Homelands (Samuel Bennett House)
- Isaac Newland House
- James Bogie House (ruins)
- James Smith Tanyard
- John Floyd House
- John Hutcherson House
- John Leavell House (Spring Garden)
- John Leavell Quarters (Spring Garden)
- Mount Pleasant Christian Church
- Nathan Hawkins House
- Paris Teater House
- Parke-Moore House
- Ray House
- Rolling Meadows
- Samuel Karr House
- Sebastian Log House
- Smith Thompson Log House
- Stapp Homelace
- Stephen Murphy House
- Stephenson House
- Tates Creek Baptist Church
- Taylor House
- Tevis House (Sleepy Hollow)
- Thomas Bogie House & Mill Site (ruins)
- Turner / Fitzpatrick House
- Turner House
- Walden Place
- Walker House
- White Hall
- Whitney Cobb Place
- William Parks House
- William Teater House

Avoidance Areas: City/County Parks, Day Care, Cemetery, School and Church Parcels

City & county parks, day cares, cemeteries, schools and churches are all considered avoidance areas in the Built Environment. There are records of approximately 100 such parcels in the available datasets. Information was developed by Photo Science Inc. from data available from public sources and from analysis of aerial photography.



2. Proximity to Buildings

In the Built Environment of the Kentucky Siting Model, it is considered more suitable to locate transmission lines farther away from buildings. The model has five categories for proximity to buildings. These are listed below in Table 9, along with their respective suitability values. Background constitutes all areas that are farther than 1,200 feet from a building. Structure locations are presented in the map at right. Buildings are particularly concentrated along the I-75 corridor and around Richmond. This information was developed by Photo Science Inc. from analysis of aerial photography.

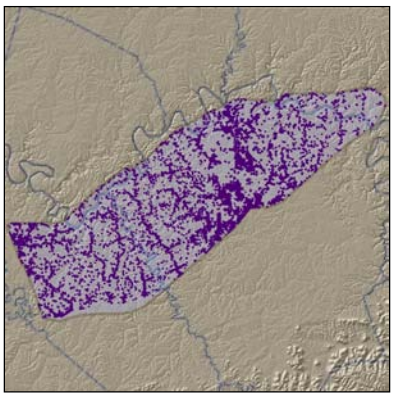


TABLE 9: Suitability, Proximity to Building

Distance from building	Suitability Value from Model	Suitability
0-300 feet	9.0	Low
300-600 feet	8.0	Low
600-900 feet	5.7	Moderate
900-1,200 feet	3.4	High
Background	1.0	High

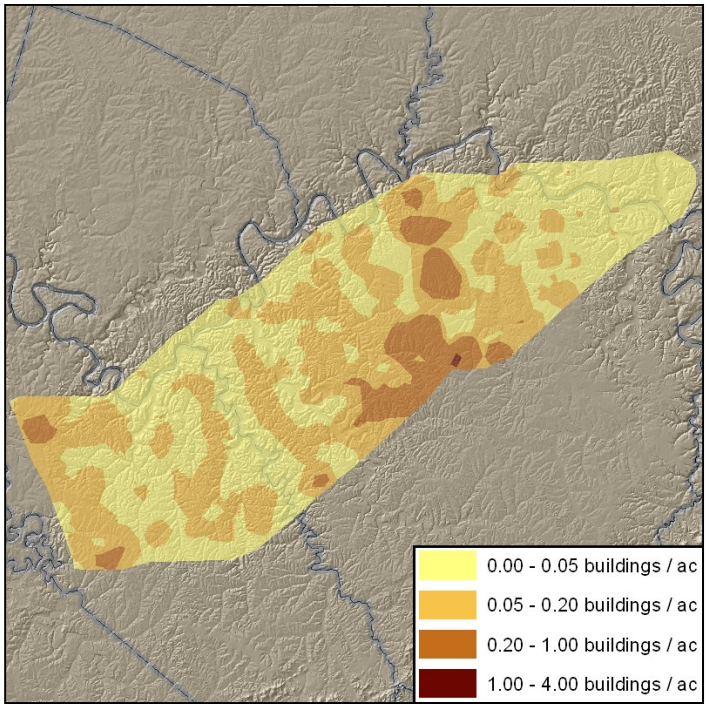
3. Building Density

In the Built Environment of the Kentucky Siting Model, transmission lines are more suitable in areas of lower building density. The model features five categories of building density, summarized in Table 10 below. Figure 18 shows building density categories mapped within the Study Area. Areas of higher density tend to occur around Richmond and near the I-75 corridor. This information was developed by Photo Science Inc. from analysis of aerial photography.

TABLE 10: Suitability, Building Density

Building Density	Suitability Value from Model	Suitability
0-0.05 buildings/acre	1	High
0.05-0.2 buildings/acre	3	High
0.2-1.0 building/acre	5.6	Moderate
1-4 buildings/acre	8.5	Low
>4 buildings/acre	9	Low

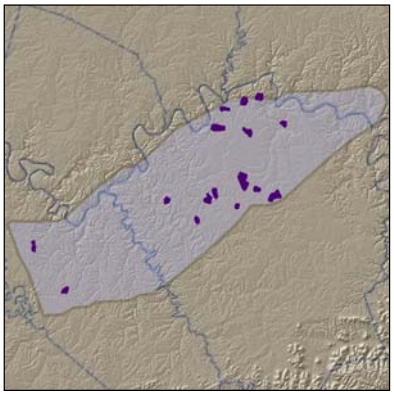
FIGURE 18: Building Density in Study Area



4. Proposed Development

Low Suitability (9.0): Proposed Development

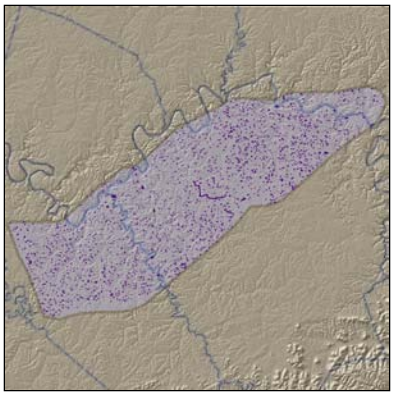
According to the Kentucky Siting Model, areas of proposed development are deemed in the have low suitability for locating transmission lines. In the Study Area, these locations tend to be concentrated near the I-75 corridor. Data was obtained from local planning/zoning officials and from aerial photography.



5. Spannable Lakes and Ponds

Low Suitability (9.0): Spannable Lakes and Ponds

The Built Environment of the model considers spannable lakes and ponds unsuitable for locating transmission lines. There are numerous lakes and ponds dotted throughout the Study Area. This information was obtained from the U.S. Geological Survey National Hydrography Dataset.



6. Land Use

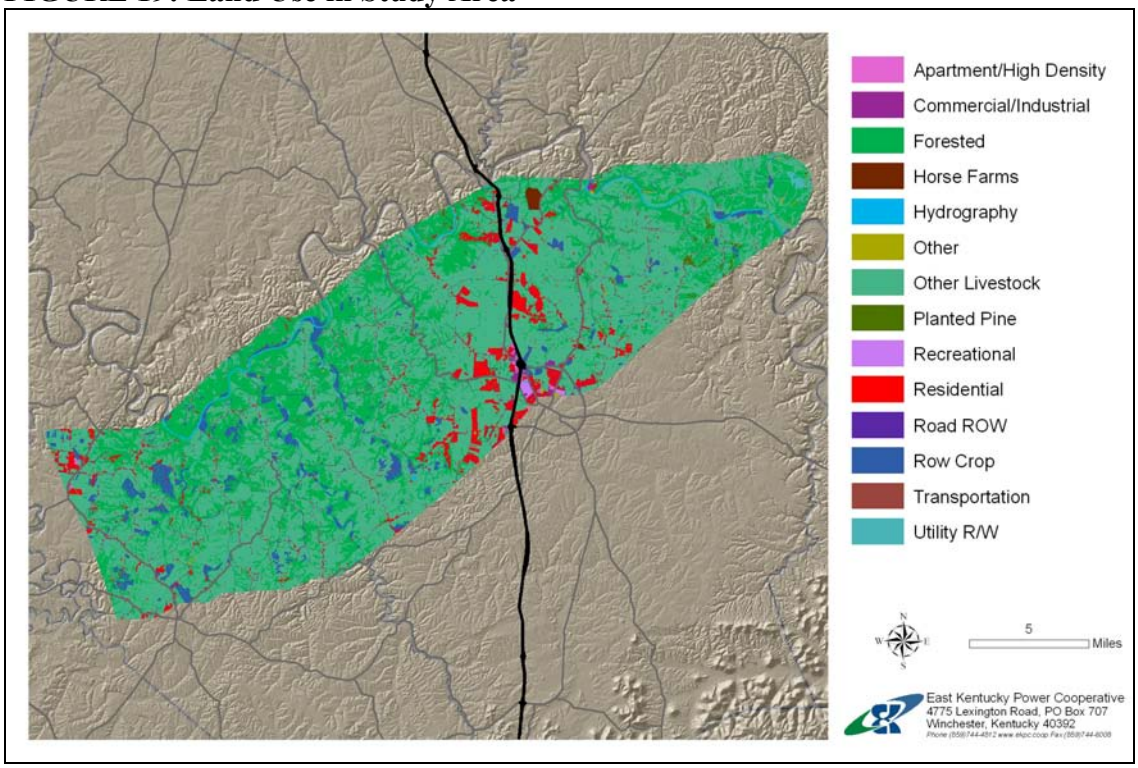
Compared to other land uses, the Built Environment of the Kentucky Siting Model considers commercial/industrial tracts and cropland most suitable for locating transmission lines. Residential areas and horse farms are least suitable in the Built Environment of the model. See Table 11 below for a summary of land-use suitability values as determined in the model.

TABLE 11: Suitability, Land Uses

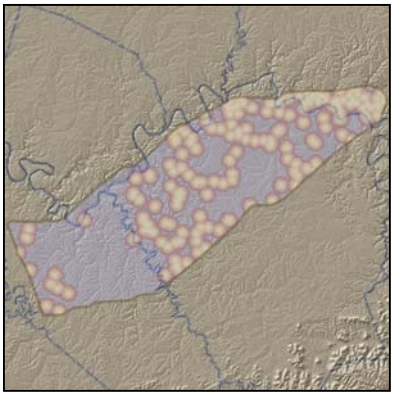
Land Use	Suitability Value from Model	Suitability
Commercial/Industrial	1.0	High
Agriculture (crops)	3.5	High
Agriculture (other livestock)	4.6	Moderate
Silviculture	6.0	Moderate
Other (forest)	6.7	Moderate
Agriculture (horse farms)	8.0	Low
Residential	9.0	Low

Figure 19 on Page 47 shows land uses in the Study Area. Commercial/industrial tracts are concentrated for the most part in a small area near I-75 in the vicinity of Richmond. Cropland is scattered throughout the Study Area, occurring with greater frequency in the western half. Residential tracts tend to be concentrated near I-75 and Richmond. The most common land use in the Study Area is agriculture (other livestock). Forested land also is common. This information was developed by Photo Science Inc. from analysis of aerial photography, and from other public sources.

FIGURE 19: Land Use in Study Area



7. Proximity to Eligible Historic and Archaeological Sites



The Built Environment of the model considers the proximity of a transmission line to sites that are eligible to be listed on the National Register of Historic Places. Generally, the closer the line would be to the site, the less suitable it is considered. The model features four proximity categories, plus background, which is considered any feature outside of the four proximity categories. Table 12 below summarizes the categories and their suitability values. Because of disclosure concerns, the map at right does not include archaeological sites. Nevertheless, those locations were included as part of the suitability surface mapping process that produced the alternative corridors for the Built Environment. This information was obtained from the Kentucky State Historic Preservation Office.

TABLE 12: Suitability, Proximity to Eligible and Archaeological Sites

Distance from site	Suitability Value from Model	Suitability
Background	1.0	High
900-1,200	4.6	Moderate
600-900	7.9	Low
300-600	9.0	Low
0-300	8.6	Low

8. Built Environment Data Layer Weights

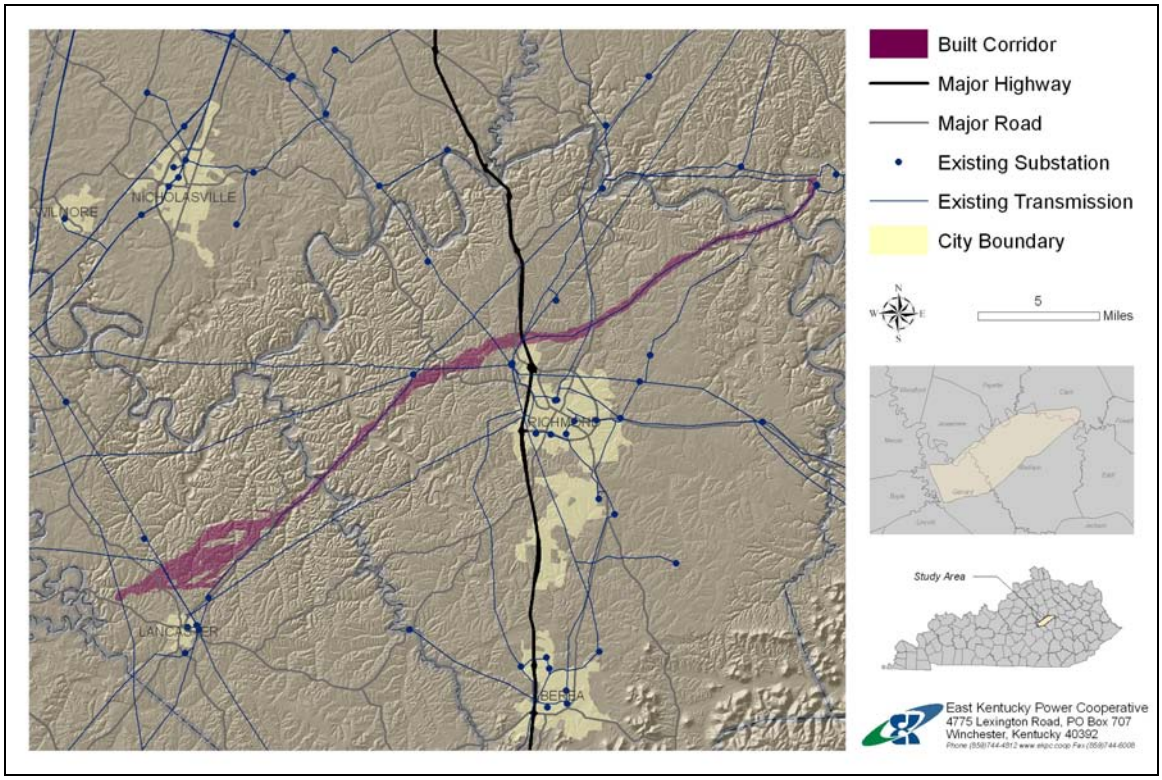
The Built Environment data layers and their relative weights are summarized in Table 13 below. There were no proposed developments as defined in the model within the available datasets for this Study Area.

TABLE 13: Built Environment Data Layers and Relative Weights	
Layer	**Weight**
Proximity to Buildings	16.8%
Building Density	8.4%
Proposed Development	3.9%
Spannable Lakes & Ponds	4.0%
Land Use	35.9%
Proximity to Eligible Historic and Arch. Sites	31.0%

9. Built Environment Alternative Corridors

Figure 20 below displays the Built Environment Alternative Corridors. Beginning at Smith Station in the east, the "least-cost path" alternative corridors for the Built Environment generally follow the corridor of the existing Smith-Fawkes 138-kV line to a point near I-75 north of Richmond. From there, the Built Environment corridor widens and goes "over land" to a KU 138-kV line, then to EKPC's Newby-Lancaster 69-kV line. From a point several miles northeast of Lancaster, the Built Environment Alternative Corridor offers numerous alternatives for splitting from the Newby-Lancaster corridor and traveling to the West Garrard Substation site.

FIGURE 20: Built Environment Alternative Corridors

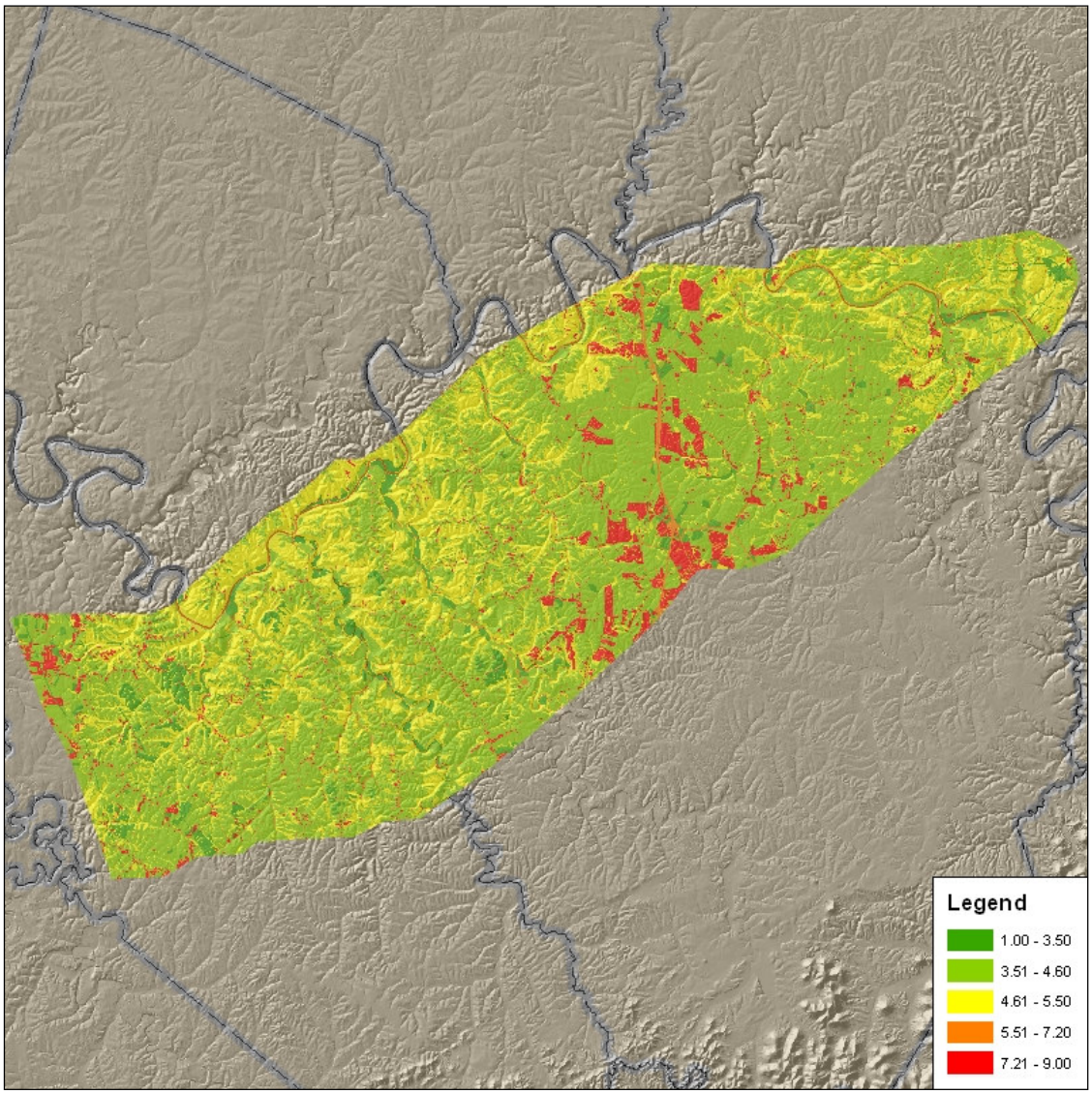


PART VIII: AVERAGE ALTERNATIVE CORRIDOR

1. Suitability Surface Map

After generating an Alternative Corridor for each environment, an average corridor is generated. This is accomplished by applying the "least-cost path" algorithm and averaging the suitability values and data layer weights to develop a suitability score for each grid cell on the surface of the Study Area, with a minimum ground resolution of 15 meters. The resulting suitability surface map is displayed below in Figure 21. Areas displayed in red are least suitable, while areas displayed in green are most suitable.

FIGURE 21: Suitability Surface Map, Smith-West Garrard Study Area



2. Description of Simple Average Alternative Corridor

By taking the top (or most suitable) 3 percent of possible routes across this suitability surface from one endpoint to the other, an average Alternative Corridor is produced. This is the final Alternative Corridor. It is displayed in Figure 22 below. This Alternative Corridor begins at Smith Substation on the eastern end of the Study Area and follows the existing EKPC 138-kV Smith-Fawkes line to the west. At Richmond, near I-75, the corridor leaves the existing transmission line corridor, widens and goes southwest to join 138-kV transmission line owned by Kentucky Utilities. The corridor follows that line to the Newby Substation, then pick up the corridor of EKPC's existing Newby-Lancaster transmission line, which runs southwest to just east of Lancaster. From there, the corridor again widens and heads west to the site of the West Garrard substation.

Table 14 on Page 53 details land uses within each environment's Alternative Corridor and within the simple average Alternative Corridor.

FIGURE 22: Simple Average Alternative Corridor

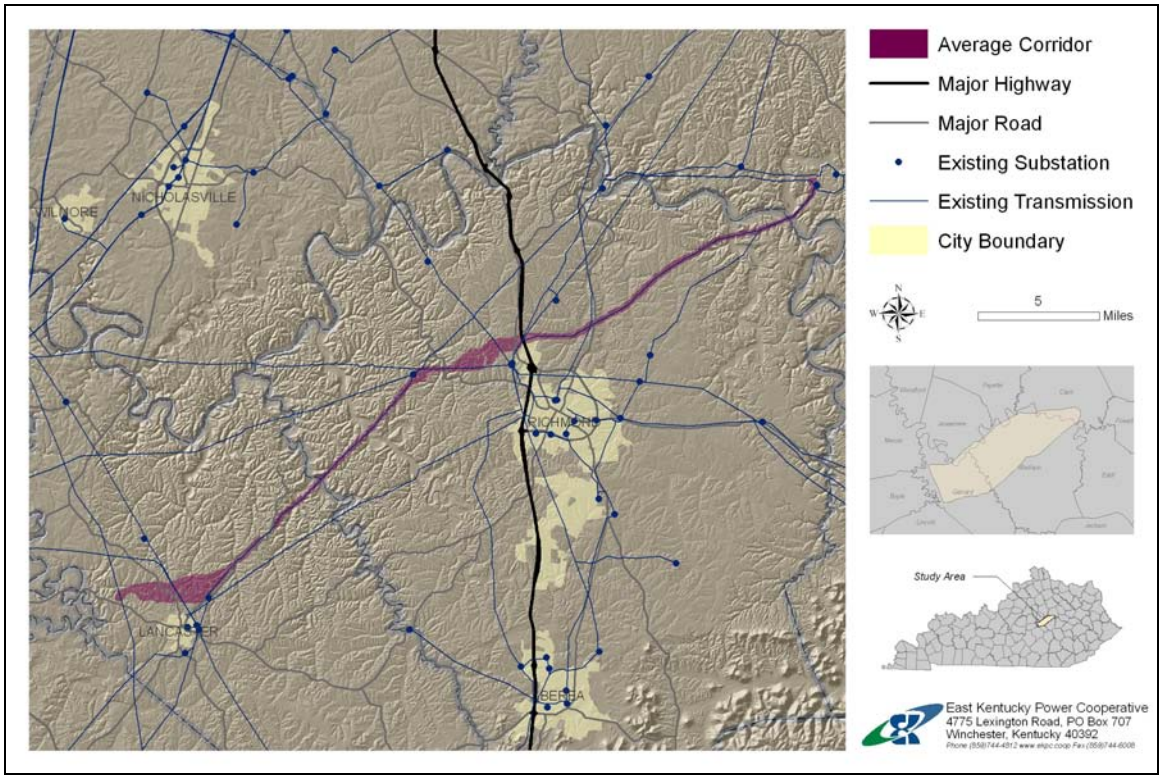


TABLE 14: Land-Use Acres, Environment & Average Alternative Corridors

Land Use	Average Corridor Acres		Built Corridor Acres		Engineering Corridor Acres		Natural Corridor Acres	
Apartment/High Density	0.04	*0.00%*	0.03	*0.00%*	0.35	*0.00%*	0.57	*0.01%*
Commercial/Industrial	0.87	*0.01%*	0.03	*0.00%*	1.06	*0.01%*	32.11	*0.33%*
Forested	1,434.53	*18.71%*	2,088.86	*19.96%*	1,948.54	*21.44%*	1,553.39	*16.20%*
Hydrography	42.06	*0.55%*	57.22	*0.55%*	55.98	*0.62%*	68.95	*0.72%*
Other	4.55	*0.06%*	16.19	*0.15%*	6.04	*0.07%*	11.16	*0.12%*
Other Livestock	5,286.55	*68.97%*	7,383.32	*70.56%*	6,014.21	*66.17%*	6,822.54	*71.15%*
Planted Pine	25.30	*0.33%*	26.51	*0.25%*	30.84	*0.34%*	24.97	*0.26%*
Recreational	0.81	*0.01%*	0.00	*0.00%*	1.02	*0.01%*	0.00	*0.00%*
Residential	85.37	*1.11%*	106.58	*1.02%*	102.13	*1.12%*	209.60	*2.29%*
Road ROW	58.71	*0.77%*	78.57	*0.75%*	79.04	*0.87%*	112.03	*1.17%*
Row Crop	474.05	*6.18%*	439.85	*4.20%*	558.58	*6.15%*	472.66	*4.93%*
Transportation	40.22	*0.52%*	43.57	*0.42%*	50.06	*0.55%*	78.83	*0.82%*
Utility R/W	212.08	*2.77%*	223.61	*2.14%*	240.86	*2.65%*	201.97	*2.11%*
TOTAL	**7,665.13**		**10,464.33**		**9,088.68**		**9,588.78**	

PART IX: REFERENCES

- "EPRI-GTC Overhead Electric Transmission Line Siting Methodology," Electric Power Research Institute & Georgia Transmission Corp., February 2006

- "Kentucky Transmission Line Siting Model," draft report, Photo Science Inc., April 2006.