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April 6, 2015

Via Federal Express

Mr. Jeff Derouen
Executive Director
Public Service Commission
211 Sower Boulevard, P.O. Box 615
Frankfort, Kentucky 40602-0615

Re: **In the Matter of: Application of Big Rivers Electric Corporation for a Certificate of Public Convenience and Necessity to Construct Two 161 kV Transmission Lines in Hancock County, Kentucky, Case No. 2015-00051**

Dear Mr. Derouen:

Enclosed for filing pursuant to 807 KAR 5:120 are (1) an original and six copies of the application of Big Rivers Electric Corporation for a certificate of public convenience and necessity to construct two 161 kV transmission lines; (2) three copies of a set of maps showing the location of the proposed transmission line; and (3) one copy of a set of maps showing alternative routes that were considered. Thank you for your assistance in this matter.

Sincerely,

Tyson Kamuf

TAK/lm
Enclosures

cc. Michael Chambliss
Bob Warren
Burns Mercer
Scott Ribble
Greg Starheim
Wayne Elliot

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ORIGINAL

Big Rivers
ELECTRIC CORPORATION

Your Touchstone Energy® Cooperative

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION OF KENTUCKY

In the Matter of:

APPLICATION OF	)	
BIG RIVERS ELECTRIC CORPORATION	)	
FOR A CERTIFICATE OF PUBLIC CONVENIENCE	)	**Case No.**
AND NECESSITY TO	)	**2015-00051**
CONSTRUCT TWO 161 KV TRANSMISSION LINES	)	
IN HANCOCK COUNTY, KENTUCKY	)	

APPLICATION and EXHIBITS

FILED: April 7, 2015

ORIGINAL

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the matter of:

Application of Big Rivers Electric Corporation for a Certificate of Public Convenience and Necessity to Construct Two 161 kV Transmission Lines in Hancock County, Kentucky	))))	Case No. 2015-00051

APPLICATION

Big Rivers Electric Corporation ("Big Rivers") files this application ("Application") pursuant to KRS 278.020 and 807 KAR 5:120, seeking a certificate of public convenience and necessity to construct two 161 kilovolt ("kV") transmission lines. In support of this Application, Big Rivers states as follows:

1. The applicant, Big Rivers, is a rural electric cooperative corporation organized pursuant to KRS Chapter 279. Its address is P.O. Box 24, 201 Third Street, Henderson, Kentucky 42419. Big Rivers' address for electronic mail service is regulatory@bigrivers.com. 807 KAR 5:120 Section 2(1)(a); 807 KAR 5:001 Section 14(1).

2. Big Rivers owns generating assets and purchases, transmits and sells electricity at wholesale. Its principal purpose is to provide the wholesale electricity requirements of its three distribution cooperative members: Jackson Purchase Energy Corporation, Kenergy Corp. ("Kenergy"), and Meade County Rural Electric Cooperative Corporation (collectively, the "Members"). The distribution cooperatives in turn provide retail electric service to approximately 114,000 consumer/retail members located in 22 western Kentucky counties: Ballard, Breckenridge, Caldwell, Carlisle, Crittenden, Daviess, Graves, Grayson, Hancock, Hardin, Henderson, Hopkins, Livingston, Lyon, Marshall, McCracken, McLean, Meade, Muhlenberg, Ohio, Union and Webster.

3. Big Rivers was incorporated in the Commonwealth of Kentucky on June 14, 1961, and hereby attests that it is currently in good standing in Kentucky. 807 KAR 5:120 Section 2(1)(a); 807 KAR 5:001 Section 14(2).

4. Big Rivers is seeking approval to construct two new 161 kV transmission lines in Hancock County, Kentucky. The lines are approximately 1.7 miles and 2.0 miles in length, respectively. The purpose of the proposed transmission lines is to serve a planned expansion of a Kenergy industrial customer, Aleris Rolled Products, Inc. ("Aleris"), at Aleris' aluminum mill in Lewisport, Kentucky. Due to the length and voltage of these transmission lines, KRS 278.020 requires a certificate of public convenience and necessity for the construction. The authority of the Public Service Commission ("Commission") to grant this certificate is found in KRS 278.020. 807 KAR 5:120 Section 2(1)(a); 807 KAR 5:001 Section 14(1).

5. A table of each regulatory requirement for this filing, cross-referenced to the location in this Application where that requirement is satisfied, is attached hereto as Exhibit A.

6. The route for the proposed lines begins at the Big Rivers Coleman Extra High Voltage ("EHV") Substation, which is located approximately 1.5 miles east of the Aleris aluminum mill. From this substation in northern Hancock County, the lines will extend west to two substations at the Aleris aluminum mill, which is also in northern Hancock County. Big Rivers is requesting approval to construct these two transmission lines based upon its demonstrated need. 807 KAR 5:120 Section 2(1)(b); 807 KAR 5:001 Section 15(2)(c).

7. Three copies of a proposed route map, with a scale of one inch equals 1000 feet, and showing the location of the proposed construction, have been filed with the Commission along with this Application. 807 KAR 5:120 Section 2(2).

8. The proposed construction is required by the public convenience and necessity. As shown in the "Aleris Transmission Service Plan" (the "Transmission Study") attached hereto as Exhibit B, the proposed transmission lines are required to support the voltage in the Hancock County area under certain contingencies. More specifically, the lines are a necessary part of several projects that together will enable Big Rivers to serve the expansion of Aleris' aluminum mill. The mill expansion will provide employment opportunities for residents of Hancock County and the surrounding counties. 807 KAR 5:001 Section 15(2)(a); 807 KAR 5:120 Section 2(1)(b).

These several projects include the proposed transmission lines as well as other projects, including construction of a new transmission substation on the north side of the Aleris mill, construction of a 0.7 mile 161 kV transmission line out of Big Rivers' Hancock County Substation, modifications to the existing substation on the south side of the Aleris mill, and construction of two line terminals at the Coleman EHV Substation. While all of these projects are necessary to serve the mill expansion, the proposed transmission lines project from the Coleman EHV Substation is the only project for which a certificate of public convenience and necessity is required. The other projects are ordinary extensions of existing systems in the usual course of business for which no certificate is required under KRS 278.020(2).

9. In the transmission study process, Big Rivers evaluated the potential upgrade of all three transformers at the existing Aleris substation with no additional transmission line construction as an alternative to the proposed construction. That alternative was rejected because of greater risk to the bulk electric system and less flexibility than the proposed construction. The Transmission Study describes in more detail the benefits and justification for the proposed construction as well as the limitations of the construction alternative considered, but not selected.

10. Big Rivers also considered a total of five alternative routes for the construction of the proposed transmission lines. The evaluation of these routes is summarized in the report, "Electric Transmission Line Route Selection Technical Report - Lines 3-K & 3-L 161 kV Transmission Lines Connecting the Coleman EHV Substation Site and Aleris Aluminum Mill," attached hereto as Exhibit C. That report also discusses and supports the reasons for the route selection. Maps depicting the alternative routes not selected have been filed with the Commission along with this Application. 807 KAR 5:120 Section 2(2)(c).

11. Each proposed transmission line requires a right-of-way of 100 feet in width. Approximately 0.6 miles of the recommended route will be double-circuited requiring only 100 ft. of right-of-way width for both circuits. These lines will typically be constructed using single steel poles for tangent structures, two-pole steel for angle structures, and three pole steel for large angled dead-end structures. Access to the proposed right-of-way for the construction of the new transmission line will maximize the use of existing roads in the project area, and off-road movement of vehicles will be restricted to the proposed right-of-way to the extent practicable. Trees within the proposed new right-of-way will be removed in order to achieve National Electric Safety Code electrical clearances. Conventional construction equipment will be used to frame and install the transmission line steel poles. The electrical conductors will then be strung, dead-ended, and clipped-in using conventional equipment and processes. Sketches of proposed typical structures are attached hereto as Exhibit D. 807 KAR 5:120 Sections 2(1)(b), (2)(b); 807 KAR 5:001 Section 15(2)(c).

12. The proposed construction will be self-financed by Big Rivers. The total cost of the transmission line project, including the purchase price of the necessary easements, is estimated to be $1,400,000. The estimated cost of operation of the new construction, including the cost of taxes and operation and maintenance ("O&M"), based on historical averages of 3.7 miles of transmission line,

is approximately $27,000 per year. The project does not involve sufficient capital outlay to materially affect the existing financial condition of Big Rivers. 807 KAR 5:120 Sections 2(1)(b), (7); 807 KAR 5:001 Section 15(2)(e)-(f).

13. The proposed transmission line which ties into the northern most substation at the Aleris mill passes just over 0.2 miles from the Hancock County Airport north of Lee Henderson Road. Big Rivers has submitted applications and obtained approvals from the Federal Aviation Administration and the Kentucky Airport Zoning Commission. Copies of these approvals are attached hereto as Exhibit E. No other franchises or permits from any other public authority are required for the proposed construction. 807 KAR 5:120 Section 2(1)(b); 807 KAR 5:001 Section 15(2)(b).

14. The proposed construction will not compete with any other public utilities, corporations, or persons. 807 KAR 5:120 Section 2(1)(b); 807 KAR 5:001 Section 15(2)(c).

15. Each property owner over whose property the transmission line right-of-way is proposed to cross has been sent by first-class mail, addressed to the property owner at the owner's address as indicated by the county property valuation administrator records, or has been hand delivered:

(a) Notice of the proposed construction;

(b) The commission docket number under which the application will be processed and a map showing the proposed route of the line;

(c) The address and telephone number of the executive director of the Commission;

(d) A description of his or her rights to request a local public hearing and to request to intervene in the case; and

(e) A description of the project.

807 KAR 5:120 Section 2(3).

16. The notification letters were sent by Big Rivers to the property owners. A sample copy of the notice letter is attached hereto as Exhibit F. A list of the names and addresses of the property owners to whom Big Rivers sent the notices is attached hereto as Exhibit G. 807 KAR 5:120 Section 2(4).

17. A notice of intent to construct the proposed transmission line was published in the *Owensboro Messenger-Inquirer* and the *Hancock County Clarion*, a newspaper of general circulation in Hancock County. The notice included:

(a) A map showing the proposed route;

(b) A statement of the right to request a local public hearing; and

(c) A statement that interested persons have the right to request to intervene.

807 KAR 5:120 Section 2(5).

18. Copies of the newspaper notices are attached hereto as Exhibit H. 807 KAR 5:120 Section 2(6).

WHEREFORE, Big Rivers requests that the Commission issue an order granting it a certificate of public convenience and necessity for the proposed construction, and for all other relief to which it may be entitled.

On this the 6th day of April, 2015.

Respectfully submitted,

James M. Miller
Tyson Kamuf
SULLIVAN, MOUNTJOY, STAINBACK & MILLER, P.S.C.
100 St. Ann Street
P. O. Box 727

Owensboro, Kentucky 42302-0727
Phone: (270) 926-4000
Facsimile: (270) 683-6694
jmiller@smsmlaw.com
tkamuf@smsmlaw.com

Counsel for Big Rivers Electric Corporation

Verification

I, Michael W. Chambliss, Vice President, System Operations for Big Rivers Electric Corporation, hereby state that I have read the foregoing Application and that the statements contained therein are true and correct to the best of my knowledge and belief, on this the 6th day of April, 2015.

Michael W. Chambliss
Vice President, System Operations
Big Rivers Electric Corporation

COMMONWEALTH OF KENTUCKY)
COUNTY OF HENDERSON)

SUBSCRIBED AND SWORN to before me by Michael W. Chambliss, as Vice President, System Operations for Big Rivers Electric Corporation, on this the 6 day of April, 2015.

Notary Public, State at Large Kentucky
My commission expires: 8-8-2016
Notary ID: _____

Big Rivers Electric Corporation
Cross-Reference Table for Compliance with Regulatory Requirements
Case No. 2015-00051

Regulation	Filing Requirement	Location in Application
807 KAR 5:120 Section 1	Notice of intent to file application.	Big Rivers filed its notice of intent on February 12, 2015.
807 KAR 5:120 Section 2(1)	All documents and information required by: (a) 807 KAR 5:001 Section 14, except the applicant shall file an original and six copies of the application; and (b) 807 KAR 5:001 Section 15(2)(a) through (c) and (e) through (f).	See below; original and six copies of Application filed
807 KAR 5:120 Section 2(2)(a)	Three (3) maps of suitable scale, but no less than one (1) inch equals 1,000 feet for the project proposed.	Filed with the Application
807 KAR 5:120 Section 2(2)(b)	Sketches of proposed typical transmission line support structures shall also be provided.	Exhibit D
807 KAR 5:120 Section 2(2)(c)	A separate map of the same scale shall show any alternative routes that were considered.	Filed with the Application
807 KAR 5:120 Section 2(3)	A verified statement that each property owner properly notifed.	Application ¶ 15
807 KAR 5:120 Section 2(4)	A sample copy of the property owner notice.	Exhibit F
807 KAR 5:120 Section 2(4)	A list of the names and addresses of the property owners to whom the notice has been sent.	Exhibit G
807 KAR 5:120 Section 2(5)	A statement that a notice was properly published.	Application ¶ 17
807 KAR 5:120 Section 2(6)	A copy of the newspaper notice.	Exhibit H
807 KAR 5:120 Section 2(7)	A statement as to whether the project involves sufficient capital outlay to materially affect the existing financial condition of the utility involved.	Application ¶ 12
807 KAR 5:001 Section 14(1)	The full name, mailing address, and electronic mail address of the applicant,	Application ¶ 1
807 KAR 5:001 Section 14(1)	Fully the facts on which the application is based, with a request for the order, authorization, permission, or certificate desired and a reference to the particular law requiring or providing for the information.	Application; Application ¶ 4

Big Rivers Electric Corporation
Cross-Reference Table for Compliance with Regulatory Requirements
Case No. 2015-00051

Regulation	Filing Requirement	Location in Application
807 KAR 5:001 Section 14(2)	If a corporation, the applicant shall identify in the application the state in which it is incorporated and the date of its incorporation, attest that it is currently in good standing in the state in which it is incorporated, and, if it is not a Kentucky corporation, state if it is authorized to transact business in Kentucky.	Application ¶ 3
807 KAR 5:001 Section 15(2)(a)	The facts relied upon to show that the proposed construction or extension is or will be required by public convenience or necessity.	Application
807 KAR 5:001 Section 15(2)(b)	Copies of franchises or permits, if any, from the proper public authority for the proposed construction or extension, if not previously filed with the commission.	Application ¶ 13; Exhibit E
807 KAR 5:001 Section 15(2)(c)	A full description of the proposed location, route, or routes of the proposed construction or extension, including a description of the manner of the construction and the names of all public utilities, corporations, or persons with whom the proposed construction or extension is likely to compete.	Application ¶¶ 6, 11, 14; *see* the maps of proposed route filed with Application
807 KAR 5:001 Section 15(2)(e)	The manner in detail in which the applicant proposes to finance the proposed construction or extension.	Application ¶ 12
807 KAR 5:001 Section 15(2)(f)	An estimated annual cost of operation after the proposed facilities are placed into service.	Application ¶ 12

Big Rivers
ELECTRIC CORPORATION

Your Touchstone Energy® Cooperative

Aleris Transmission Service Plan

February 2015

Case No. 2015-00051
Exhibit B

Table of Contents

I. INTRODUCTION

Big Rivers Electric Corporation (Big Rivers) received a request to provide electric service to an expanding industrial facility (Aleris Corporation) located in the Kenergy service territory near Hawesville, Kentucky. Big Rivers currently provides transmission service to this customer through its 161 kV system connected to the Hancock County substation. However, with a planned expansion to a contract maximum of 72 MW, the existing service arrangement will no longer provide adequate service. Therefore, an evaluation to determine the most cost effective and reliable transmission service option to the expanding industrial facility has been completed.

II. EXECUTIVE SUMMARY

Various studies were completed in order to analyze service plans for the 33 MW Aleris load addition (expected running load), with a starting peak load of 44 MW. After these studies were completed, a management review resulted in a service plan that includes the construction of a new 1.7 mile 161 kV circuit to serve the 28 MW existing load, and a new 2 mile 161 kV circuit to provide service to the planned 33 MW load expansion. Both new 161 kV transmission circuits will be terminate in the Coleman EHV substation.

The existing Big Rivers owned Hancock County to Martin-Marietta substation (Aleris) 161 kV transmission circuits will remain available as backup feeds to both the existing Aleris load and the planned load expansion to allow service from Hancock County in the event of an emergency.

This document describes the completed studies of the proposed service plan and alternative considered. The evaluation criteria applied during the completion of the described studies and analyses is included in Appendix A.

III. ALTERNATIVE A: PROPOSED 161 KV RADIAL SERVICE

The proposed service plan for the Aleris load includes construction of a new-terrain 1.7 mile 161 kV radial circuit from Coleman EHV to serve the 28 MW load at the existing 161/13.8 kV delivery point. In addition, the plan includes a new-terrain 2 mile 161 kV circuit to provide service to a new 161/13.8 kV delivery point necessary to serve the expanded load.

Both a 2018 summer peak near-term model and a 2025 summer peak long-term model were used to study this alternative. Normal and single contingency conditions were studied with the 33 MW (92% power factor) load addition. Studies showed no line loading or voltage problems on the transmission system (both internal and external). While a significant addition, adequate and reliable service can be expected with the proposed 161 kV service plan.

Further evaluations with the maximum contract demand (44 MW at a 90% power factor in addition to the existing load) indicated no line loading or voltage problems.

2025 Summer Case: Present Load Level, Coleman In-Service

	Proposed Configuration Bus Voltages (kV)				
	Base	Reid-Daviess out	Aleris served from Hancock	Cole-Newt out	CEHV-DEHV out
Aleris	165.3	165.2	165.1	166.1	165.3
Newman	161.5	158.4	161.4	161.7	161.3
Reid	165.5	165.5	165.5	165.5	165.5

Worst Case Line Loading (MW) -- Proposed Configuration					
Branch Monitored	Outaged Branch	Base Loading	% Loading	Contingency Loading	% Loading
Reid - Daviess 161 kV	Hancock - Coleman EHV 161 kV	158.7	47.4	178.5	53.2
Coleman - Newtonville 161 kV	Reid - Daviess 161 kV	99	29.6	149.3	44.6
Hancock to Coleman EHV 161 kV	Reid - Daviess 161 kV	24.4	9.0	180.2	68.0

2025 Summer Case: Proposed Load Addition (33 MW), Coleman In-Service

	Proposed Configuration Bus Voltages (kV)				
	Base	Reid-Daviess out	Aleris served from Hancock	Cole-Newt out	CEHV-DEHV out
Aleris	165.2	165.1	164.7	165.2	165.1
Newman	161.3	158.3	161.2	161.3	161.2
Reid	165.5	165.5	165.5	165.5	165.5

Worst Case Line Loading (MW) --Proposed Configuration					
Branch Monitored	Outaged Branch	Base Loading	% Loading	Contingency Loading	% Loading
Reid - Daviess 161 kV	Coleman EHV - Daviess EHV 345 kV	162.3	48.4	185.1	55.3
Coleman - Newtonville 161 kV	Coleman EHV - Daviess EHV 345 kV	107.2	32.0	161.3	48.1
Hancock to Coleman EHV 161 kV	Reid - Daviess 161 kV	21.6	8.0	180.2	68.0

2025 Summer Case: Present Load Level, Coleman Out-of-Service

	Proposed Configuration Bus Voltages (kV)				
	Base	Reid-Daviess out	Aleris served from Hancock	Cole-Newt out	CEHV-DEHV out
Aleris	163.5	161.6	163.3	163.9	154.8*
Newman	160.1	154.3*	160	159.7	154.7*
Reid	165.5	165.5	165.5	165.5	165.5

*Potential mitigation of voltage issues via SPS

Worst Case Line Loading (MW) -- Proposed Configuration					
Branch Monitored	Outaged Branch	Base Loading	% Loading	Contingency Loading	% Loading
Reid - Daviess 161 kV	Coleman EHV - Daviess EHV 345 kV	212.4	63.4	275.6	82.3
Coleman - Newtonville 161 kV	Coleman EHV - Daviess EHV 345 kV	252.7	75.4	411.8	122.9*
Hancock to Coleman EHV 161 kV	Reid - Daviess 161 kV	33.3	12.6	180.2	68.0

*SPS trips 1 potline = 106% loading *SPS trips 2 potlines = 88% loading

2025 Summer Case: Proposed Load (33 MW), Coleman Out-of-Service

	Proposed Configuration Bus Voltages (kV)				
	Base	Reid-Daviess out	Aleris served from Hancock	Cole-Newt out	CEHV-DEHV out
Aleris	162.7	160.6	162.4	159	152.8*
Newman	159.7	153*	159.4	162.7	153.7*
Reid	165.5	165.5	165.5	165.5	165.5

*Potential mitigation of voltage issues via SPS

Worst Case Line Loading (MW) --Proposed Configuration					
Branch Monitored	Outaged Branch	Base Loading	% Loading	Contingency Loading	% Loading
Reid - Daviess 161 kV	Coleman EHV - Daviess EHV 345 kV	211.1	63.0	282.5	84.3
Coleman - Newtonville 161 kV	Coleman EHV - Daviess EHV 345 kV	262	78.2	422.5	126.1*
Hancock to Coleman EHV 161 kV	Reid - Daviess 161 kV	35.5	13.4	180.2	68.0

*SPS trips 1 potline = 112% loading *SPS trips 2 potlines = 94% loading

2018 Summer Case: Present Load Level, Coleman Out-of-Service

	Proposed Configuration Bus Voltages (kV)				
	Base	Reid-Daviess out	Aleris served from Hancock	Cole-Newt out	CEHV-DEHV out
Aleris	164.2	163	164	164.4	156.4
Newman	160.6	156.8	160.5	160.1	155.7
Reid	165.5	165.5	165.5	165.5	165.5

Worst Case Line Loading (MW) -- Proposed Configuration					
Branch Monitored	Outaged Branch	Base Loading	% Loading	Contingency Loading	% Loading
Reid - Daviess 161 kV	Coleman EHV - Daviess EHV 345 kV	221.1	66.0	284.8	85.0
Coleman - Newtonville 161 kV	Coleman EHV - Daviess EHV 345 kV	227.7	68.0	395.9	118.2*
Hancock to Coleman EHV 161 kV	Reid - Daviess 161 kV	47.2	17.8	172.9	65.2

*SPS trips 1 potline = 101% loading *SPS trips 2 potlines = 82% loading

2018 Summer Case: Proposed Load (33 MW), Coleman Out-of-Service

	Proposed Configuration Bus Voltages (kV)				
	Base	Reid-Daviess out	Aleris served from Hancock	Cole-Newt out	CEHV-DEHV out
Aleris	163.5	162	163.1	163.3	153.9
Newman	160.2	155.6	160	159.5	154.3
Reid	165.5	165.5	165.5	165.5	165.5

Worst Case Line Loading (MW) --Proposed Configuration					
Branch Monitored	Outaged Branch	Base Loading	% Loading	Contingency Loading	% Loading
Reid - Daviess 161 kV	Coleman EHV - Daviess EHV 345 kV	224.9	67.1	292.3	87.3
Coleman - Newtonville 161 kV	Coleman EHV - Daviess EHV 345 kV	237.3	70.8	414.7	123.8*
Hancock to Coleman EHV 161 kV	Reid - Daviess 161 kV	49.7	18.8	173	65.3

*SPS trips 1 potline = 107% loading *SPS trips 2 potlines = 88% loading

IV. ALTERNATIVE B: TOPOLOGY REMAINS UNCHANGED

The service plan evaluation also considered the option of leaving the topology unchanged and providing service to the entire Aleris load by expanding the existing delivery point. The evaluation indicated an increased risk to the bulk electric system and limited flexibility compared to the proposed alternative.

As the following tables indicate, the high-side voltage at Aleris is expected to drop to 91% with an outage of the Coleman EHV to Hancock County 161 kV circuit (33 MW load addition and total plant power factor of 92%). The expected high-side voltage was reduced to 89% with the same outage and the maximum contract demand (44 MW at a 90% power factor in addition to the existing load).

Due to the described voltage concerns, Alternative A is the recommended service plan. Overall, the evaluation showed the proposed plan to be the more robust and flexible service plan while also providing back-up service options to both delivery point substation during outage conditions.

2025 Summer Case: Present Load Level, Coleman In-Service

	Bus Voltages (kV) -- Present Day Configuration				
	Base	Reid-Daviess out	Hancock-CEHV out	Cole-Newt out	CEHV-DEHV out
Aleris	165.1	164.7	154.9	165.8	165.3
Newman	161.4	158.2	155.9	161.6	161.2
Reid	165.5	165.5	165.5	165.5	165.5

Worst Case Line Loading (MW) -- Present Day Configuration					
Branch Monitored	Outaged Branch	Base Loading	% Loading	Contingency Loading	% Loading
Reid - Daviess 161 kV	Hancock - Coleman EHV 161 kV	159.6	47.6	208.7	62.3
Coleman - Newtonville 161 kV	Reid - Daviess 161 kV	98.7	29.5	149.4	44.6
Hancock to Coleman EHV 161 kV	Reid - Daviess 161 kV	53.9	20.3	209.1	78.9

2025 Summer Case: Proposed Load Addition (33 MW), Coleman In-Service

	Bus Voltages (kV) -- Present Day Configuration				
	Base	Reid-Daviess out	Hancock-CEHV out	Cole-Newt out	CEHV-DEHV out
Aleris	164.8	164.3	147.1	164.8	164.7
Newman	161.2	157.8	151.6	161.1	161
Reid	165.5	165.5	165.5	165.5	165.5

Worst Case Line Loading (MW) -- Present Day Configuration					
Branch Monitored	Outaged Branch	Base Loading	% Loading	Contingency Loading	% Loading
Reid - Daviess 161 kV	Coleman EHV - Daviess EHV 345 kV	164.4	49.1	186.9	55.8
Coleman - Newtonville 161 kV	Coleman EHV - Daviess EHV 345 kV	106.5	31.8	160	47.8
Hancock to Coleman EHV 161 kV	Reid - Daviess 161 kV	85.8	32.4	243.7	92.0

2025 Summer Case: Present Load Level, Coleman Out-of-Service

	Bus Voltages (kV) -- Present Day Configuration				
	Base	Reid-Daviess out	Hancock-CEHV out	Cole-Newt out	CEHV-DEHV out
Aleris	163.5	161.6	163.9	163.9	154.8*
Newman	160.1	154.3*	159.3	159.7	154.7*
Reid	163.3	165.5	165.5	165.5	165.5

*Potential mitigation of voltage issues via SPS

Worst Case Line Loading (MW) -- Present Day Configuration					
Branch Monitored	Outaged Branch	Base Loading	% Loading	Contingency Loading	% Loading
Reid - Daviess 161 kV	Coleman EHV - Daviess EHV 345 kV	212.7	63.5	275.8	82.3
Coleman - Newtonville 161 kV	Coleman EHV - Daviess EHV 345 kV	252.4	75.3	411.6	122.9*
Hancock to Coleman EHV 161 kV	Reid - Daviess 161 kV	29.4	11.1	209.2	78.9

*SPS trips 1 potline = 107% loading *SPS trips 2 potlines = 90% loading

2025 Summer Case: Proposed Load Addition (33 MW), Coleman Out-of-Service

	Bus Voltages (kV) -- Present Day Configuration				
	Base	Reid-Daviess out	Hancock-CEHV out	Cole-Newt out	CEHV-DEHV out
Aleris	163.3	161	147.4	163.7	157.8*
Newman	160	154*	151.8	159.6	154.7*
Reid	165.5	165.5	165.5	165.5	165.5

*Potential mitigation of voltage issues via SPS

Worst Case Line Loading (MW) -- Present Day Configuration					
Branch Monitored	Outaged Branch	Base Loading	% Loading	Contingency Loading	% Loading
Reid - Daviess 161 kV	Coleman EHV - Daviess EHV 345 kV	212.2	63.3	284	84.8
Coleman - Newtonville 161 kV	Coleman EHV - Daviess EHV 345 kV	259.3	77.4	421	125.7*
Hancock to Coleman EHV 161 kV	Reid - Daviess 161 kV	50.2	18.9	243.8	92.0

*SPS trips 1 potline = 112% loading *SPS trips 2 potlines = 95% loading

2018 Summer Case: Present Load Level, Coleman Out-of-Service

	Present Day Configuration Bus Voltages (Coleman Gen Offline) (kV)				
	Base	Reid-Daviess out	Hancock-CEHV out	Cole-Newt out	CEHV-DEHV out
Aleris	163.3	160.5	158.1	163.1	145.9*
Newman	160.2	154.3	157.9	159.5	150.5*
Reid	165.5	165.5	165.5	165.5	165.5

*Potential mitigation of voltage issues via SPS

Worst Case Line Loading (MW) -- Present Day Configuration					
Branch Monitored	Outaged Branch	Base Loading	% Loading	Contingency Loading	% Loading
Reid - Daviess 161 kV	Coleman EHV - Daviess EHV 345 kV	218.3	65.2	281.8	84.1
Coleman - Newtonville 161 kV	Coleman EHV - Daviess EHV 345 kV	229.7	68.6	391.3	116.8*
Hancock to Coleman EHV 161 kV	Reid - Daviess 161 kV	32.4	12.2	201.3	76.0

*SPS trips 1 potline = 103% loading *SPS trips 2 potlines = 85% loading

2018 Summer Case: Proposed Load (33 MW), Coleman Out-of-Service

	Present Day Configuration Bus Voltages (Coleman Gen Offline) (kV)				
	Base	Reid-Daviess out	Hancock-CEHV out	Cole-Newt out	CEHV-DEHV out
Aleris	163.2	161.2	151.9	162.9	154.5*
Newman	160.1	155.2	154.6	159.4	154.6*
Reid	165.5	165.5	165.5	165.5	165.5

*Potential mitigation of voltage issues via SPS

Worst Case Line Loading (MW) -- Present Day Configuration					
Branch Monitored	Outaged Branch	Base Loading	% Loading	Contingency Loading	% Loading
Reid - Daviess 161 kV	Coleman EHV - Daviess EHV 345 kV	223.2	66.6	289.9	86.5
Coleman - Newtonville 161 kV	Coleman EHV - Daviess EHV 345 kV	239.1	71.4	408.3	121.9*
Hancock to Coleman EHV 161 kV	Reid - Daviess 161 kV	45.2	17.1	235.4	88.8

*SPS trips 1 potline = 109% loading *SPS trips 2 potlines = 91% loading

VI. SHORT CIRCUIT ANALYSIS

Big Rivers has completed a short-circuit study to ensure the protective equipment installed at the Aleris facility is properly sized. The study results are shown below. No circuit breaker replacements or other improvements are necessary as a result of the increased fault currents.

Expected High-Side Fault Currents

Existing System (without Coleman generation)

Martin-Marietta – existing delivery point: three phase 15,865 Amps (13,187 Amps)
Martin-Marietta – existing delivery point: single line-to-ground 13,527 Amps (10,979 Amps)

Proposed Configuration (without Coleman generation)

LAM1 - existing delivery point: three phase 17,409 Amps (13,950 Amps)
LAM1 - existing delivery point: single line-to-ground 15,171 Amps (11,565 Amps)
LAM2 - new delivery point: three phase 16,773 Amps (13,538 Amps)
LAM2 - new delivery point: single line-to-ground 14,424 Amps (11,125 Amps)

VII. STABILITY ANALYSIS

Since the proposed transmission service involves only short radial 161 kV tap line, no stability analysis was deemed necessary.

VIII. CONCLUSION

When cost, time of construction, overall robustness, and environmental impacts are all considered, the proposed 1.7 mile and 2 mile 161 kV radial transmission lines were judged to be the superior alternative for supplying the required electric service to the Aleris industrial facility.

APPENDIX A: TRANSMISSION PLANNING CRITERIA AND GUIDELINES

Contingency Criteria

Big Rivers follows two RUS recommended criteria for analyzing the adequacy of its transmission system. The first criteria defines single contingency outages to be used in all system planning studies. This criteria serves as the basis for planning and justifying system improvements.

The second criteria outlines double contingency outages that can be analyzed to determine the extent of problems encountered on the system under extreme outage or emergency situations. In most double contingency cases, system improvements would not be considered justifiable. However, the type and severity of the system problems encountered is useful information in planning those system improvements that are justifiable.

Single Contingency Criteria:

1. Outage of two generation units (any combination).
2. Outage of one generation unit and one transmission line.
3. Outage of one generating unit and one transformer.
4. Outage of one transmission line.

Double Contingency Criteria:

1. Outage of two transmission lines on the same right-of-way.
2. Outage of transmission lines due to outage of one bus.
3. Outage of three generation units.

In addition to the above-described criteria, Big Rivers also analyzes its transmission system to ensure compliance with NERC Planning Standards. Big Rivers will ensure established normal operating procedures are in place and will have all projected firm transfers modeled. The studies and assessment reports will address any planned upgrades needed to meet TPL performance requirements for each Category and will include a written summary of any plans to achieve the required system performance (including schedule for implementation, discussion of expected required in-service dates of facilities, and will consider necessary lead times) and/or corrective action plan.

When completing all bulk transmission studies, all internal facilities are monitored for voltage and loading violations. In the event an outage results in the need for additional reactive resources, Big Rivers will consider that as part of the potential solution set. Overall, Big Rivers intends to self-provide all VARs and maintain acceptable voltages under all TPL Category outages. Generator and transmission outages are studied to ensure reactive resources are available under a wide-range of system conditions.

Either select external facilities or the complete list of external system previously described are also monitored. When completing seasonal assessments, the neighboring systems may only be monitored for the potential to cascade.

When completing expansion studies or connection studies, any neighboring system violation will be compared against the base model to determine the impact of the proposed projects. Any violation made worse by the proposed system improvement will be investigated with the facility owner.

Voltage Criteria

As indicated in the following table, Big Rivers has adopted a voltage criteria for planning and assessing its transmission system. This criteria defines acceptable minimum and maximum voltage levels for the high-side buses. The criteria include a range of acceptable voltages for normal system conditions (all facilities in service) and during single contingency conditions. A more detailed description of the voltage criteria is included as Appendix A.

Transmission System Conditions	69 kV Bus Voltage		> 69 kV Bus Voltage	
	Minimum	Maximum	Minimum	Maximum
Range A: Normal System Operations	95.0%	105.0%	95.0%	105.0%
Range B: Single Contingency Conditions	91.7%	105.8%	92.0%	105.0%

Electric Transmission Line Route Selection

Technical Report

Lines 3-K & 3-L 161 kV Transmission Lines
Connecting the Coleman EHV Substation Site
And Aleris Aluminum Mill

PHOTO: Coleman EHV Substation, Henderson, KY

Study by Quantum Spatial on behalf of
Big Rivers Electric Corporation
March 3, 2015

Case No. 2015-00051
Exhibit C

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Part I: Introduction

Big Rivers Electric Corporation (BREC) is a member-owned, not-for-profit generation and transmission cooperative headquartered in Henderson, Kentucky. BREC provides wholesale electric power and services to three distribution cooperative members across 22 counties in western Kentucky.

Incorporated in June of 1961, the member cooperatives are Jackson Purchase Energy Corporation, Kenergy Corp, and Meade County Rural Electric Cooperative Corporation. Together, they distribute retail electric power and provide other services to more than 114,000 homes, farms, businesses, and industries. BREC operates and maintains 1,298 miles of transmission line with a total power capacity of 1,756 Megawatts.

BREC has elected to conduct a study to determine the preferred routes of two 161 kilovolt (kV) transmission lines. One end point will be the proposed Lewisport Aluminum Mill (LAM) 2 substation site to the north of the Aleris Aluminum Mill, east of the Hancock County Airport, in Hancock County, Kentucky. The other endpoint, LAM 1, is at the Aleris Aluminum Mill, on the south side of the mill site, also in Hancock County. BREC commissioned this Route Selection Study to identify a preferred route for the proposed transmission lines that considers many diverse factors, including existing land uses, habitats, special land use classifications (e.g., National or State Parks, Military Reservations, floodplains, and wetlands), previously-confirmed cultural resources and threatened or endangered species.

Please note that the figures contained in this report show that the endpoint for LAM 2 was changed according to the project team's wishes. Originally the endpoint was 1,100 feet east of the currently displayed LAM 2 endpoint. The change was made after the alternate corridor analysis had been made. The change in location did not affect the outcome of the analyses.

The first step in this methodology was the development of Macro Corridors, which define an area for more detailed study between the proposed endpoints. For this stage of the process, the best available land cover dataset, based on 30 meter (m) LandSat imagery, was used to develop the Macro Corridors. In the case of the proposed project area, the best available dataset was from 2014.

The Macro Corridors were used to develop a Study Area of approximately 2.28 square miles centered on the area in between the Coleman EHV Substation, LAM 1, and LAM 2. The northern and eastern portions of the Study Area are largely agriculture and interspersed with forested land. The southern part of the Study Area, contains more forested land with some agriculture. The western side of the Study Area is dominated by the Aleris Aluminum Mill with forest and agriculture surrounding the mill.

Once the Study Area was identified, more detailed dataset layers were collected or created to generate Alternate Corridors. For the purposes of this study, the Study Area represents a larger land area between the end points of the project through which Alternate Corridors might be logically and practically identified. "Alternate Corridors" are defined as the most suitable areas for routing a transmission line within the Study Area. Alternate Corridors may vary in width depending upon the resources encountered in the Study Area. "Route" is a term that describes the potential centerline path of a transmission line, whereas a "corridor" is a more general area of sufficient width to contain the eventual right-of-way.

The EPRI-GTC Overhead Electric Transmission Line Siting Methodology (EPRI-GTC Methodology), described in Part III of this report, was used to produce four Alternate Corridors (Built, Natural, Engineering Considerations, and Simple Average) that represent different perspectives - or emphases - for routing transmission lines. The Built Corridor seeks to minimize impacts to human development and historical / cultural resources. The Natural Corridor emphasizes protection of natural resources and avoiding impacts to natural plant communities and animal species. The Engineering Considerations Corridor seeks to maximize infrastructure co-location opportunities and avoid areas in which it would be difficult to construct a new transmission line. Finally, the Simple Average Corridor weighs all three perspectives equally, with no emphasis on any one group of criteria.

Using the corridors developed through the methodology, BREC developed five Alternate Routes. The Alternate Routes were evaluated and ranked according to the criteria and weights developed by Kentucky stakeholders, and then a preferred route was selected. The Preferred Route and the processes used to generate it are detailed in this report.

Part II: Project Description

BREC is utilizing the EPRI-GTC Methodology to identify a Preferred Route for construction of two new 161 kV transmission lines. The first is proposed to connect the Coleman EHV Substation and LAM 1, and the second proposes connecting the Coleman EHV Substation and LAM 2. The project would require the construction of approximately 1.98 miles of new transmission line to LAM 2 and 1.74 miles of new transmission line to LAM 1. The new transmission lines would serve the Aleris Aluminum Mill, an existing BREC industrial customer.

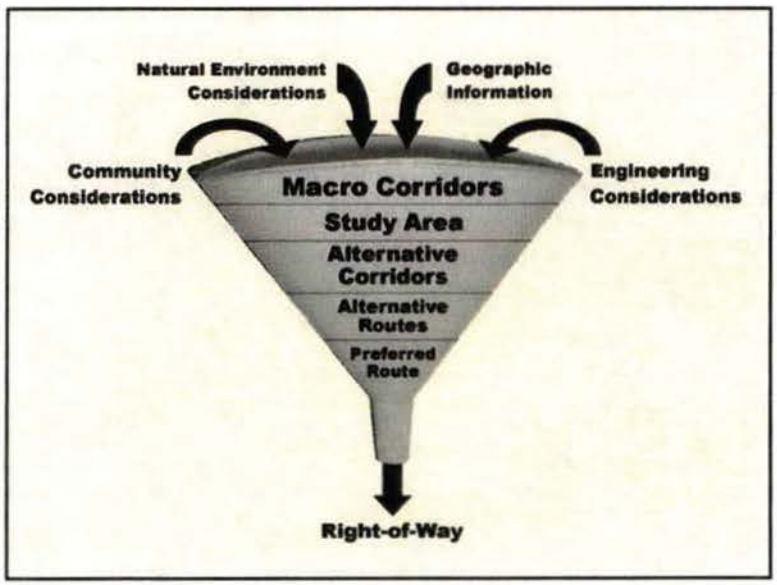
Part III: Overview of Suitability Analysis

1. EPRI-GTC Methodology

The EPRI-GTC Overhead Electric Transmission Line Siting Methodology (EPRI-GTC Methodology) is a quantitative, computer-based methodology developed by the Electric Power Research Institute (EPRI) and Georgia Transmission Corporation (GTC) for use as a tool in evaluating the suitability of individual 15 feet x 15 feet grid cells for locating new overhead transmission lines. Based on this suitability analysis, Macro Corridors are created which define the Study Area. Using more detailed information for the grid cells within the Study Area, Alternate Corridors are developed. Within these Alternate Corridors, Alternate Routes are developed and analyzed. The analysis results in the selection of a Preferred Route.

Among its advantages, the EPRI-GTC Methodology is an objective, comprehensive, and consistent approach for routing transmission lines. Employing increasingly detailed data, the Methodology allows the utility to take into consideration vast amounts of information and to quantitatively consider stakeholder input during project development. Figure 1 represents the components and process of the EPRI-GTC Methodology.

FIGURE 1: EPRI-GTC METHODOLOGY



The EPRI-GTC Methodology approaches corridor development by considering three broadly conceived perspectives, plus a fourth perspective which considers the other three equally:

- **Built Environment Perspective,** which is concerned with minimizing the impact on people, places and cultural resources;
- **Natural Environment Perspective,** which is concerned with protecting water resources, plants and animals;
- **Engineering Considerations Perspective,** which is concerned with maximizing co-location and considering physical restraints; and
- **Simple Average,** which weighs the first three perspectives as equally important.

Features are identified and evaluated in order to map the suitability of areas within a project area for locating a transmission line. These suitable areas are assembled into Alternate Corridors. These processes are discussed in detail in the following sections.

2. The Siting Model

The siting model was developed using data collected from stakeholders during workshops conducted in June, 2003, in Atlanta, GA, and in February, 2006, in Lexington, KY. Stakeholders represented a broad range of interests including environmental concerns, historic preservation, homeowners associations, agricultural groups, government agencies, and utilities. A model based on the stakeholders' preferences was developed and tested by a project team of independent experts. The resulting model (Figure 2) includes data layers, features, layer weights, and suitability values used for siting transmission lines. More information concerning these workshops is available in the EPRI-GTC Overhead Electric Transmission Line Siting Methodology (hereafter, EPRI/GTC Methodology) (published by EPRI in 2006) and in the Kentucky Transmission Line Siting Methodology (hereafter, Kentucky Model) (published by EPRI in 2007). Some minor alterations are made to the model for site-specific and data availability reasons. These alterations are discussed in the following chapters.

Based on each stakeholder's interests, each was assigned to a breakout group for one of three perspectives – Built Environment, Natural Environment, or Engineering Considerations. Guided by an independent expert from the project team, each of these groups developed a set of data layers (shown in green in Figure 2) with component features (shown in yellow), as well as areas Areas of Least Preference (shown in red).

For example, one of the data layers in the Natural Environment perspective 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 Kentucky Model (2006) as follows:

Areas that have High Suitability for an Overhead Electric Transmission Line (1, 2, 3) - These areas 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 areas 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 areas contain resources or land uses that present a potential for significant impacts that may not be readily mitigated. Locating a transmission line in these areas would require careful siting or special design measures. While these areas can be crossed, it is not desirable to do so if other, more suitable alternatives are available.

After assigning suitability values to features, stakeholders then assigned weights to each data layer based on their opinion of its relative importance in the siting process. This was accomplished by conducting pair-wise comparisons. The result was a percentage weighting for each data layer within each perspective, with all data layers within the perspective totaling 100 percent.

The EPRI-GTC Methodology and the Kentucky Model recognize that it can be difficult to locate overhead transmission lines on or around some features because they may involve physical constraints or permitting delays. Such areas are termed "Areas of Least Preference" because the model prefers to avoid entering them, if possible. Features that constitute areas of least preference were determined by the stakeholder groups and are listed in red in Figure 2. One of the first steps in implementing the EPRI-GTC Methodology is identifying areas of least preference within the Study Area where, if possible, the Methodology would avoid locating facilities.

FIGURE 2: KENTUCKY MODEL

Kentucky Transmission Line 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
Areas of Least Preference	
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
Areas of Least Preference	
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
Equine Agri - Tourism	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
Areas of Least Preference	
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.

Areas of Least Preference (red cells): Features to avoid when siting a transmission line, if possible, as determined by stakeholders.

For more detailed information on datasets used in the model, including data sources, please see Appendix C of the EPRI-GTC Methodology (2006). This report was used as a guideline for this project.

3. Suitability Mapping

The methodology begins with three endpoints (Coleman EHV Substation, LAM 1, and LAM 2) as the basis for creating transmission line corridors. A large area between and near the endpoints is divided into grid cells 15 feet by 15 feet in size.

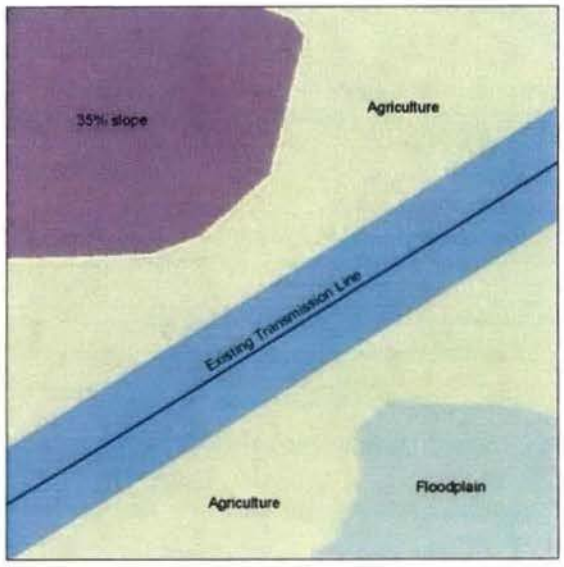
Data from aerial photography, geographic information systems, publicly available datasets, and other sources are used to identify features within each grid cell. Based on these features and the values and data layer weights determined in the Kentucky Siting Model, the methodology then assigns a suitability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

Because cells deemed to have lower suitability for locating a transmission line are assigned higher values, the methodology employs an algorithm that seeks to connect the endpoints, minimizing the sum of values as it works its way from one endpoint to the other. The resulting corridor is referred to as the "optimal path".

Figures 3, 4, and 5 demonstrate the development of a sample "optimal path" using information from a hypothetical situation.

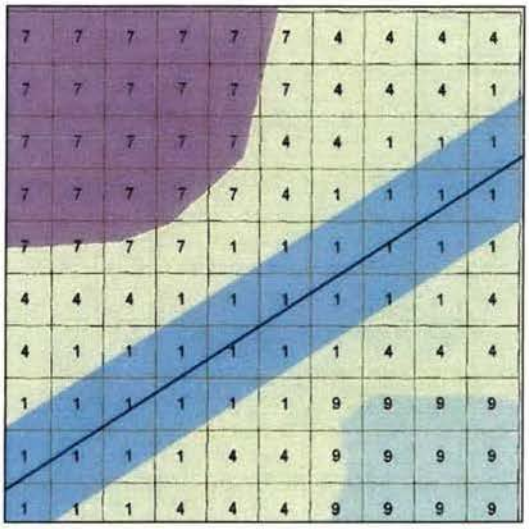
Figure 3 displays an example area that has four features: an existing transmission line through the center of the area, surrounded by agricultural land with an area of steep slopes to the northwest and a floodplain to the southeast.

FIGURE 3: FEATURE MAP OF EXAMPLE AREA



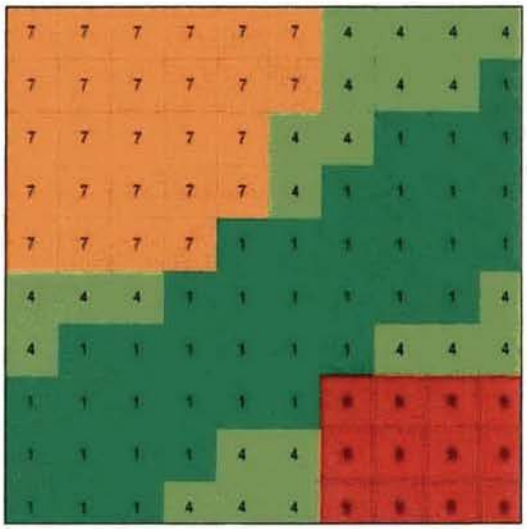
In Figure 4, grid cells are overlaid and assigned suitability values based on the features. The suitability values used in this example do not necessarily correspond to the Siting Model. The area of the existing line is considered highly suitable, the agricultural land is moderately suitable, and the steep slopes and floodplains have lower suitability values.

FIGURE 4: GRID CELL MAP OF EXAMPLE AREA WITH SUITABILITY VALUES



Finally, Figure 5 shows the most suitable corridor through the area for locating a transmission line in green. 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 5: SUITABILITY MAP OF EXAMPLE AREA



4. Developing Alternate Corridors

As described above, the EPRI-GTC Methodology analyzes the suitability of grid cells within a project area to develop Alternate Corridors. This analysis is based on satellite and GIS information that is readily available from public sources as well as data extracted from aerial photo interpretation. The data is then used to develop the suitability grid. The numbers that are applied to the grid cells are taken from the Methodology. The corridors developed from the model are the top three percent - that is, the most suitable three percent - of possible routes within the Study Area, where each route is a string of 15 foot square grid cells connecting the two endpoints to the project.

Alternate Corridors are generated for each of the three perspectives (Built Environment, Natural Environment, and Engineering Considerations). It should be noted that when generating Alternate Corridors for each perspective, data layers from the other two perspectives are taken into account. Although the target perspective is weighted much more heavily (five times), values and weights from the other perspectives affect the Alternate Corridors generated for the emphasized perspective. The final step in generating Alternate Corridors is to equally weigh the three perspectives and generate a Simple Average Alternate Corridor.

The Composite of Alternate Corridors (Figure 39) depict the areas of greatest preference for construction of a transmission line while minimizing adverse impacts to people, environmentally sensitive areas, and cultural resources. The Composite Corridor also provides a reasonable balance among co-location of the proposed line, minimization of the overall project impacts, and construction and maintenance of the line in a cost effective manner.

The following sections of this report provide information about features that were found within the Study Area, the Alternate Corridors generated, the Alternate Routes developed, and the selection of Preferred Routes for construction of the proposed lines.

Part IV: Study Area Description

1. Study Area Location

The transmission line Study Area (Figure 6) is located in northern Hancock County, Kentucky. The Study Area is located approximately six miles east of Lewisport, Kentucky, 7 miles west of Tell City, Indiana, and 21 miles northeast of Owensboro, Kentucky. The Ohio River is approximately 1.3 miles north east of the Study Area. The Study Area encompasses approximately 1,459 total acres (2.28 square miles). Residential areas are in the central portion of the Study Area. The Study Area has relatively flat topography.

PHOTO: Existing Transmission Line in Hancock County

FIGURE 6: LOCATION MAP

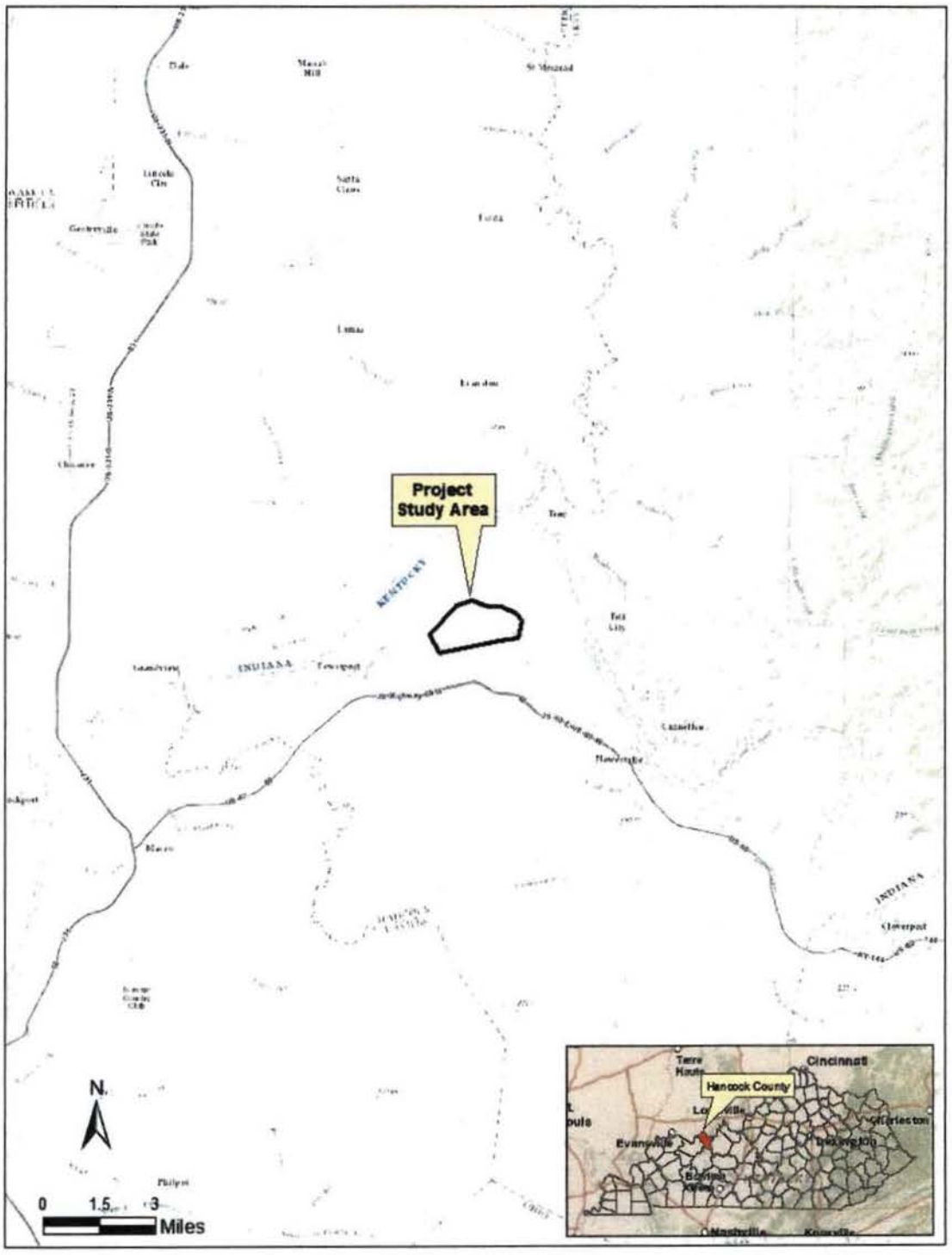
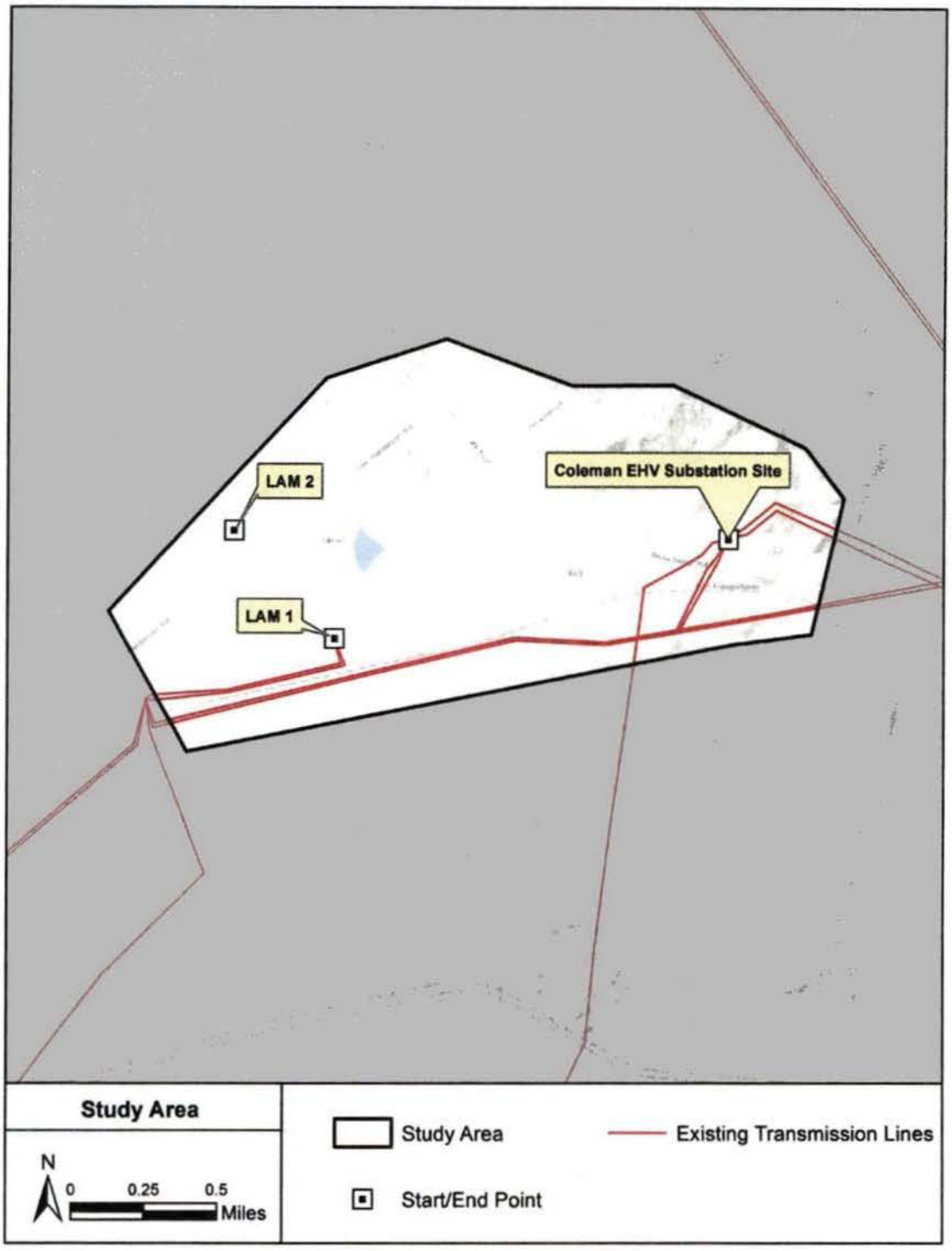

Project Study Area
KENTUCKY
INDIANA
N.
0 1.5 3
Miles
Hancock County
Cincinnati

FIGURE 7: STUDY AREA MAP



2. Study Area Characteristics

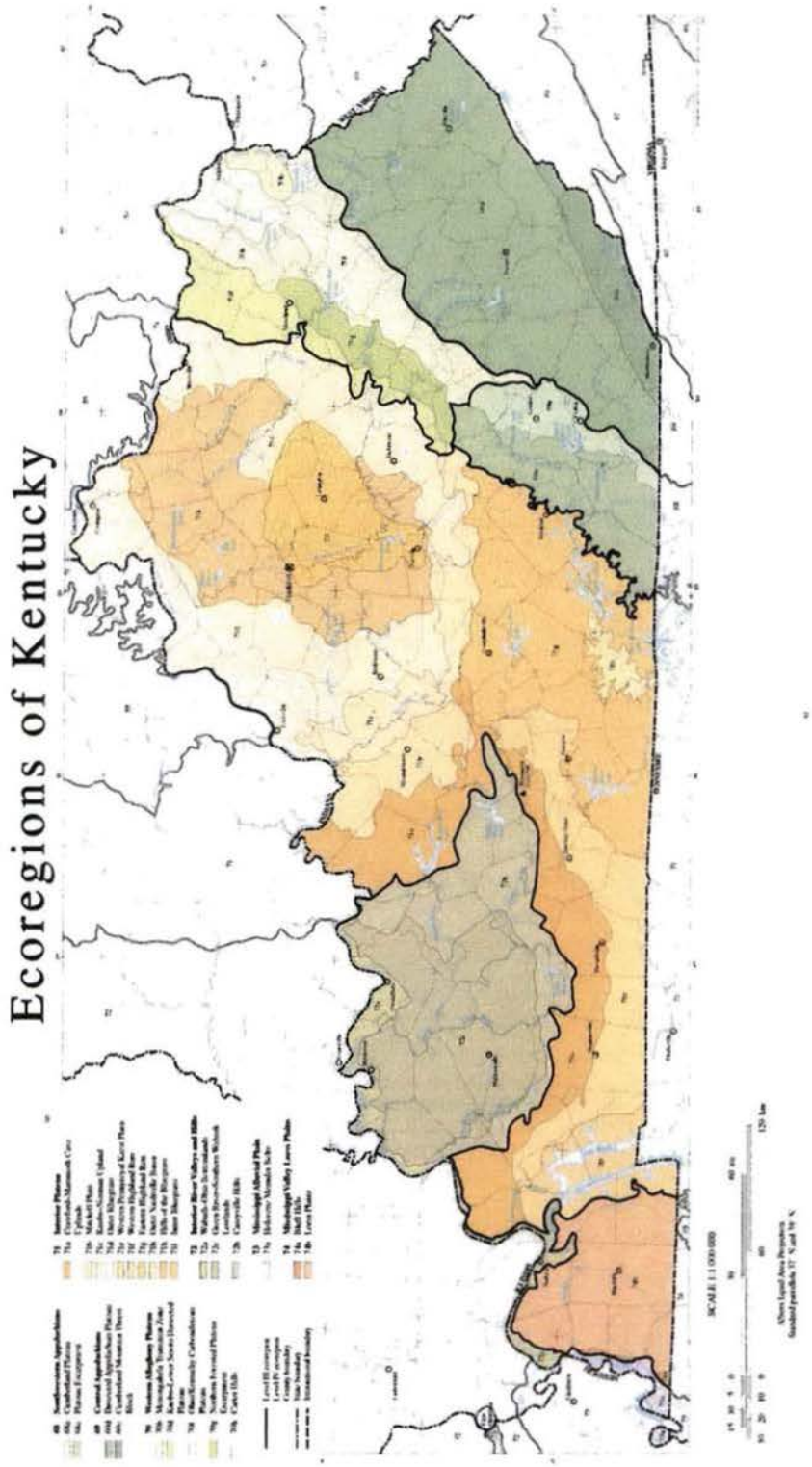
Ecological Region

The Study Area lies along two specific ecoregions. The easternmost portion lies within the Wabash-Ohio Bottomlands ecoregion. While the rest of the Study Area, is in the Green River-Southern Wabash Lowlands. There is also a small portion on the western side of the study area that is also within the Wabash-Ohio Bottomlands ecoregion (Figures 8 & 9).

The Green River–Southern Wabash Lowlands is dominated by agriculture and coal mining. Wide, poorly-drained, low gradient valleys filled with alluvial and lacustrine deposits are extensive and low hills mantled with loess occur. The Green River–Southern Wabash Lowlands is largely underlain by Pennsylvanian carboniferous sedimentary rocks of the Sturgis and Carbondale formations that are not exposed in the higher, more rugged, and more wooded than the Caseyville Hills ecoregion. Bottomland forests were once common and oak–hickory forests grew on the better-drained upland sites. Today, some forests and wetlands remain but cropland, pastureland, and both underground and surface coal mining are now extensive. Siltation from mining and agriculture has increased flooding and prompted remedial channelization projects. Channelized streams lack riparian forests and have very warm water, high turbidity, and limited concentrations of dissolved oxygen. Acid coal mine runoff has decreased biological productivity in streams; many tributaries have low numbers of fish and fish species while others are entirely devoid of fish. Macroinvertebrate and fish communities are similar to those in the Wabash-Ohio Bottomlands ecoregion but are less diverse than in the upland streams of Caseyville Hills ecoregion *(McMahon & Omernik, et al).*

The Wabash–Ohio Bottomlands ecoregion is composed of nearly level, poorly-drained floodplains and undulating terraces. Wetlands, ponds, abandoned channels, oxbow lakes, and low ridges occur. Potential natural vegetation is mapped as southern floodplain forest. The Wabash–Ohio Bottomlands is lower, more poorly-drained, and has different natural vegetation than other parts of surrounding ecosystems. Today, some woodlands remain but livestock, alfalfa, corn, soybean, and wheat farming is extensive. Land use is affected by seasonally high water tables and localized flooding. Low gradient streams with silt or sand bottoms occur and are inhabited by Ohio River-type fish fauna. Channelization and drainage ditches are common *(McMahon & Omernik, et al).*

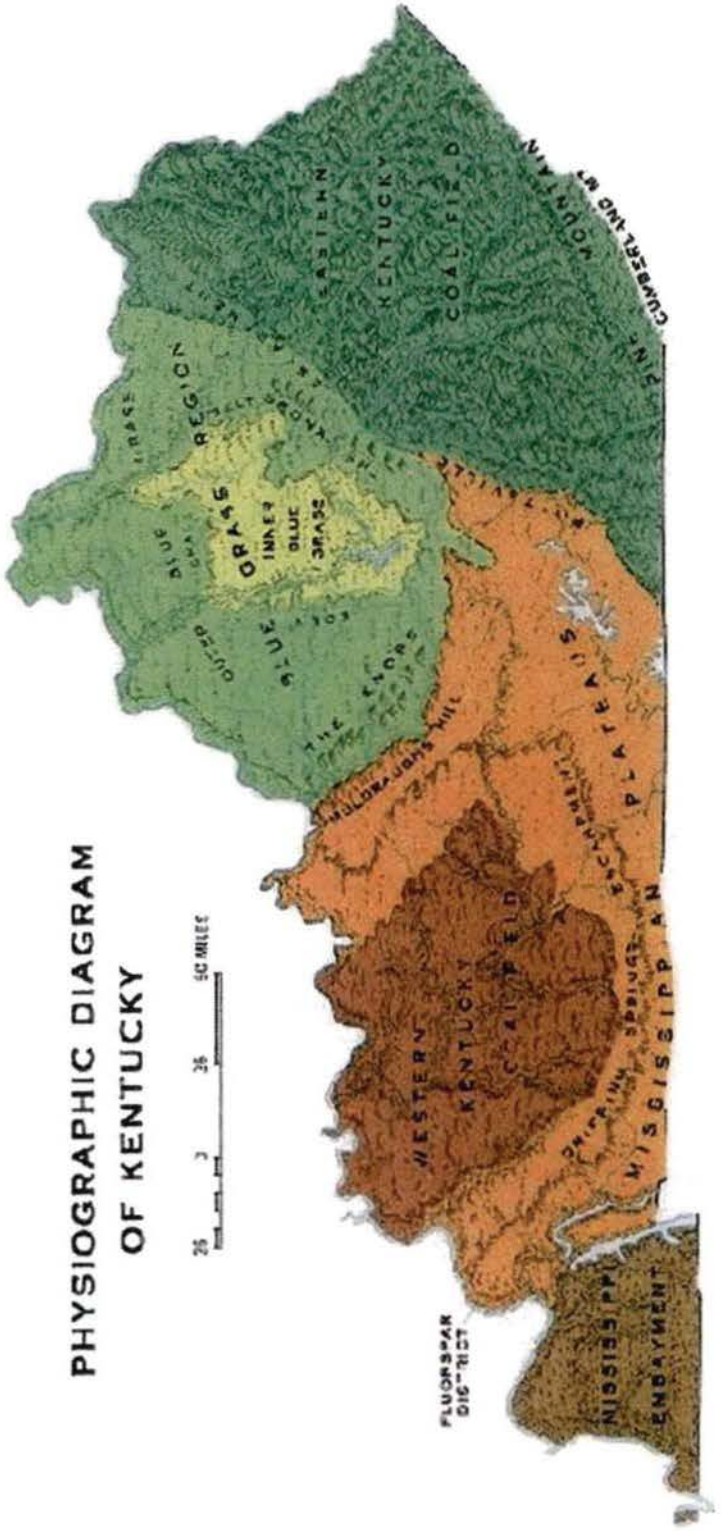
FIGURE 8: ECOREGIONS OF KENTUCKY



Source: United States Environmental Protection Agency
(ftp://ftp.epa.gov/wed/ecoregions/ky/ky_eco_lg.pdf)

FIGURE 9: PHYSIOGRAPHIC MAP OF KENTUCKY

(http://www.uky.edu/KGS/geoky/physiographic.htm)



Land Use/Land Cover

The Study Area consists primarily of forested areas and row crops, which occupy approximately 30% each of the total area. Commercial and Industrial land use comprises the third highest percentage, at 10%, while open land accounts for 9%. Other notable areas are residential areas which occupy approximately 7% and transportation areas that occupy approximately 7% of the total area. 6% of the Study Area consists of utility ROW and the final 1% is hydrography. The land cover types are detailed in Table 1 (page 18) and Figure 10 (page 19).

PHOTO: Agricultural land usage along Adair Rd

TABLE 1: LAND USE/LAND COVER OF STUDY AREA

LULC Type	Acres in Study Area	% of Study Area
Commercial/Industrial	142.95	9.80%
Forested	436.59	29.93%
Hydrography	11.98	0.82%
Open Land	131.45	9.01%
Residential	105.49	7.23%
Row Crops	432.26	29.64%
Transportation	109.40	7.50%
Utility ROW	88.37	6.06%
Total:	**1,458.49**	**100%**

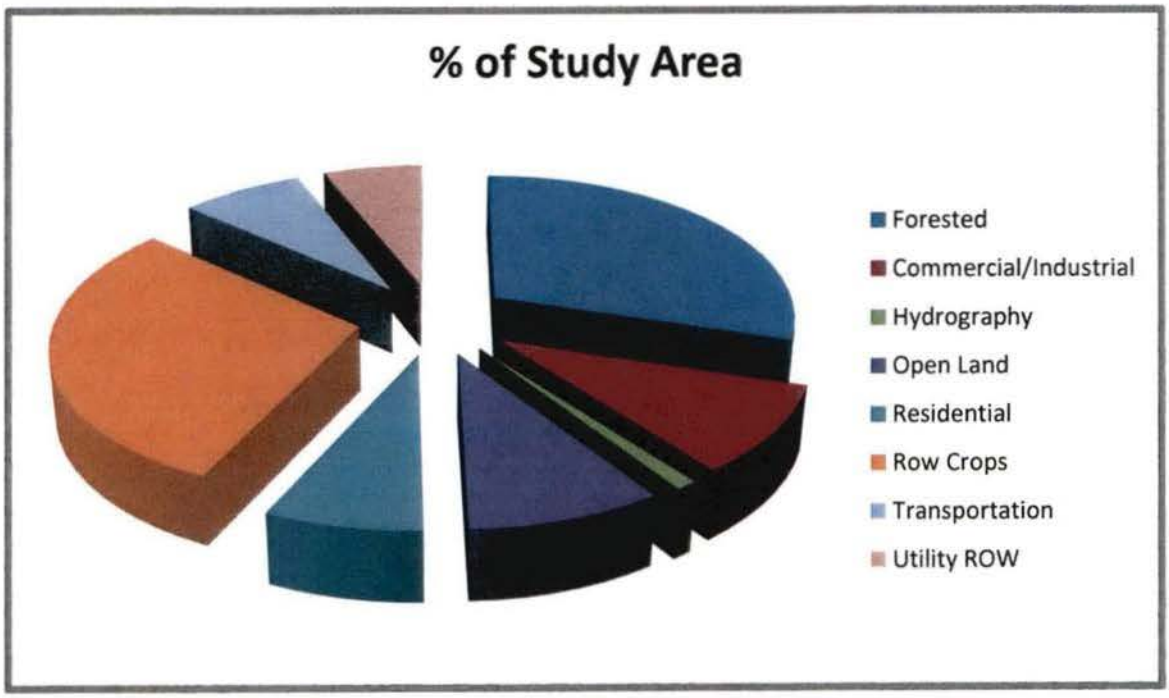
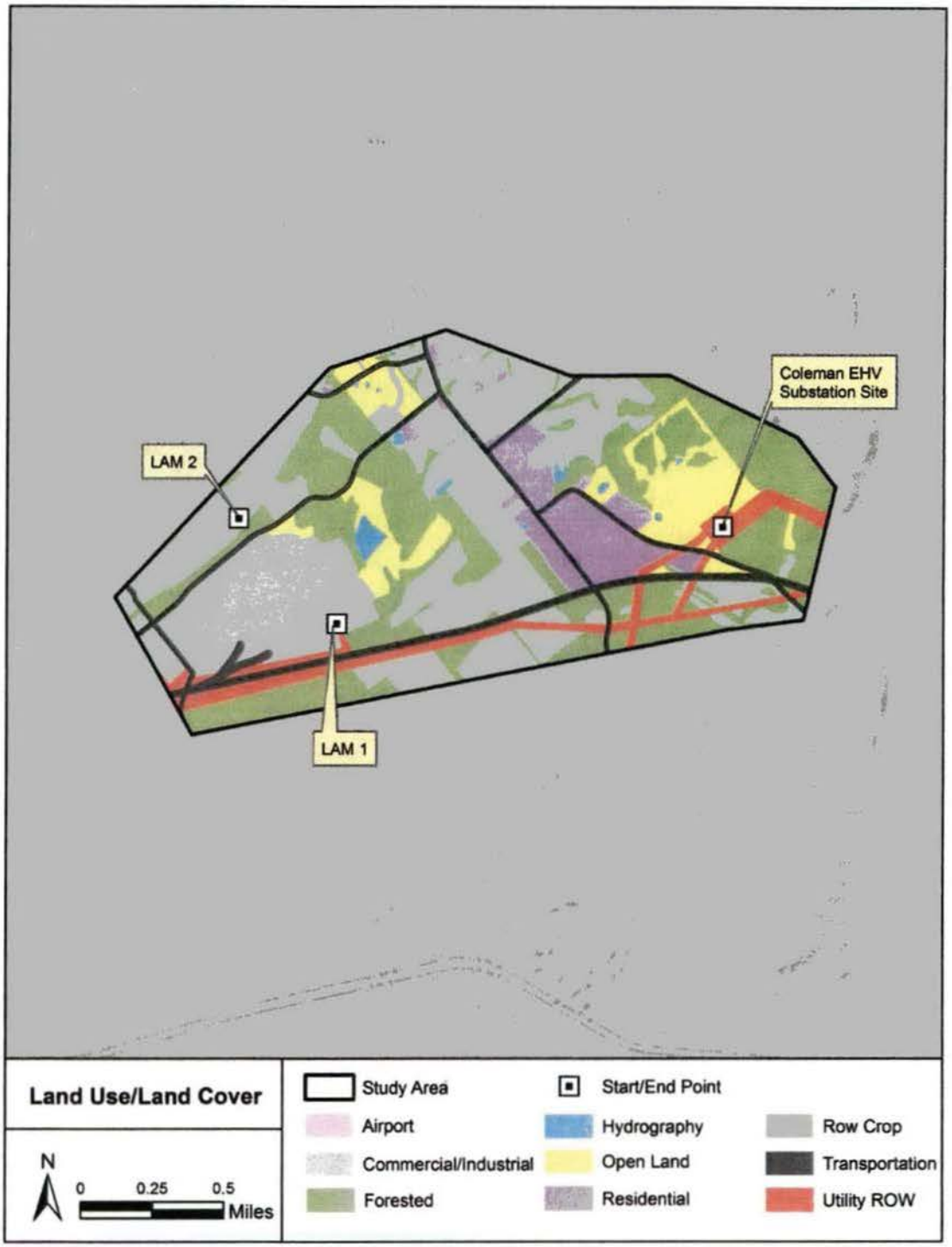


FIGURE 10: LAND USE / LAND COVER CLASSIFICATION



Socioeconomics

The Commonwealth of Kentucky's population growth from 2010 to 2014 was 1.7%, while the national average during the same period was 3.3%. Hancock County, Kentucky experienced an estimated population increase of 1.4% between 2010 and 2014. According to the U.S. Census 2010, 8,565 people were living in Hancock County. (*U.S. Census Bureau State and County Quick Facts).*

As of 2009, there were 3,361 households in Hancock County. The median income for a household in Hancock County was $51,189 (2013). The per capita income was $22,686. 14.2% of the counties' families were below the poverty line (*U.S. Census Bureau State and County Quick Facts).*

Transportation

Three significant transportation features are found within the Study Area. Two are Kentucky highways, while the third is a railway.

Kentucky Highway 1957 – This highway, locally known as Lee Henderson Road, runs roughly in a southwesterly direction across the northwestern portion of the Study Area. For the approximately 1.4 miles it is within the Study Area, KY 866 is a two lane, undivided highway with no turn lanes. This highway enters the Study Area from the western boundary before ending at Kentucky Highway 1605 (Adair Rd).

Kentucky Highway 1605 – This road travels in a generally north to south direction across the central-eastern section of the Study Area. KY 1605 enters the northern edge of the Study Area in a southeasterly direction for approximately 1.4 miles, where it is known locally as Adair Road, and then intersects Kentucky Highway 1957. KY 1605 is a two lane, undivided highway consisting of no turn lanes.

Seaboard System Railroad –The Seaboard System Railroad is aligned in an east to west direction for approximately 2.4 miles across the southern portion of the Study Area. The railway enters the Study Area from the east, passing south of the Coleman EHV substation, and then exiting the western edge of the Study Area.

PHOTO: Seaboard System Railroad; Aleris Mill to the left

Water Resources

The Study Area includes approximately 11.98 acres of open water, which account for 0.82% of the total Study Area. The largest hydrologic feature is a lake to the northeast of the Aleris aluminum mill, which encompasses approximately 6 acres and is located in the western portion of the Study Area. In general, the remaining water bodies in the study area are smaller ponds used in conjunction with agriculture. Within the Study Area, there are approximately 57.68 acres of mapped floodplain areas identified by the Federal Emergency Management Agency (FEMA). There are 2 floodplains in the Study Area, one at the southwest corner and one at the southeast corner.

Cultural Resources

The Kentucky Heritage Council recognizes three structures within the Study Area that are potentially eligible (i.e., the eligibility has not yet been determined) to be listed on the National Register of Historic Places (NRHP). These structures are shown in Table 2.

TABLE 2: LISTING OF CULTURAL RESOURCES

Site Number	Name	Status
6	Lewis Place	Undetermined
8	Thrasher House	Undetermined
9	House	Undetermined

The Kentucky Office of State Archaeology identified one eligible archaeological site within the Study Area, listed in Table 3. It is located in the northeast corner of the Study Area, south of the Hancock County Airport.

TABLE 3: LISTING OF ARCHEOLOGICAL RESOURCES

Site Number	Site Type
347	Open habitation w/o mounds

Part V: Engineering Considerations

Below is the Engineering Considerations Perspective from the Kentucky Siting Model. The submodel incorporates those features whose presence or absence is considered important from the perspective of constructing a transmission line. Other considerations that could be included in this perspective might be more appropriate in another submodel.

TABLE 4: ENGINEERING ENVIRONMENT LAYERS AND WEIGHTS (MODEL VALUES)

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 Road ROW	5.4
Parallel Pipelines	5.6
Future DOT Plans	5.6
Parallel Railway ROW	6.1
Transportation 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
AREAS OF LEAST PREFERENCE	
Non-Spannable Waterbodies	
Mines and Quarries (Active)	
Buildings	
Airports	
Military Facilities	
Center Pivot Irrigation	

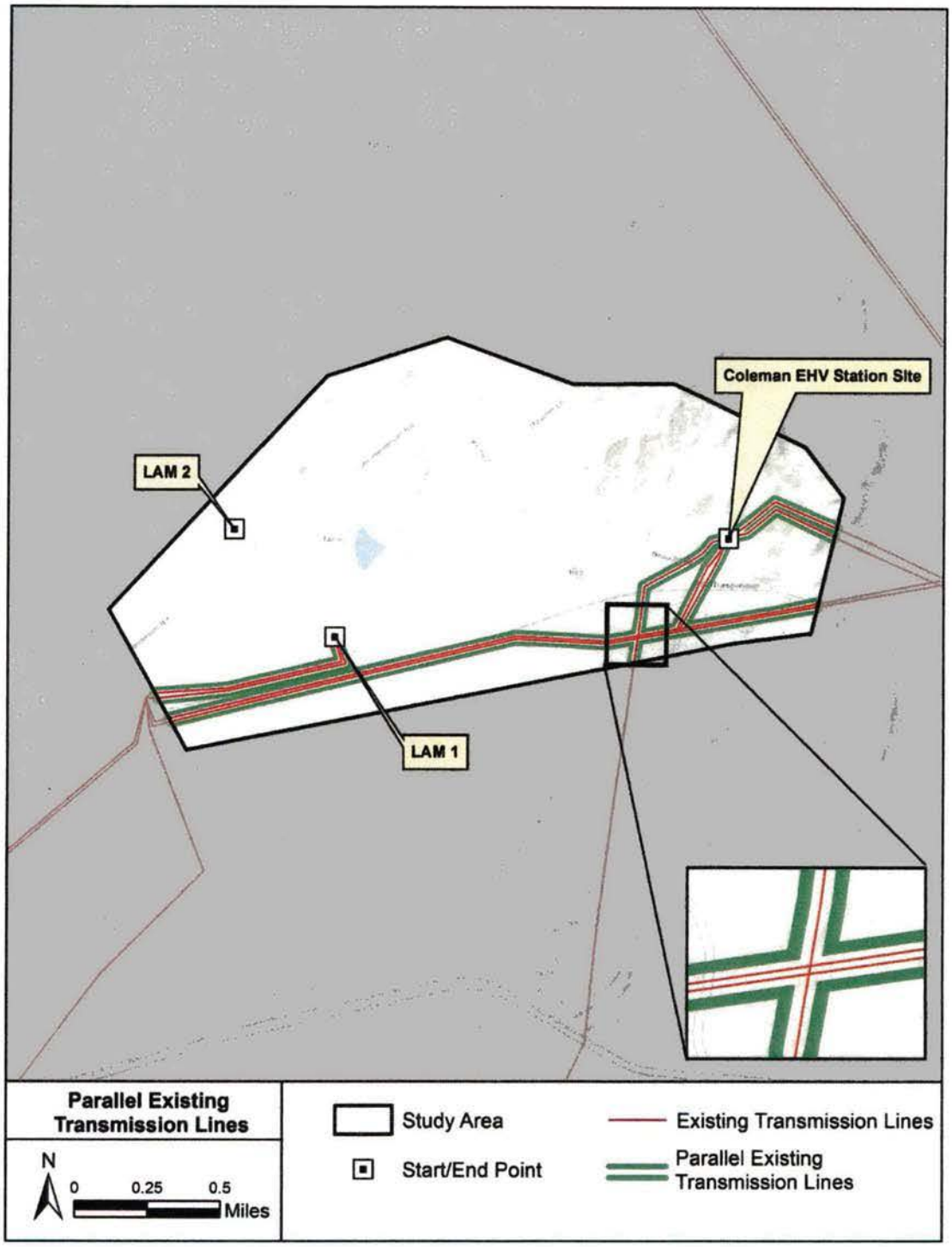
1. Linear Infrastructure Features

High Suitability: Parallel Existing Transmission Lines

In the Engineering Considerations Perspective, the model considers paralleling existing transmission lines to be highly suitable. Two existing transmission lines are present within the southern portion of the Study Area and run in an east-west direction across the entire span of the project area, one of which is Line 7-C. Two transmission lines exit the Coleman EHV Substation and go in a southwesterly direction; these are the 3-H and 3-G lines. Figure 11 shows the limits of the Study Area, and the parallel opportunities contained therein. Only transmission lines suitable for paralleling were considered during this portion of the study.

Existing transmission line data was obtained from the Kentucky Public Service Commission, and updated by East Kentucky Power Cooperative in 2011. Quantum Spatial verified all relevant transmission line features within the Study Area through 2014 Natural Agricultural Inventory Program (NAIP) aerial photography. The transmission line right-of-way was modeled by buffering the transmission lines created per the width requested by BREC. The cross country transmission lines received a right-of-way width of 100 feet, paralleling existing transmission lines utilized a 60 foot right-of-way, while paralleling existing roads right-of-way was a 100 feet.

FIGURE 11: PARALLEL EXISTING TRANSMISSION LINE ROW

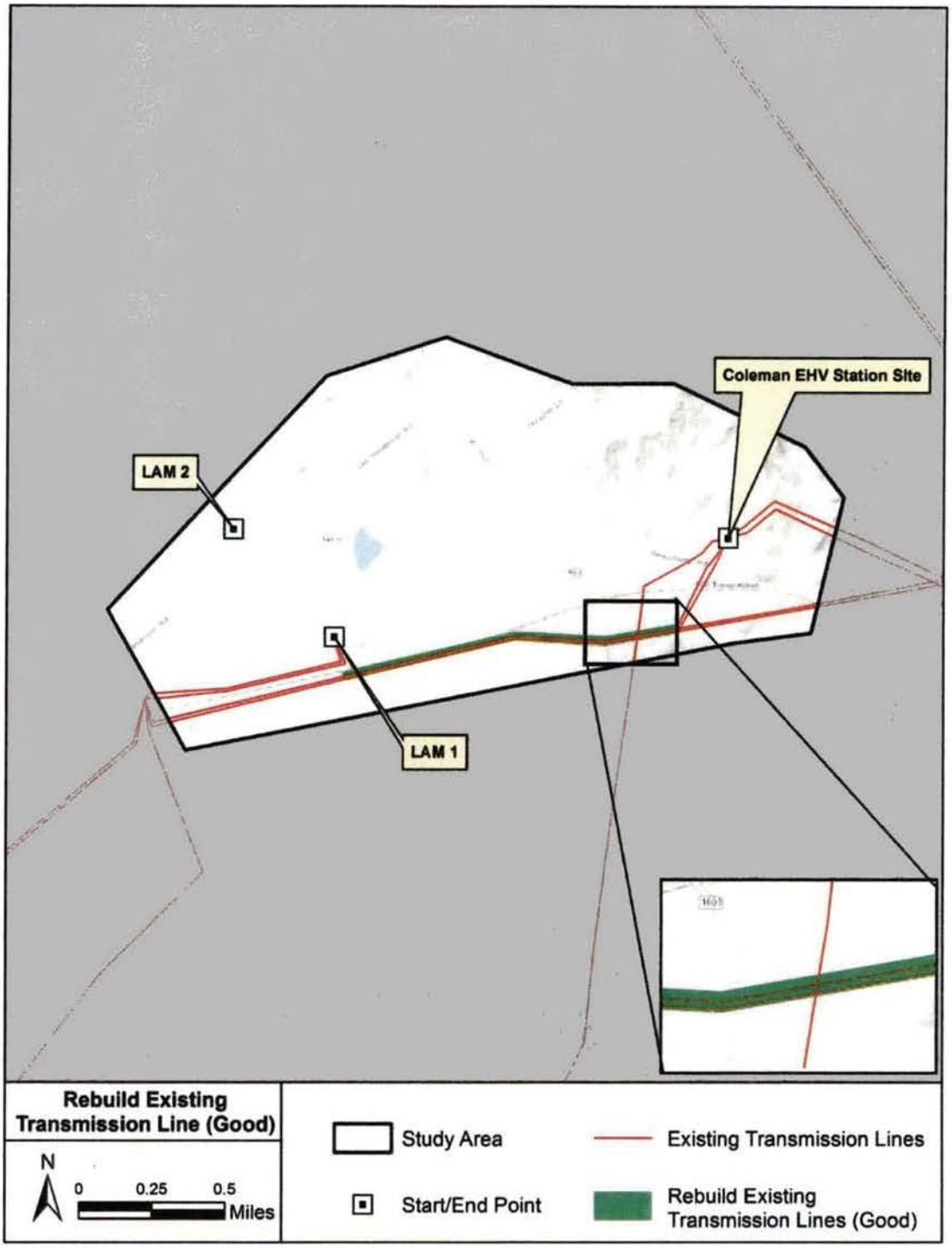


High Suitability: Rebuild Existing Transmission Lines (Good)

BREC distinguishes between "good" and "bad" opportunities to rebuild existing transmission lines. "Good" rebuild opportunities represent transmission line easements that are not constrained; that is, they are with existing infrastructure that makes the easement suitable for rebuilding as a double-circuited transmission line. The existing utility rights-of-way that were modeled as "good" (areas of high suitability) are shown in Figure 12. BREC identified rebuild opportunities that were appropriate for this project.

Existing transmission line data was obtained from the Kentucky Public Service Commission, and updated by EKPC in 2011. Quantum Spatial verified all relevant transmission line features within the Study Area through 2014 NAIP aerial photography.

FIGURE 12: REBUILD EXISTING TRANSMISSION LINES (GOOD)

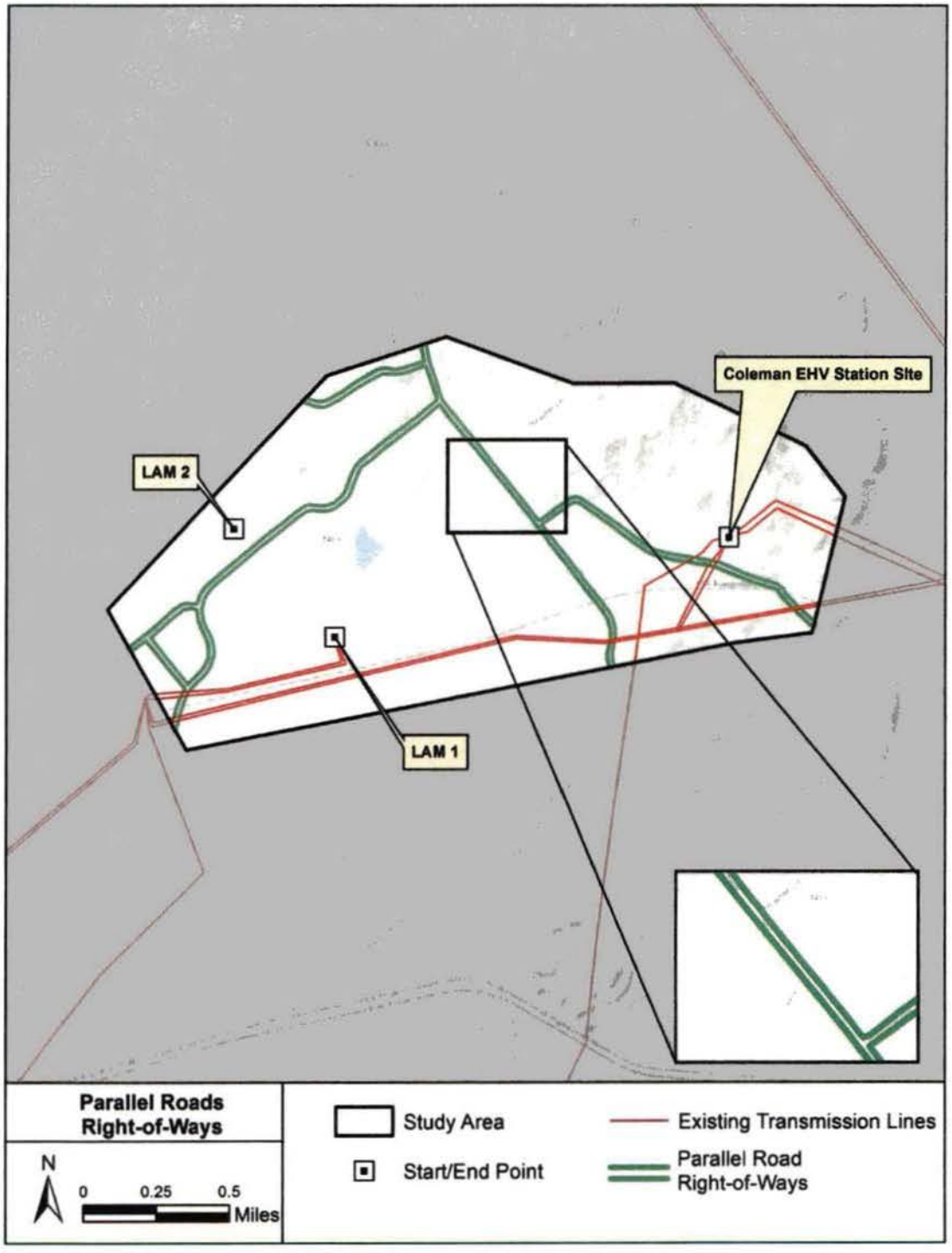


Moderate Suitability: Parallel Road Right-of-Ways

Paralleling road right-of-ways (ROWs) is given a moderate suitability in the Engineering Considerations Perspective. Within the Study Area, several roads provide co-location opportunities. Roads which do not provide connectivity and / or are residential in nature were not considered. Figure 13 shows the suitable road ROW co-location opportunities within the Study Area.

The road right-of-way data used in this analysis was extracted from land use data, which was derived from parcel data received from the PVA office in Hancock County.

FIGURE 13: PARALLEL ROAD RIGHT-OF-WAYS

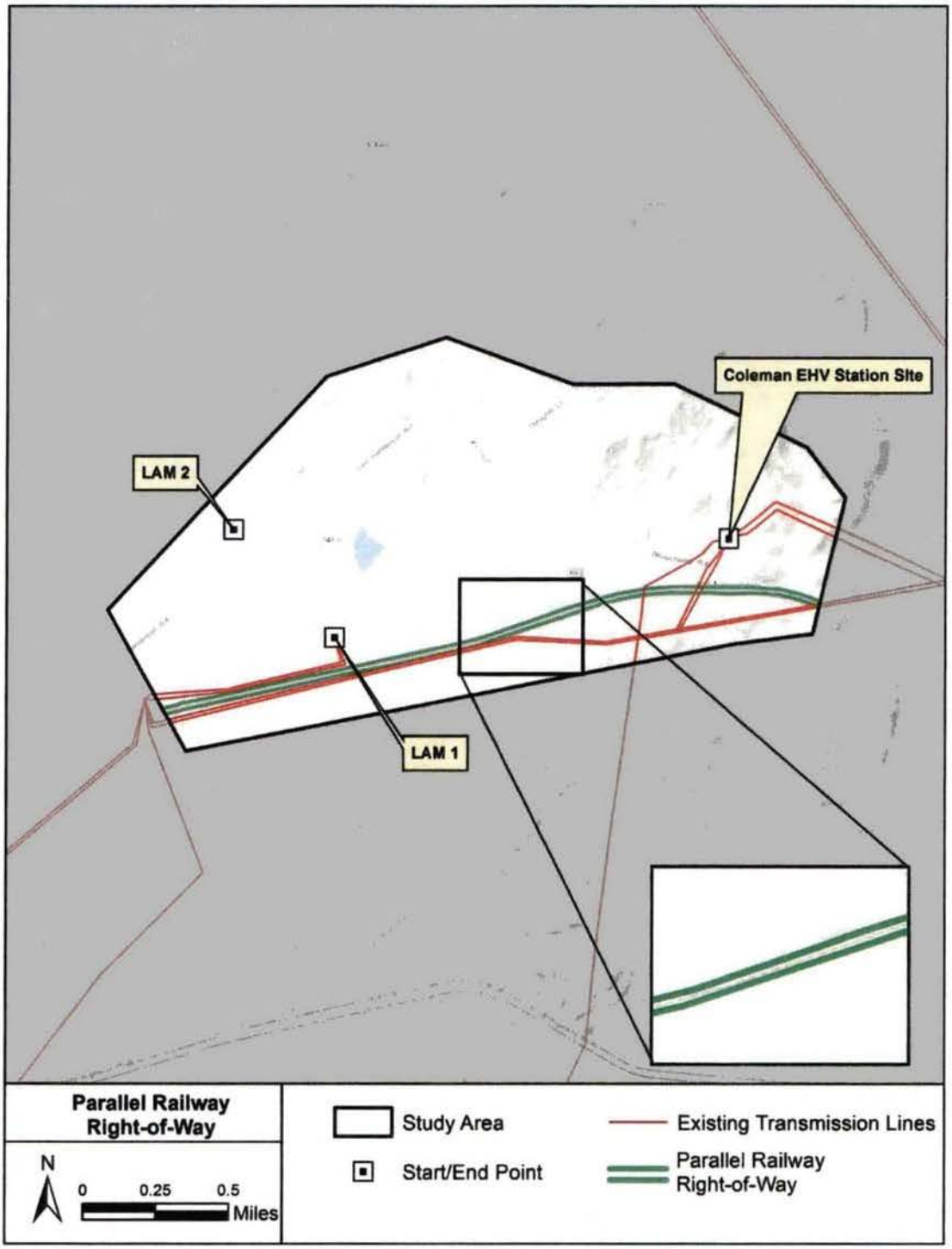


Moderate Suitability: Parallel Railway ROW

Paralleling a railroad right-of-way (ROW) is given a moderate suitability in the Engineering Considerations Perspective. The Seaboard System Railroad, located in the southern portion of the Study Area, is the only railroad within the Study Area. This rail road travels in an east to west direction. Figure 14 displays the railroad ROW co-location opportunities within the Study Area.

The railway right-of-way data used in this analysis was extracted from parcel data received from the PVA office of Hancock County.

FIGURE 14: PARALLEL RAILWAY ROW

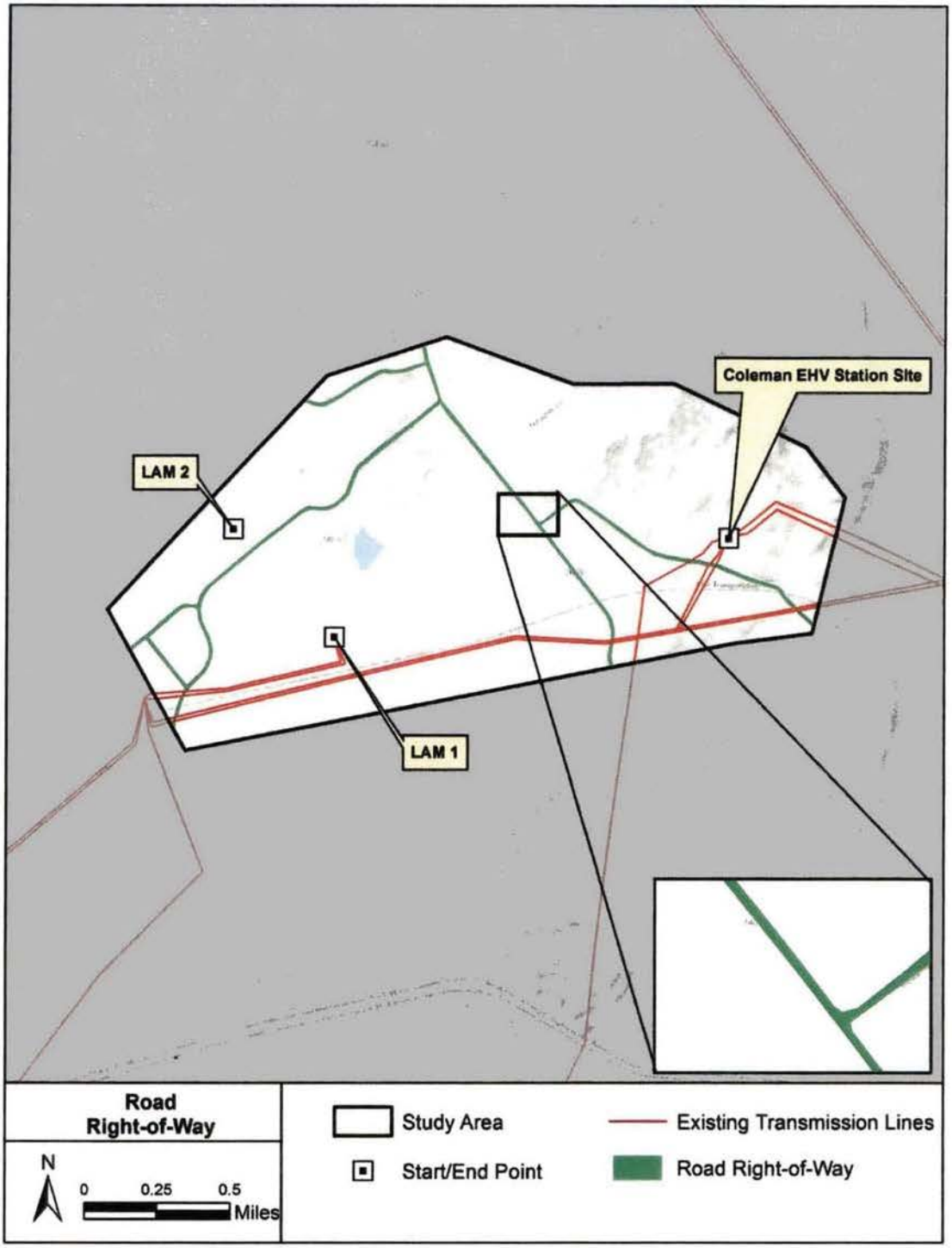


Lower Suitability: Road Right-of-Way

The Engineering Considerations Perspective assigns a low suitability value to locating a new transmission line within an existing road right-of-way. Although it is often necessary to cross existing roads, a transmission line centerline should not travel directly down the center of an existing roadway or other utility corridor. Figure 15 shows the road ROW locations.

The transportation right-of-way data used in this analysis was extracted from parcel data received from the PVA office of Hancock County.

FIGURE 15: ROAD RIGHT-OF-WAY

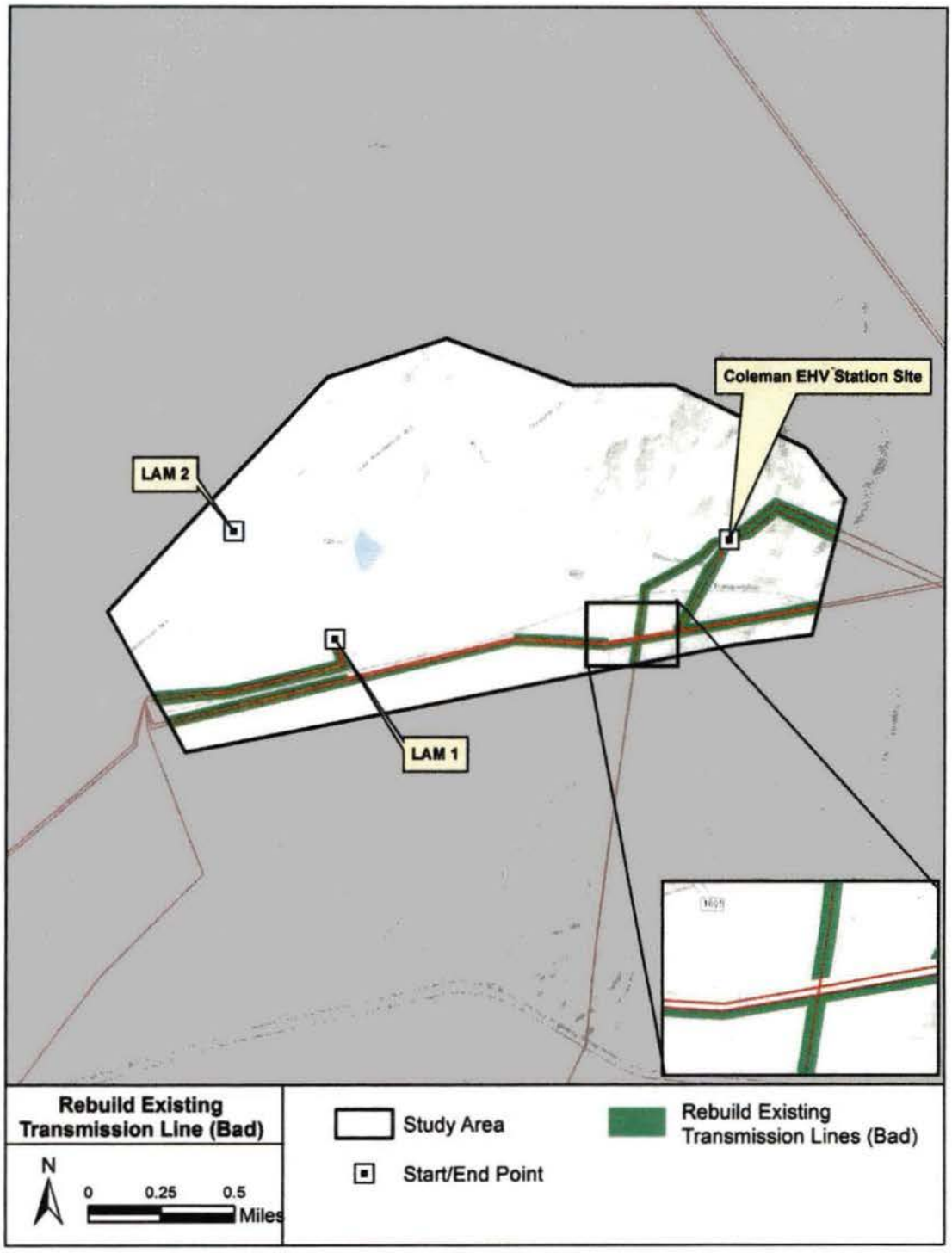


Low Suitability: Rebuild Existing Transmission Lines (Bad)

BREC distinguishes between "good" and "bad" opportunities to rebuild existing transmission lines. "Bad" rebuild opportunities represent transmission line easements which are constrained; that is, they are encumbered with existing infrastructure that makes the easement unsuitable for rebuilding as a double-circuited transmission line. It is sometimes feasible to rebuild an existing transmission line, using the existing easement and purchasing only a minimal amount of additional right-of-way. The existing utility rights-of-way that were modeled as constraints (areas of low suitability) are shown in Figure 16. BREC identified rebuild opportunities that were appropriate for the project.

Existing transmission line data was obtained from the Kentucky Public Service Commission, and updated by EKPC in 2011. Quantum Spatial verified all relevant transmission line features within the Study Area through 2014 NAIP aerial photography.

FIGURE 16: REBUILD EXISTING TRANSMISSION LINES (BAD)



2. Areas of Least Preference

Buildings, mines & quarries, airports, military facilities and non-spannable water bodies are designated as Areas of Least Preference in the Engineering Considerations Perspective of the Kentucky Model. Within and around the Study Area, airports and buildings are the only features from this list that are present. No non-spannable water bodies, mines, quarries, military facilities or center-pivot irrigation features were identified within the Study Area.

Buildings

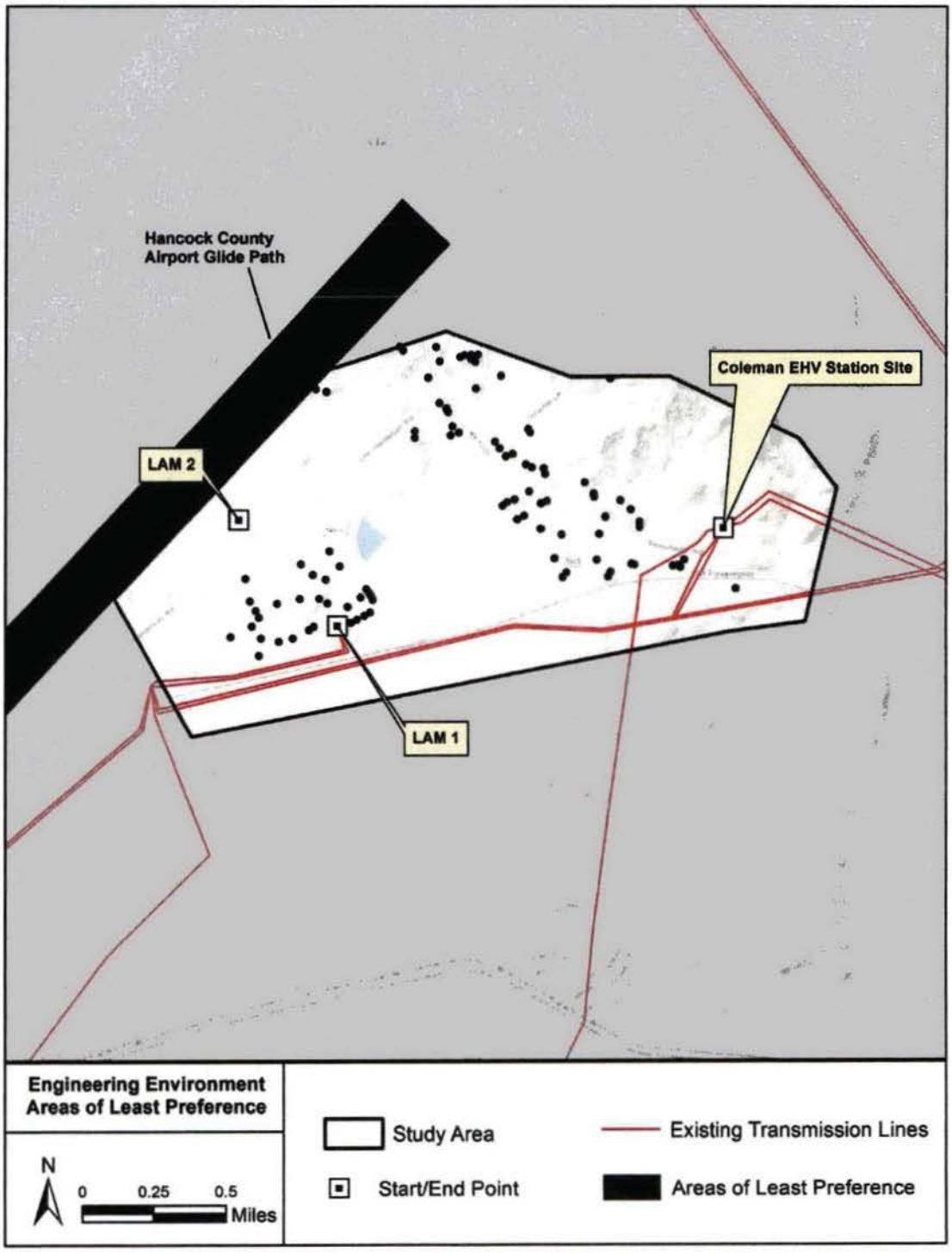
Buildings are designated as Areas of Least Preference within the Engineering Considerations Perspective. The main concentration of buildings is in the north-central area of the study area, where several residential buildings can be found.

Quantum Spatial used 2014 NAIP one (1) meter true-color photography to extract the centroids of buildings. Additionally, the footprints of larger buildings were digitized and added to the dataset. Figure 17 shows the locations of buildings identified during the analysis.

Airports

The Hancock County Airport is in the northwest corner of the Study Area. The airport and the glide path, which were created by Quantum Spatial according to FAA guidelines, are just outside of the Study Area. However, since it is such a large feature, its proximity to the Study Area should be noted.

FIGURE 17: AREAS OF LEAST PREFERENCE (CO-LOCATION/ENGINEERING)



3. Engineering Considerations Perspective Data Layer Weights (Project-Adjusted Values)

Not all features are present within every study area. Each model and submodel will be adjusted based on the contents of the study area for a particular project. When a feature or layer is absent, the weights are adjusted proportionally across the remaining features or layers. The Engineering Considerations data layers and their relative weights for the 3K3L 161 kV project are summarized in Table 5. Items highlighted in gray in Table 5 are not present within the Study Area unless otherwise discussed below.

TABLE 5: ENGINEERING CONSIDERATIONS PERSPECTIVE ADJUSTED LAYERS AND WEIGHTS

Co-location / Engineering		
Linear Infrastructure	100.0%	*AREAS OF LEAST PREFERENCE*
Parallel Existing Transmission Lines	1	Non-Spannable Waterbodies
Rebuild Existing Transmission Lines (good)	2.3	Mines and Quarries (Active)
Background	4.6	Buildings
Parallel Interstates ROW	-	Airports
Parallel Roads ROW	5.6	Military Facilities
Parallel Pipelines	-	Center Pivot Irrigation
Future DOT Plans	-	
Parallel Railway ROW	6.4	
Transportation ROW	7.5	
Rebuild Existing Transmission Lines (bad)	9	
Scenic Highways ROW	-	
Slope	0.0%	
Slope 0-15%	-	
Slope 15-30%	-	
Slope 30-40%	-	
Slope >40%	-	

- Parallel Interstates – A Kentucky highway map verified that no interstate highways are present within the Study Area.
- Parallel Pipelines – A USGS 7.5 minute Quadrangles map showed no parallel pipelines exist in the Study Area, this was confirmed by pipeline GIS data obtained from PennWell, a third party utility data source.
- Future DOT Plans – Areas in which the DOT intends to carry out certain types of work may affect project planning and/or construction. The Kentucky DOT hosts an online map showing future plans. The map was accessed in December 2014 by Quantum Spatial analysts to confirm that no future plans existed in the project. The map can be accessed at the following site:

  http://maps.kytc.ky.gov/photolog/?config=ActiveHighwayPlan
- Scenic Highways ROW – The Kentucky Transportation Cabinet maintains a list of scenic highways and byways within the state (2014). No listed scenic roads are located within the Study Area.
- Slope – Areas of slope greater than fifteen percent were not found within the Study Area. There is no relatively "better" place to be, therefore, slope was not used for modeling purposes. Slope information was extracted from USGS DEM raster data for the Commonwealth of Kentucky.
- Non-Spannable Water Bodies – BREC identified no features that were non-spannable within the Study Area.
- Mines and Quarries (Active) – After consulting mine maps from the Kentucky government in December 2014, it was determined that no mines or quarries were located within the Study Area. The map can be accessed at the following site:

  http://minemaps.ky.gov/
- Military Facilities – The Department of Defense (2014) lists no military facilities or installations in the Study Area.
- Center Pivot Irrigation – 2014 NAIP aerial photography interpretation was used to determine that there are no center pivots used for agriculture within the Study Area.

Part VI: Natural Environment

Table 6 shows the Natural Environment Perspective of the Kentucky Siting Model. The Natural Environment submodel incorporates those features which should be considered from the perspective of protecting the natural environment when constructing a transmission line.

TABLE 6: NATURAL ENVIRONMENT PERSPECTIVE LAYERS AND WEIGHTS (MODEL VALUES)

Natural Environment		
Floodplain	4.6%	***AREAS OF LEAST PREFERENCE***
Background	1	**EPA Superfund Sites**
100 Year Floodplain	9	**State and National Parks**
Streams/Wetlands	29.2%	**USFS Wilderness Area**
Background	1	**Wild/Scenic Rivers**
Streams < 5cfs+ Regulatory Buffer	6.2	**Wildlife Refuge**
Rivers/Streams > 5cfs+ Regulatory Buffer	7.1	**State Nature Preserves**
Wetlands + 30' Buffer	8.7	**Designated Critical Habitat**
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	

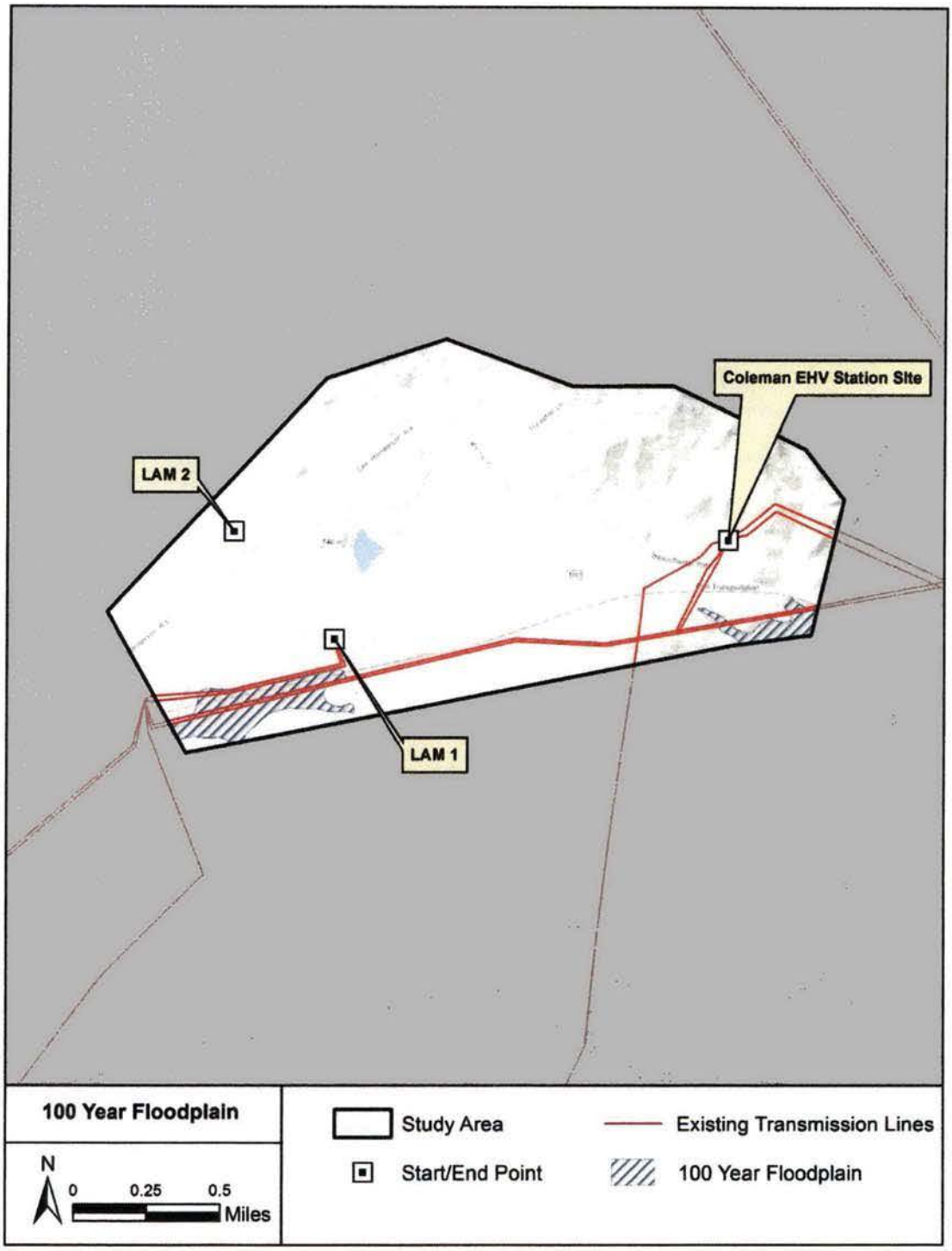
1. Floodplains

Low Suitability: Floodplains

The Natural Environment Perspective gives a low suitability value to locating a transmission line within a Federal Emergency Management Agency (FEMA) designated 100-year floodplain. Floodplain areas within the Study Area are located at the southwest and southeast corners of the Study Area. The percentage of the Study Area that is within FEMA's 100-year floodplain is approximately 4%, comprising about 57.68 of the 1,459 total acres in the Study Area.

Hancock County Q3 Flood Data was retrieved from Kentucky Geography Network (http://kygeonet.ky.gov/). The dataset was derived from the Flood Insurance Rate Maps published by the Federal Emergency Management Agency. The 100-year floodplain for Hancock County is shown in Figure 18.

FIGURE 18: FLOODPLAIN



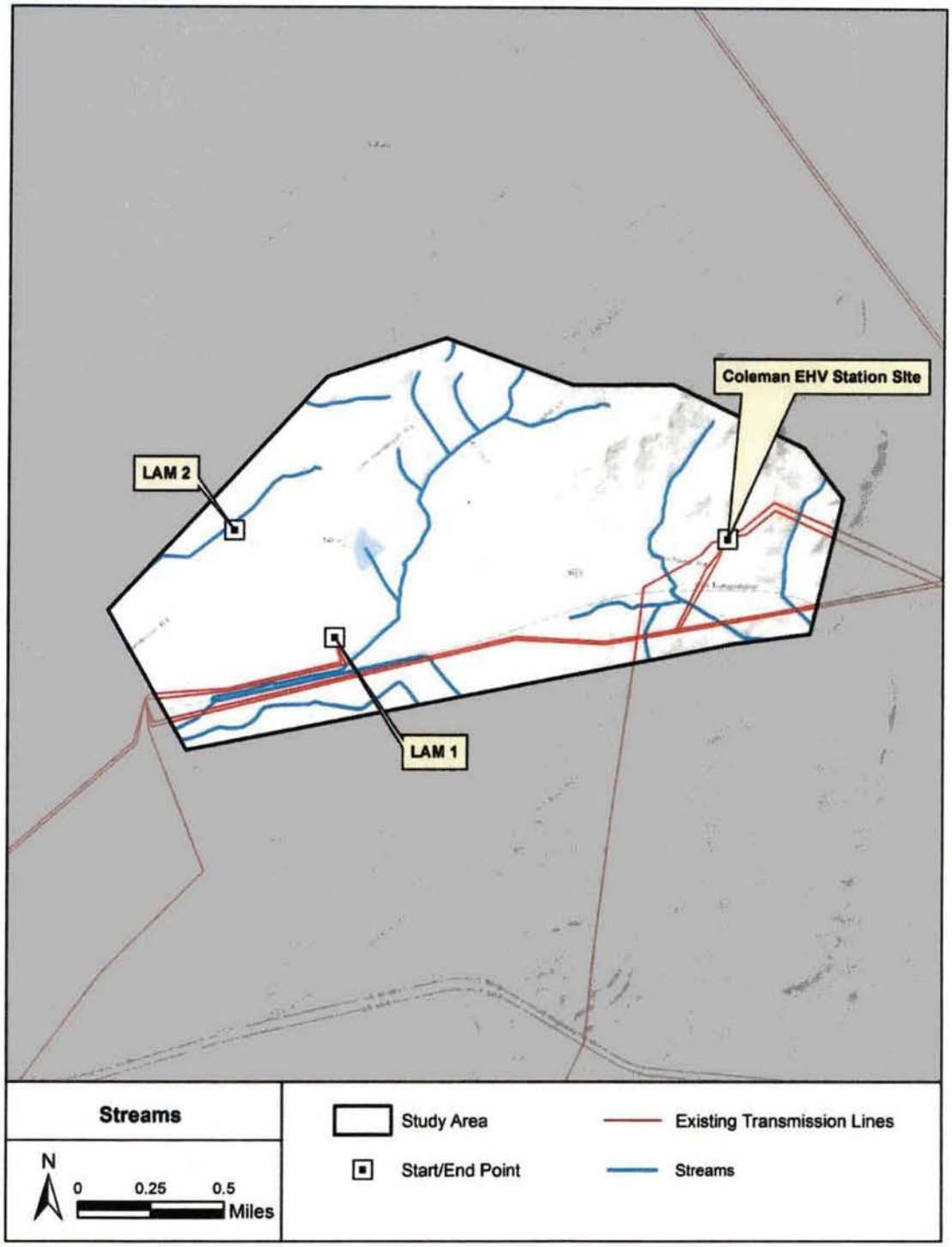
2. Streams/Wetlands

Moderate Suitability: Streams

The Natural Environment Perspective divides streams into two categories; those with a flow greater than 5 cubic feet per second (cfs) and those with a flow of less than 5 cfs. It is moderately suitable to cross a stream with a flow that is less than 5 cfs. Information gathered from the USGS shows the location of streams throughout the Study Area. The streams are categorized as having a flow regime greater or lesser than 5 cfs, as shown in Figure 19.

Location data for streams was obtained from the U.S. Geological Survey (USGS) website on December 2014. Flow rates were determined by Quantum Spatial analysts utilizing average storm water runoff rates for the area and stream basin size. The average storm water runoff rates were calculated; with the minimum watershed size of 4.17mi squared required to classify a stream segment as > 5 cfs. There were no streams that had a flow of water greater than 5 cfs in the Study Area.

FIGURE 19: STREAMS

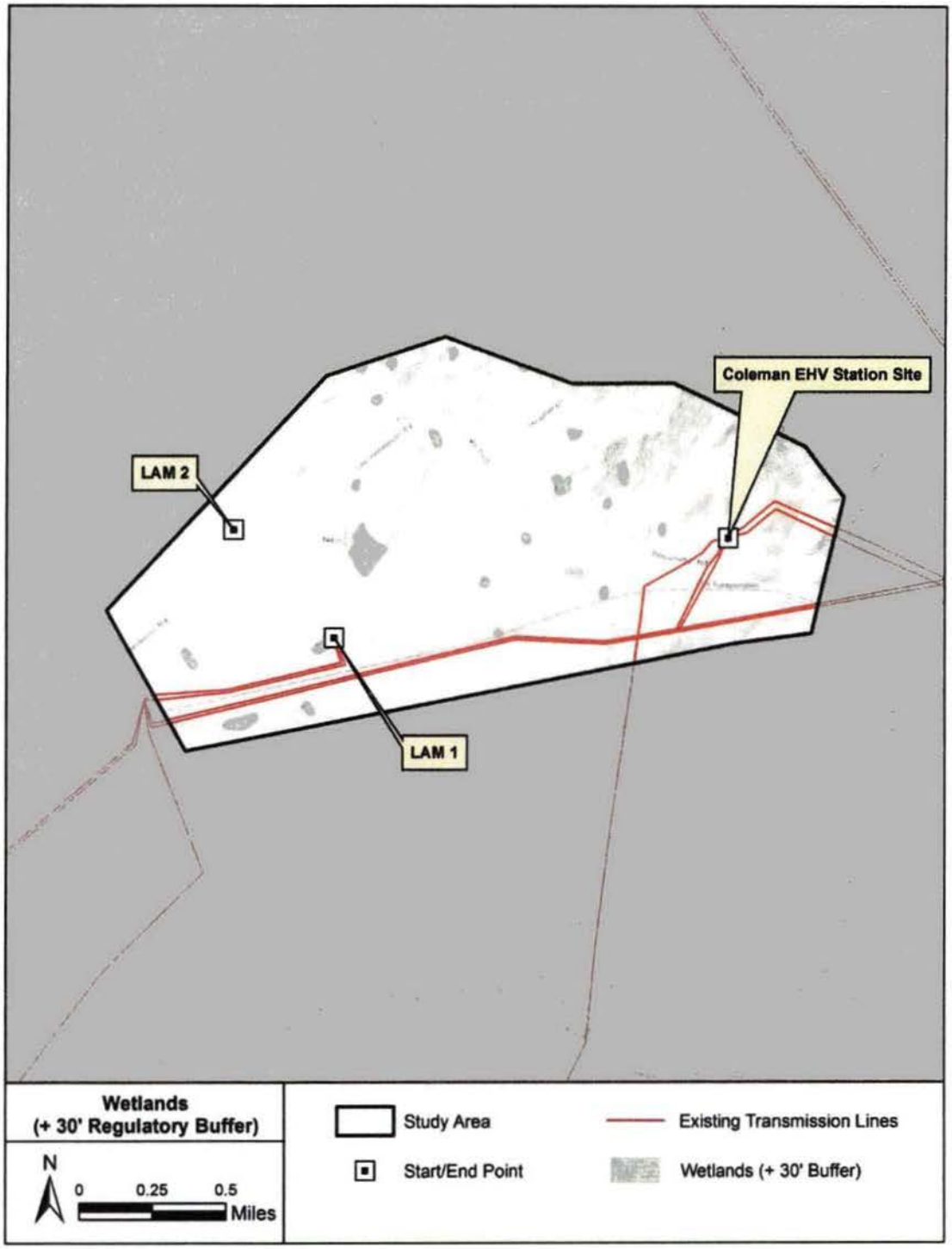


Low Suitability: Wetlands

Wetlands have a low suitability value for locating transmission lines according to the Natural Environment Perspective. There are numerous mapped wetland areas throughout the Study Area, mainly in conjunction with the streams and rivers.

The source of the wetland information is the U.S. Fish and Wildlife Service's National Wetland Inventory (NWI) data. Mapped NWI Wetlands are shown in Figure 20.

FIGURE 20: NATIONAL WETLANDS INVENTORY

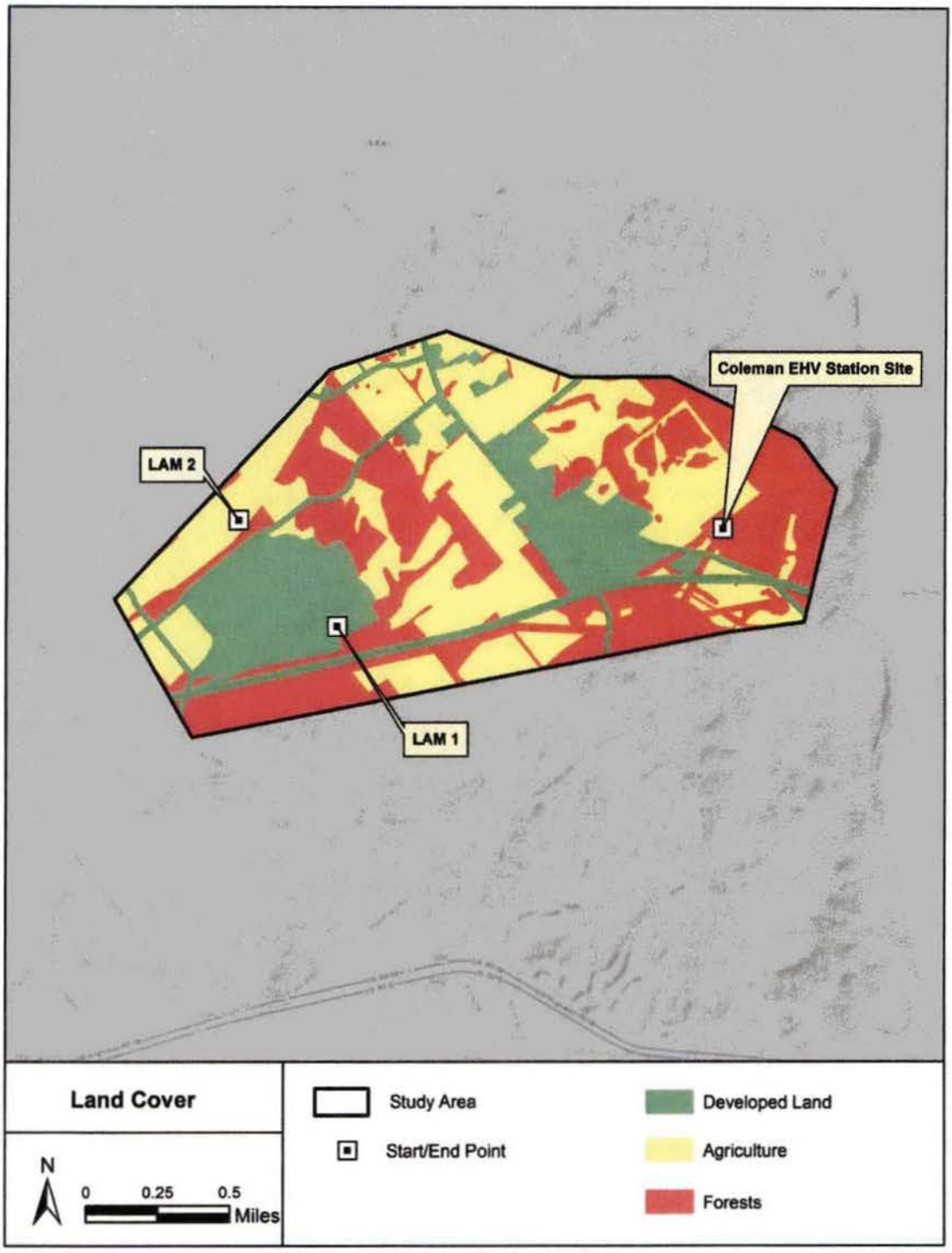


3. Land Cover

In the Natural Environment Perspective, the submodel identifies developed lands as most suitable for transmission lines. Open and agricultural lands have moderate suitability for the construction of transmission lines. Naturally forested lands and hydrologic features have the lowest suitability with respect to the Natural Environment. The land cover data is displayed in Figure 21.

This layer was created by Quantum Spatial through photo interpretation of 2014 one-meter resolution NAIP (National Agricultural Imagery Program) photography.

FIGURE 21: LAND COVER



4. Wildlife Habitat

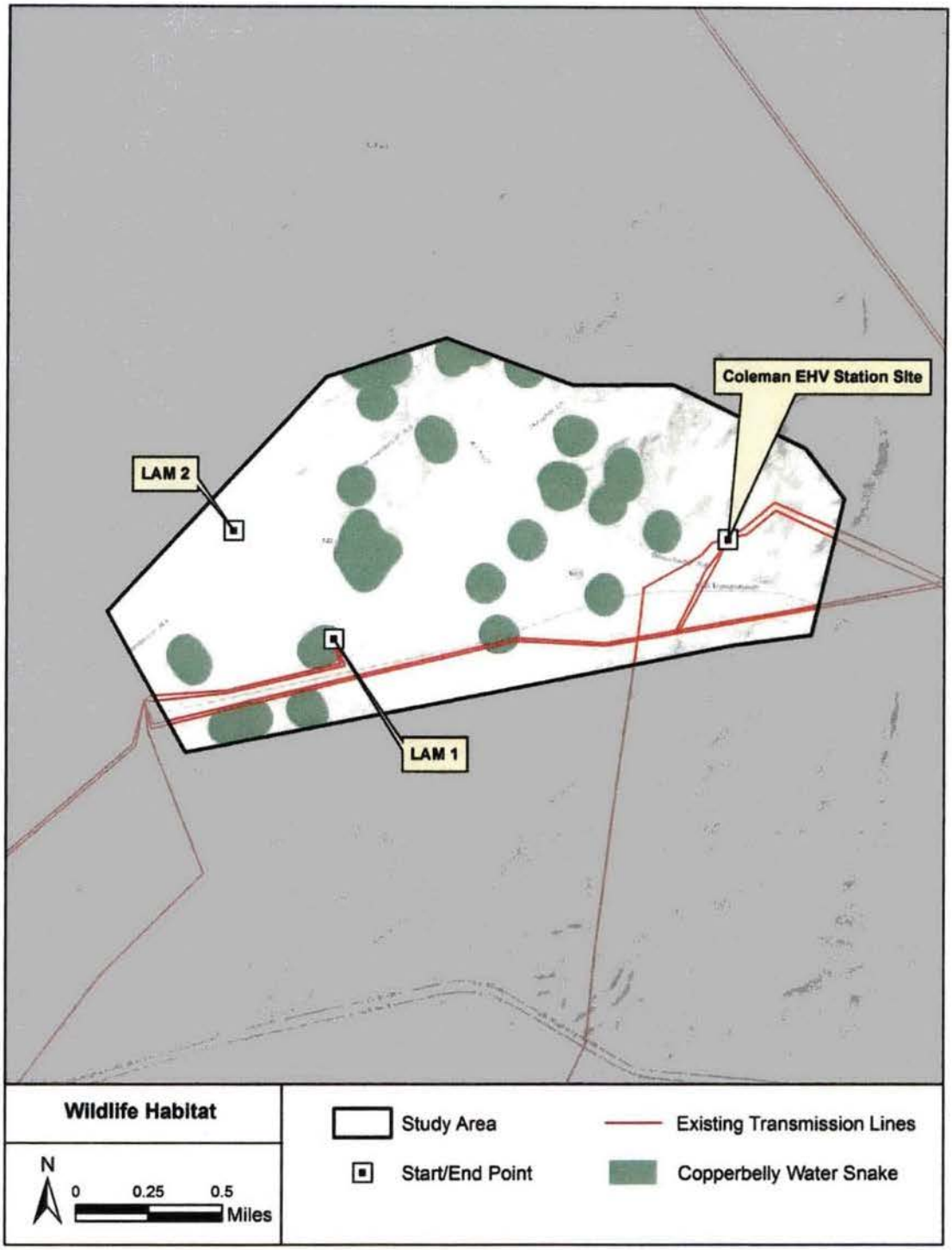
The Natural Environment Perspective gives low suitability to locating a transmission line where habitat for a species of concern has been identified. United States Fish & Wildlife Service (USFWS) indicates the known habitat of the Copperbelly Water Snake (*Nerodia erthrogaster neglecta*) exists throughout the Study Area. The data was confirmed through the Kentucky Threatened and Endangered Species Handbook (2001) created by the Kentucky Department of Fish and Wildlife Resources.

The Copperbelly Water Snake is described as a distinct subspecies of the Plainbelly Water Snake. Adults reach a length of between 20 and 48 inches. The Copperbelly Water Snake has a dark (usually black) back with a bright orange-red belly. Blotches of dark pigment extend onto the belly scales. The habitat of the Copperbelly Water Snake is found in swamps, sloughs, and bottomland hardwood forests. Upland areas adjacent to these habitat types are also utilized as travel corridors (Hermes, et al.).

Quantum Spatial modeled the habitat of the Copperbelly Water Snake by buffering the NWI wetland features by a distance of 300 feet, as shown in Figure 22. At that distance, distinct wetlands began to coalesce and appear as a single feature. This approximates the description of the habitat of the Copperbelly Water Snake.

There were no other features or species identified within the Study Area according to the Kentucky Threatened and Endangered Species Handbook created by the Kentucky Department of Fish and Wildlife Resources.

FIGURE 22: WILDLIFE HABITAT



6. Natural Environment Perspective Data Layer Weights (Project-Adjusted Values)

Not all features are present within every Study Area. Each perspective is adjusted based on the contents of the Study Area for a particular project. When a feature or layer is absent, the weights are adjusted proportionally across the remaining features or layers. The Natural Environment data layers and their relative weights for the 3K3L 161 kV Transmission Line project are summarized in Table 7 below. Items highlighted in grey are not present in the Study Area unless otherwise discussed below.

TABLE 7: NATURAL ENVIRONMENT PERSPECTIVE ADJUSTED DATA LAYERS AND WEIGHTS

Natural Environment		
Floodplain	5.6%	*AREAS OF LEAST PREFERENCE*
Background	1	**EPA Superfund Sites**
100 Year Floodplain	9	**State and National Parks**
Streams/Wetlands	35.4%	**USFS Wilderness Area**
Background	1	**Wild/Scenic Rivers**
Streams < 5cfs+ Regulatory Buffer	6.4	**Wildlife Refuge**
Rivers/Streams > 5cfs+ Regulatory Buffer	-	**State Nature Preserves**
Wetlands + 30' Buffer	9	**Designated Critical Habitat**
Outstanding State Resource Waters	-	
Public Lands	0.0%	
Background	-	
WMA - Not State Owned	-	
USFS (proclamation area)	-	
Other Conservation Land	-	
USFS (actually owned)	-	
State Owned Conservation Land	-	
Land Cover	24.1%	
Developed Land	1	
Agriculture	4.6	
Forests	9	
Wildlife Habitat	34.9%	
Background	1	
Species of Concern Habitat	9	

- Streams > 5 cfs – The Natural Environment Perspective categorizes streams into two categories; those with a flow greater than five cubic feet per second (cfs) and those with a flow of less than 5 cfs. There are no streams or rivers with a flow greater than 5 cfs present in the Study Area, according to analysis Quantum Spatial analysts described previously.
- Outstanding State Resource Waters (OSRW) – OSRW waters are designated by the Kentucky Environmental and Public Protection Cabinet and require pollution management measures. The designation also includes certain unique waters of the Commonwealth. Quantum Spatial found no OSRW in the Study Area in accordance with the Kentucky Legislature. The map where this data can be found can be accessed at the following link:

  http://www.lrc.ky.gov/kar/401/010/030.htm.
- Public Lands – Data from the Kentucky State Nature Preserve Commission indicates that there are no Wildlife Management Areas (WMA), USFS lands (proclaimed or owned), or conservation land (public or privately owned) within the Study Area (2014). This information was supported by examination of PVA tax records.
- EPA Superfund Sites – Referencing the EPA Superfund map hosted by the Environmental Protection Agency's website, there are no Superfund sites present in the Study Area. The closest Superfund site is approximately 1.5 miles east of the Study Area. This site is named the National Southwire Aluminum Superfund Site.
- State & National Parks – Analysis of the PVA tax parcel information obtained from Hancock County reveal that there are no parcels owned by the federal or state governments within the Study Area (2014).
- USFS Wilderness Area – The USFWS lists no USFS wilderness areas in the Study Area (2014).
- Wild and Scenic Rivers – The National Wild & Scenic Rivers System lists no registered wild or scenic rivers within a large area around the Study Area (2014).
- Wildlife Refuge – The Kentucky State Nature Preserve lists no wildlife refuges or State Natural Preserves in the Study Area (2014).
- State Nature Preserves – After referencing the Kentucky Government map of State Nature Preserves, none were identified in the Study Area.
- Designated Critical Habitat – The USFWS lists no critical habitat areas in the Study Area (2014).

Part VII: Built Environment

Below is the Built Environment Perspective of the Kentucky Model. The Built Environment Perspective incorporates those features which should be considered from the perspective of protecting human development and activities, including viewshed, when constructing a transmission line.

TABLE 8: BUILT ENVIRONMENT PERSPECTIVE LAYERS AND WEIGHTS (MODEL VALUES)

Built Environment			
Proximity to Buildings	16.8%	**Proximity to Eligible Historic and Archeological Sites**	31.0%
Background	1	Background	1
900-1200'	3.4	900-1200'	4.6
600-900'	5.7	600-900'	7.9
300-600'	8	0-300'	8.6
0-300'	9	300-600'	9
Building Density	8.4%	***AREAS OF LEAST PREFERENCE***	
0 - 0.05 Buildings/Acre	1	**Listed Archaeology Sites & Dist.**	
0.05 - 0.2 Buildings/Acre	3	**Listed NRHP Districts and Buildings**	
0.2 - 1 Buildings/Acre	5.6	**City and County Parks**	
1 - 4 Buildings/Acre	8.5	**Day Care Parcels**	
> 4 Buildings/Acre	9	**Cemetery Parcel s**	
Proposed Development	3.9%	**School Parcels (K-12)**	
Background	1	**Church Parcels**	
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		
Equine Agri - Tourism	8		
Residential	9		

1. Proximity to Buildings

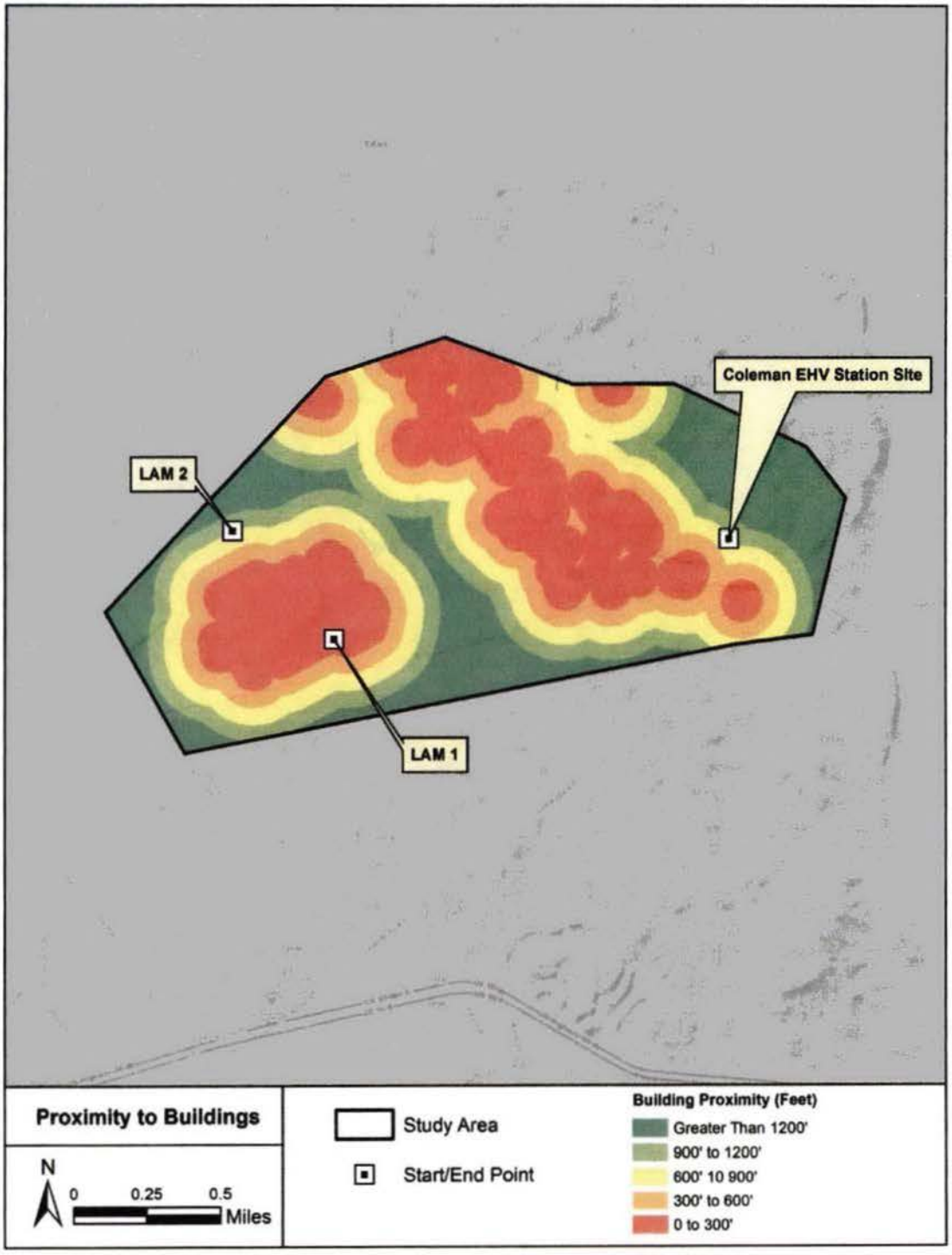
In the Built Environment, it is more suitable to locate a transmission line away from buildings. The model has five categories to rank the Proximity to Buildings layer for suitability. The "Background" category constitutes all areas that are farther than 1,200 feet from any building. This information was developed by Quantum Spatial from analysis of aerial photography and is displayed in Figure 23. Table 9 displays the siting model's suitability values associated with proximity to buildings.

Building proximity was determined by measuring linear distance from building centroids and footprints. These centroids and footprints were extracted from 2014 NAIP aerial photography by Quantum Spatial aerial photo interpreters.

TABLE 9: PROXIMITY TO BUILDING SUITABILITY

Distance	Model Value	Suitability
< 300 Feet	9.0	Low
300 - 600 Feet	8.0	Moderate
600 - 900 Feet	5.7	Moderate
900 - 1,200 Feet	3.4	Moderate
> 1,200 Feet	1.0	High

FIGURE 23: PROXIMITY TO BUILDINGS



2. Building Density

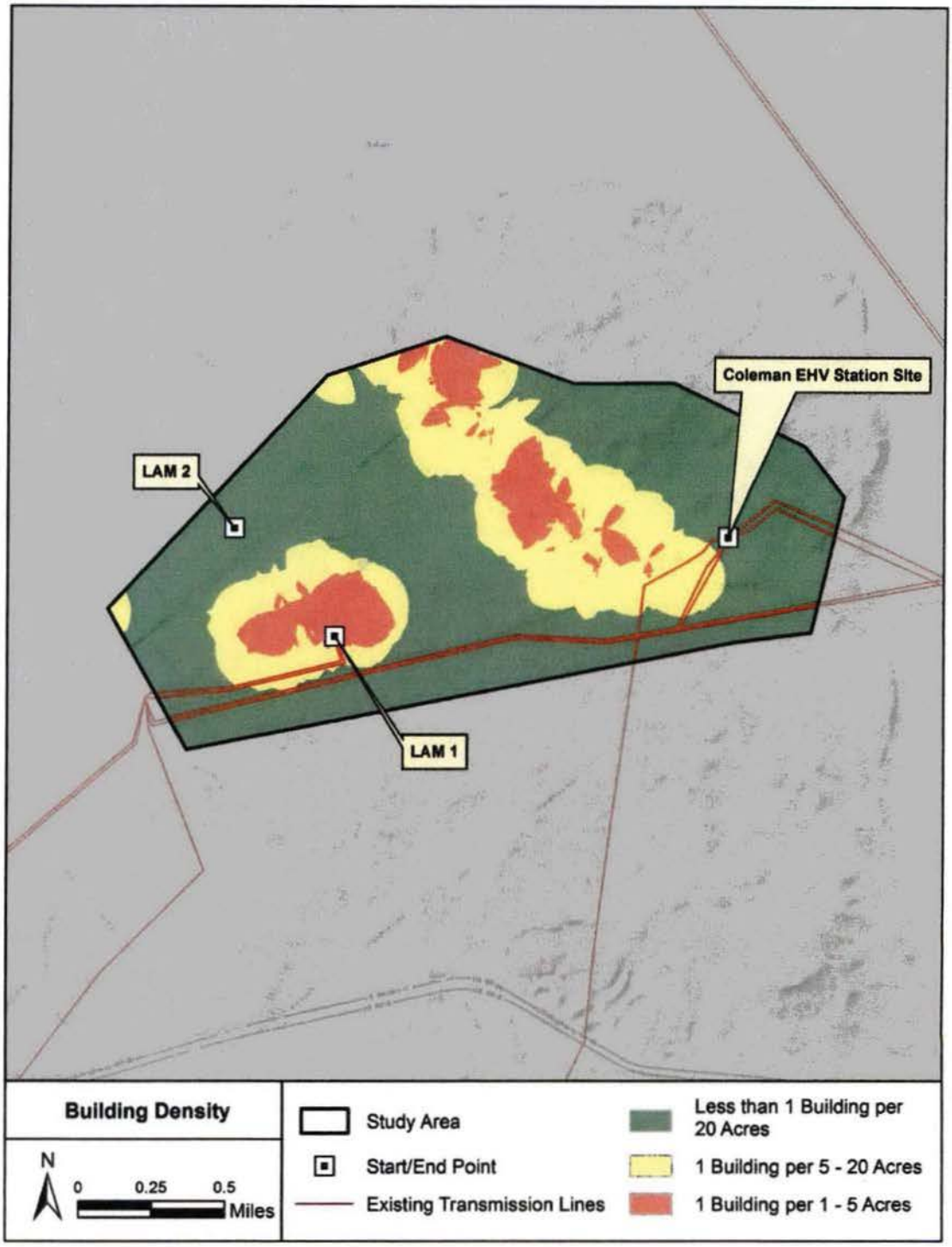
Areas of lower building density are considered more suitable to locate a transmission line. Areas of relatively higher density occur in the central portion of the Study Area. Building density suitability values are shown in Table 10.

Figure 24 displays the density of buildings in the Study Area. Building centroid information was derived by Quantum Spatial from analysis of the same building centroids and footprints as developed for the building proximity layer. This data was derived from 2014 NAIP photography.

TABLE 10: BUILDING DENSITY SUITABILITY

Density	Model Value	Suitability
1 Building / 0.2 – 1 Acres	9.0	Low
1 Building / 0.05 – 0.2 Acres	4.5	Moderate
1 Building / 0 – 0.05 Acres	1.0	High

FIGURE 24: BUILDING DENSITY SUITABILITY

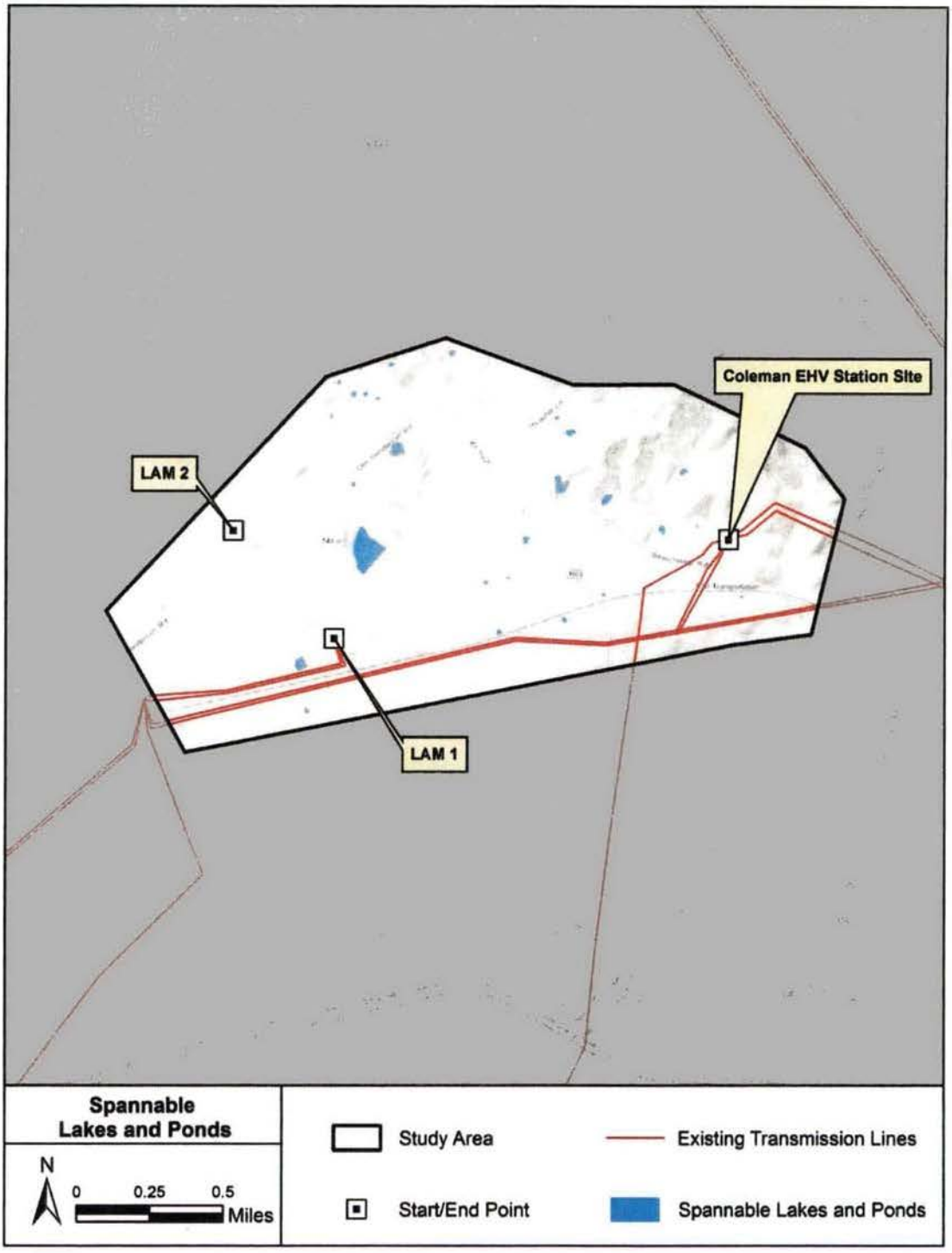


3. Spannable Lakes and Ponds

Spannable open waters, such as lakes, ponds, and rivers, are designated as less suitable for locating transmission lines. All water bodies found within the Study Area are relatively small or narrow. They still present challenges to the routing process and are considered to have a low suitability value.

Figure 25 depicts the location of spannable waterbodies within the Study Area. The hydrologic features were extracted from aerial photography interpretation (NAIP 2014) and from the USGS blue line streams dataset for the Study Area (2014).

FIGURE 25: WATERBODIES



4. Land Use

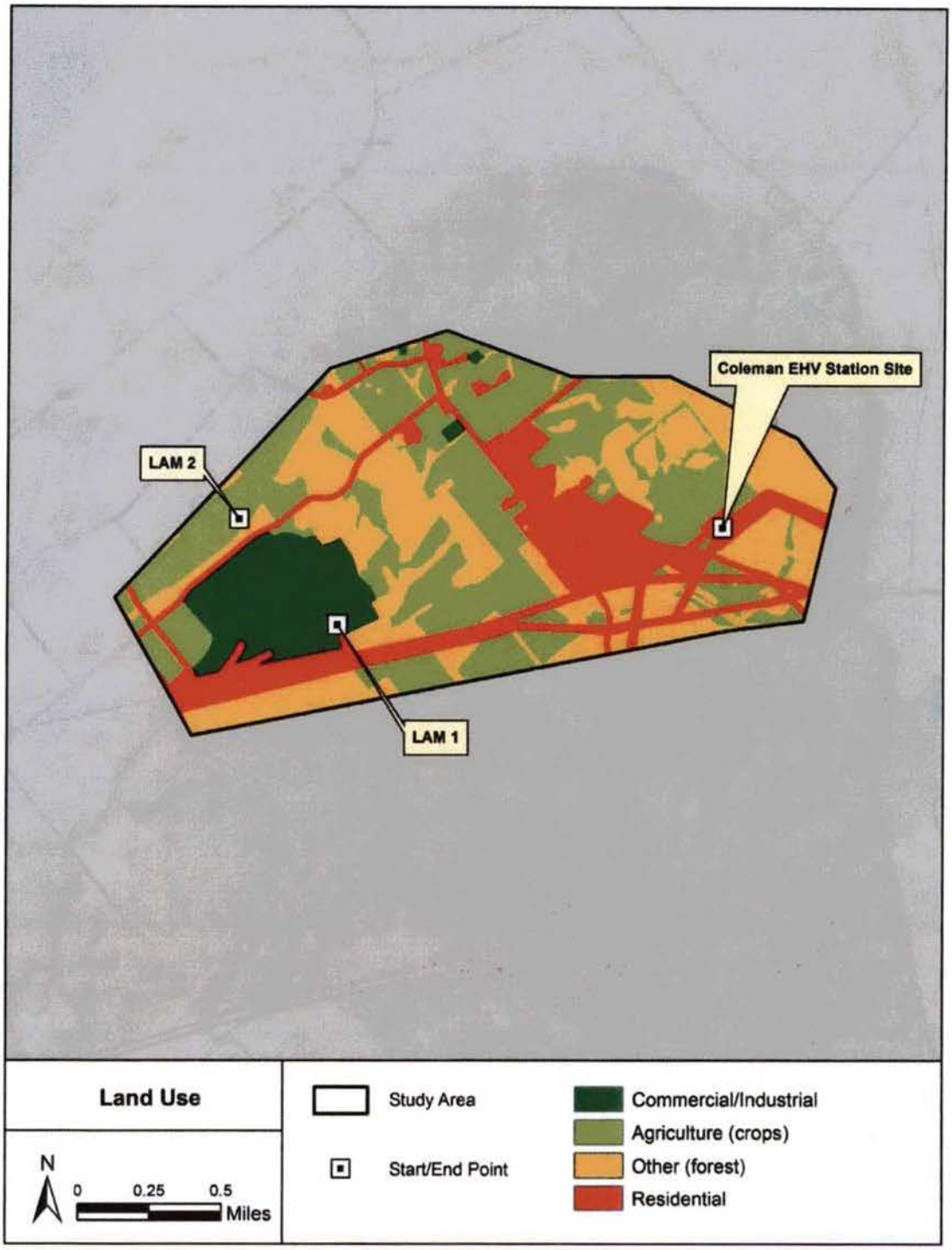
In the Built Environment Perspective, which seeks to minimize impacts to people, the Siting Model considers undeveloped land to be the most suitable for locating transmission lines, whereas residential lands are least suitable. Agricultural lands have a moderate suitability. It is these agricultural land uses that make up the majority of the Study Area. Figure 26 shows the Land Use patterns within the Study Area.

Table 11 documents the land use classifications that are present within the Study Area, their model weights, and relative suitability values. While other classifications exist with respect to the model, these are the only classes present in the Study Area. The land use data was extracted by Quantum Spatial using 2014 NAIP aerial photography (2014).

TABLE 11: LAND USE SUITABILITY

Land Use	Model Value	Suitability
Commercial / Industrial	1	High
Agriculture (crops)	3.5	Moderate
Other (forest)	6.7	Low
Residential	9	Low

FIGURE 26: LAND USE



5. Eligible Historic and Archaeological Sites

In the Built Environment Perspective, proximity to historic structures and archaeological sites eligible for nomination to the National Register of Historic Places (NRHP) is an important consideration. The eligibility of some resources have not been determined, and these potentially eligible resources are considered to be eligible for the purposes of this siting study. These features are given significant consideration in the Kentucky Model to protect their integrity. Lists of eligible and potentially eligible historic structures and archaeological sites are provided in Tables 2 and 3 in the Cultural Resources section of this report. Figure 27 shows the locations of the NRHP-eligible and potentially eligible sites.

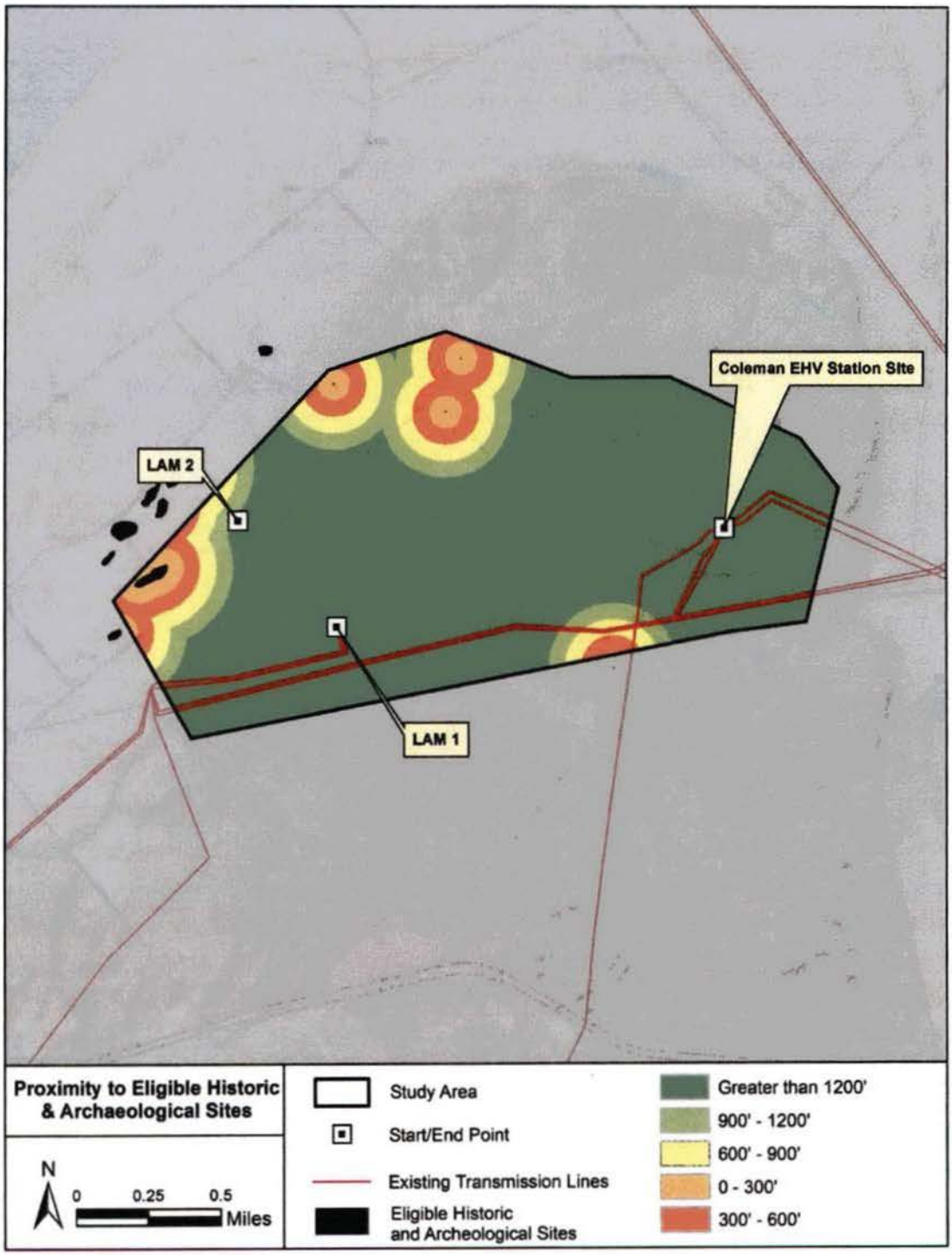
The model has five categories for proximity to eligible historic and archaeological sites (Table 12). The table also shows their respective suitability values. "Background" constitutes all areas that are farther than 1,200 feet from any cultural resource.

The historic structure data was obtained from the Kentucky Heritage Council and the archaeological data was obtained from the Kentucky Office of State Archaeology. Features are designated as listed, eligible, ineligible, and unclassified.

TABLE 12: PROXIMITY TO ELIGIBLE HISTORIC AND ARCHAEOLOGICAL SITES

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

FIGURE 27: PROXIMITY TO ELIGIBLE HISTORIC AND ARCHAEOLOGICAL SITES



6. Areas of Least Preference

Listed archaeology sites & districts, listed NRHP districts & buildings, city & county parks, day care parcels, cemetery parcels, school parcels (K-12), and church parcels are designated as Areas of Least Preference in the Built Considerations Perspective of the Kentucky Model. Within and around the Study Area, cemetery parcels and church parcels are the only features from this list of areas of least preference that are present. No listed archaeology sites & districts, listed NRHP districts & buildings, city & county parks, day care parcels, or school parcels were identified within the Study Area.

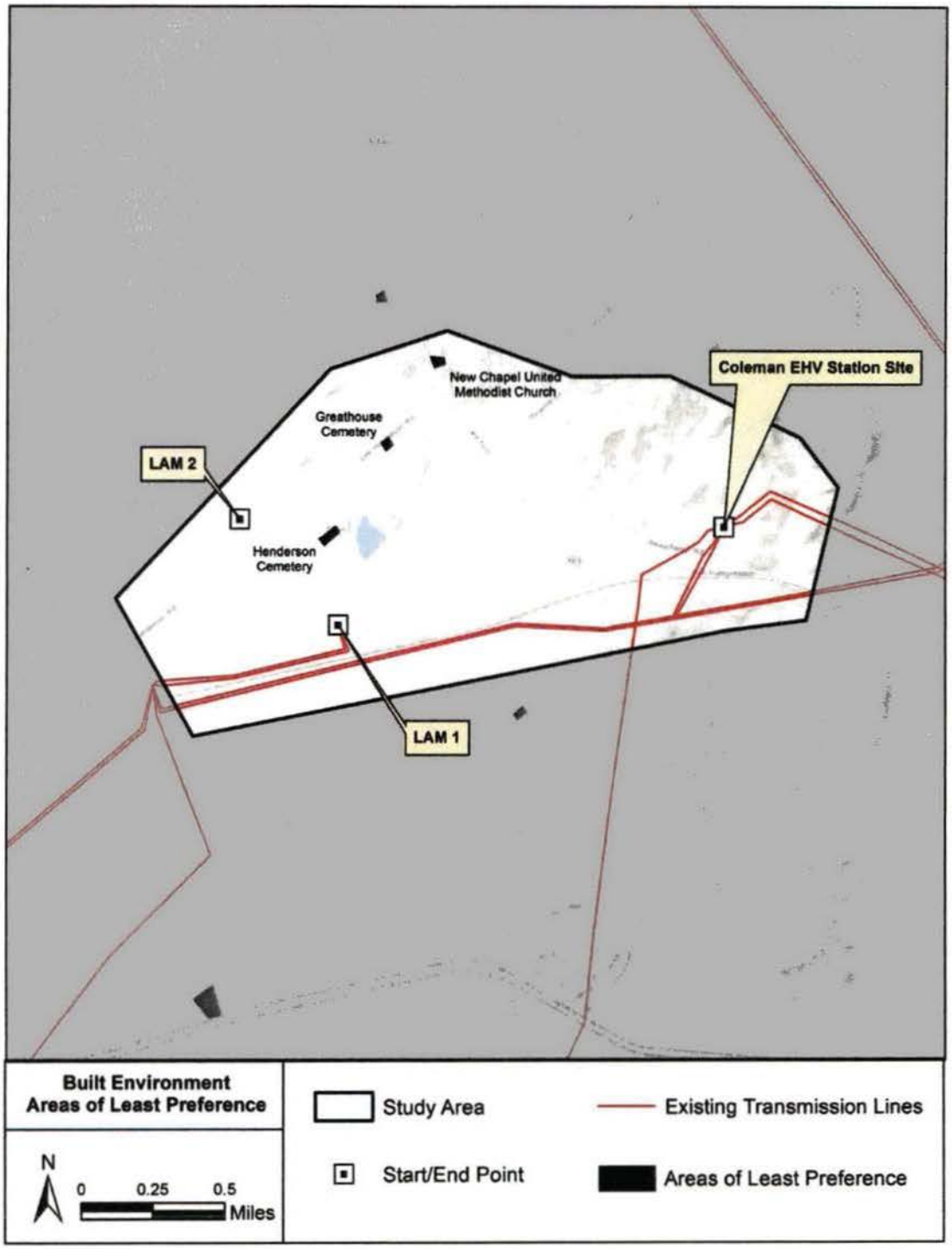
Cemetery Parcels

In the Study Area, two cemeteries were identified from the NAIP Photography and PVA data (2014). The two cemeteries are the Henderson Cemetery and the Greathouse Cemetery. The Henderson Cemetery is in between LAM 1 and LAM 2, to the northwest of the Aleris Aluminum Mill. The Greathouse cemetery is to the northwest of the Henderson Cemetery and is directly off of Lee Henderson Road.

Religious Sites

One church parcel was identified within the Study Area using PVA data and confirmed by the NAIP Photography (2014). The religious parcel in the Study Area belongs to the New Chapel United Methodist Church. This parcel is at the intersection of Great House Road and Adair Road, in the northern area of the Study Area.

FIGURE 28: AREAS OF LEAST PREFERENCE (BUILT ENVIRONMENT)



7. Built Environment Perspective Data Layer Weights (Project-Adjusted Values)

Not all features are present within every Study Area. Each perspective must be adjusted based on the contents of the Study Area for a particular project. When a feature or layer is absent, the weights are adjusted proportionally across the remaining features or layers. The Built Environment data layers and their relative weights for the Line 10-F Dual 161 kV Transmission Line project are summarized in Table 13. Items highlighted in grey are not present in the Study Area unless otherwise discussed below.

TABLE 13: BUILT ENVIRONMENT PERSPECTIVE ADJUSTED DATA LAYERS AND WEIGHTS

Built Environment			
Proximity to Buildings	17.5%	**Proximity to Eligible Historic and Archeological Sites**	32.2%
Background	1	Background	1
900-1200	3.4	900-1200	4.6
600-900	5.7	600-900	7.9
300-600	8	0-300	8.6
0-300	9	300-600	9
Building Density	8.7%	***AREAS OF LEAST PREFERENCE***	
0 - 0.05 Buildings/Acre	1	**Listed Archaeology Sites & Dist.**	
0.05 - 0.2 Buildings/Acre	3.1	**Listed NRHP Districts and Buildings**	
0.2 - 1 Buildings/Acre	5.9	**City and County Parks**	
1 - 4 Buildings/Acre	-	**Day Care Parcels**	
> 4 Buildings/Acre	-	**Cemetery Parcels**	
Proposed Development	0.0%	**School Parcels (K-12)**	
Background	-	**Church Parcels**	
Proposed Development	-		
Spannable Lakes and Ponds	4.2%		
Background	1		
Spannable Lakes and Ponds	9		
Land Use	37.4%		
Commercial/Industrial	1		
Agriculture (crops)	3.5		
Agriculture (other livestock)	-		
Silviculture	-		
Other (forest)	6.7		
Equine Agri - Tourism	-		
Residential	9		

- 1 - 4 Buildings per Acre – Building densities were calculated by Quantum Spatial using building locations extracted from 2014 NAIP photography (2014). There were no building densities that met the criteria of having 1 -4 buildings per acre.

- > 4 Buildings per Acre – Building densities were calculated by Quantum Spatial using building locations extracted from 2014 NAIP photography (2014). There were no building densities that met the criteria of having > 4 buildings per acre.

- Proposed Development – Representatives from the Hancock County PVA, the Urban Planning & Zoning offices, and the development authorities were aware of no proposed developments within the Study Area (November 2014). Quantum Spatial contacted Mike Baker, the Industrial Manager for the Industrial Foundation, for industrial proposed developments and Don Cox, a manager in the Hancock Urban Planning and Zoning Office, for all other proposed developments. Quantum Spatial spoke with Peyton Jackson at the Hancock County PVA office on November 12, 2014 to obtain the parcel data.

- Agriculture (other livestock) – Interpretation of 2014 NAIP photography did not indicate any livestock within the Study Area (2014).

- Silvicultre – Interpretation of 2014 NAIP photography did not indicate any silviculture within the Study Area (2014).

- Equine Agri–Tourism – The Kentucky Model places a high value on the protection of commercial horse farms. Interpretation of 2014 NAIP photography did not indicate any commercial horse farms within the Study Area (2014).

- Listed Archeological Sites and Districts – An inventory of listed Archeological sites and districts was obtained from the Kentucky Office of State Archaeology. This inventory identified three features within the Study Area, although none were listed as eligible for the National Register.

- Listed NRHP Districts and Buildings – An inventory of NRHP-listed buildings and districts was obtained from the Kentucky Heritage Council. This inventory did not include any features within the Study Area.

- City and County Parks – In the Study Area, there were no city and county parks identified according the 2014 NAIP photography and PVA records.

- Day Care Parcels – Review of ownership information (PVA data) tax parcels identified no commercial child care facilities in the Study Area. This information was confirmed by photo interpretation of the 2014 NAIP photography.

- School Parcels (K-12) – Review of ownership information (PVA data) tax parcels identified no school parcels in the Study Area. This information was confirmed by photo interpretation of the 2014 NAIP photography.

Part VIII: Suitability Surfaces

Suitability Surfaces were created by combining the three perspectives (Engineering Considerations, Natural Environment, and Built Environment) described in the preceding sections. Each Suitability Surface represents a weighted combination of the three perspectives. Four scenarios were created by distributing the weight of each environment. The Suitability Surfaces are used in performing the "optimal path" analysis, described in Part IX of this report. This algorithm is applied to each surface to develop the four Alternate Corridors.

Engineering Concerns Surface: The data layers from the Engineering Considerations Perspective are given five times (72%) the emphasis of the Built Environment (14%) and Natural Environment (14%) perspectives.

Natural Environment Surface: The data layers from the Natural Environment Perspective are given five times (72%) the emphasis of the Built Environment (14%) and Engineering Considerations (14%) perspectives.

Built Environment Surface: The data layers from the Built Environment Perspective are given five times (72%) the emphasis of the Natural Environment (14%) and Engineering Considerations (14%) perspectives.

Simple Average Surface: For the Simple Average suitability surface, an equal emphasis (33.3%) is applied to all three Perspectives.

FIGURE 29: SUITABILITY SURFACE – ENGINEERING CONSIDERATIONS EMPHASIS

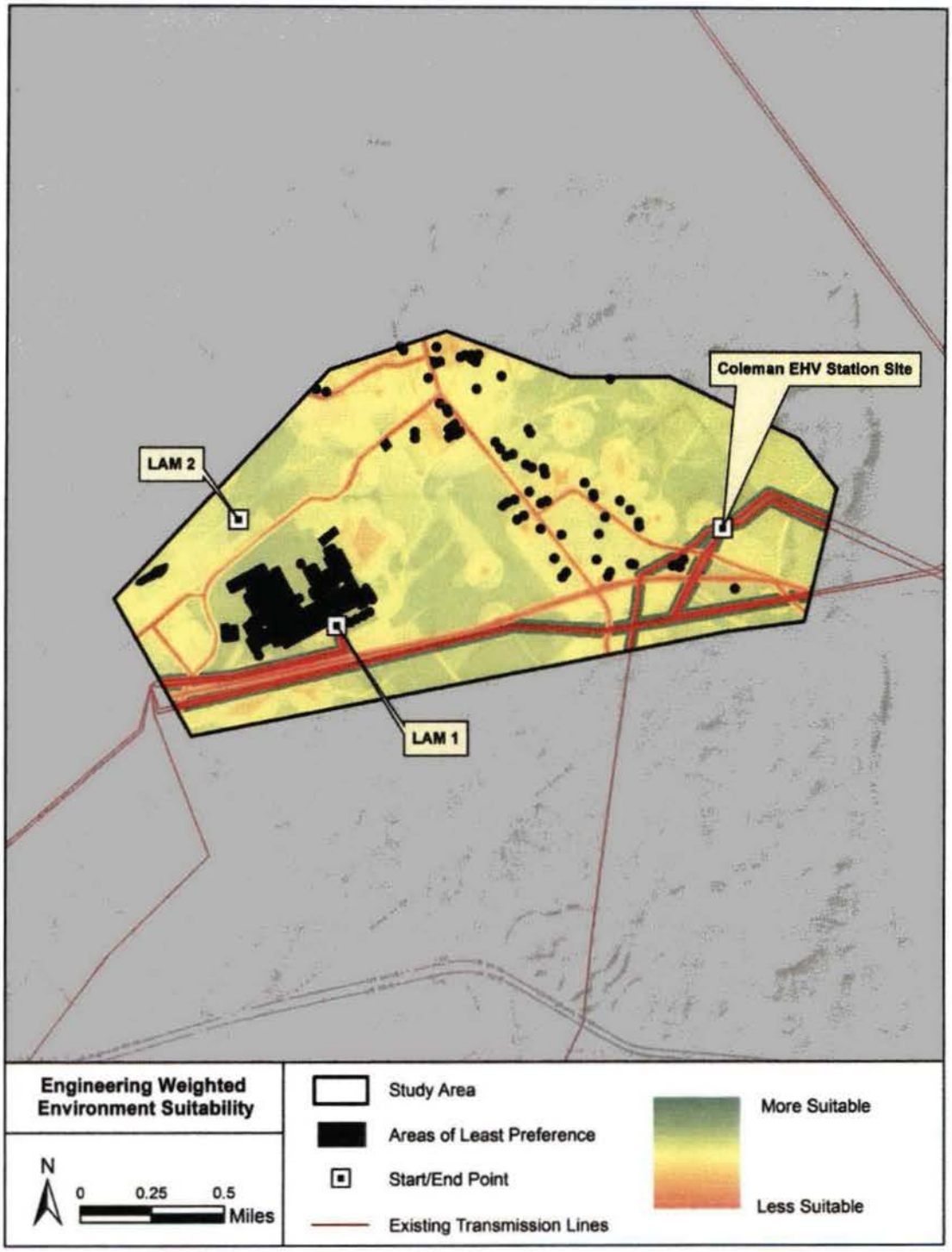


FIGURE 30: SUITABILITY SURFACE - NATURAL ENVIRONMENT EMPHASIS

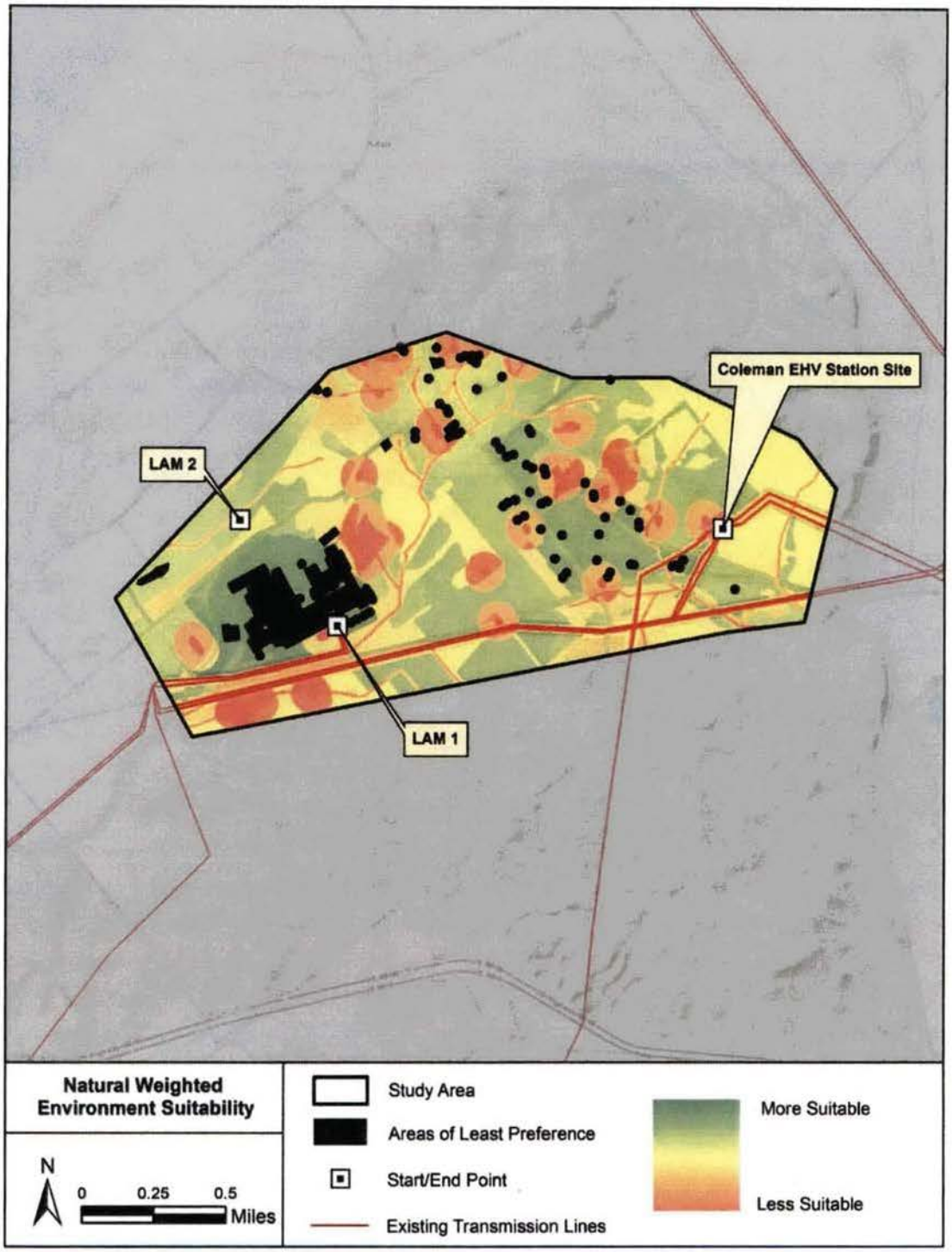


FIGURE 31: SUITABILITY SURFACE – BUILT ENVIRONMENT EMPHASIS

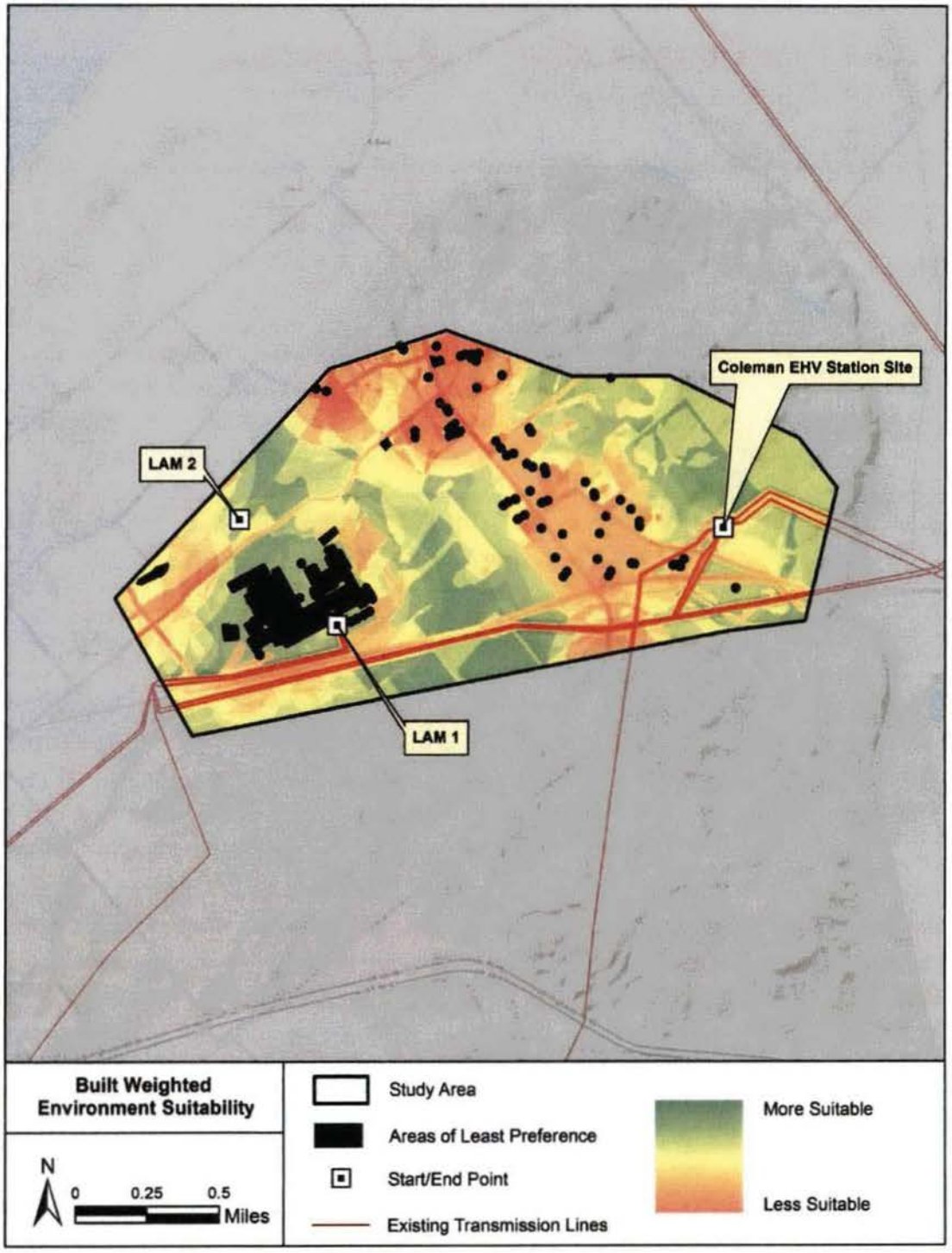
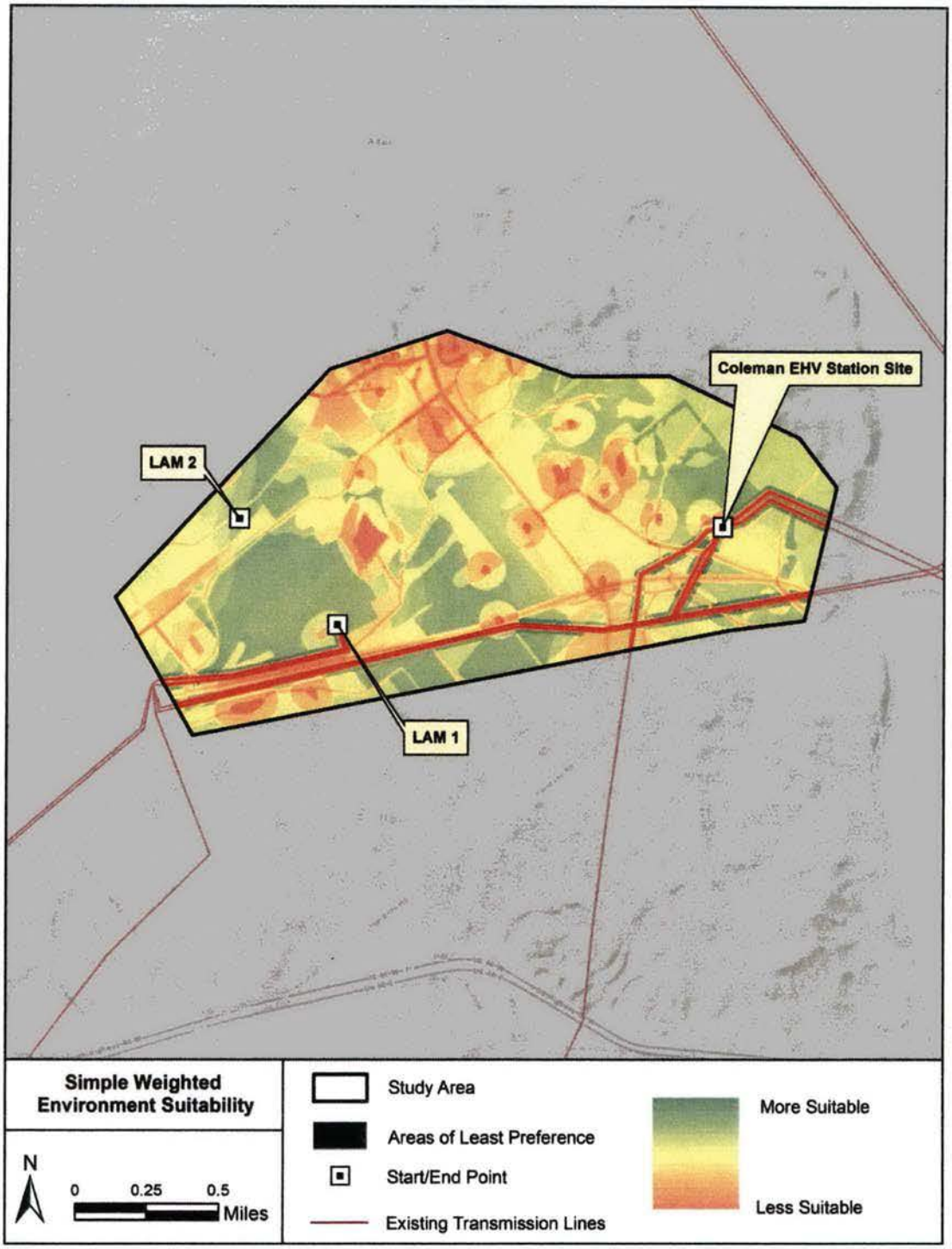


FIGURE 32: SUITABILITY SURFACE – SIMPLE AVERAGE



Part IX: Alternate Corridor Generation

Each Suitability Surface was used in the next phase of the analysis. This phase is called Alternate Route Analysis, and involves the creation of "least cost paths." An algorithm is used to find the cost of every possible path (route) between the two end points. A path is any continuous string of grid cells, 15 by 15 feet in size, connecting the Coleman EHV substation site and the LAM 1 and LAM 2.

The cost is the accrual of values of those grid cells, and the value of each cell varies depending on the features that the cell represents and the weight associated by virtue of the weighted suitability environment. Lower summed values indicate relatively more suitable paths, whereas higher summed values indicate relatively less suitable paths. The Alternate Corridor for each perspective (Engineering Considerations, Built Environment, Natural Environment, and Simple Average) is the total area representing the top 3% (lowest summed values equaling most suitable areas) of all potential routes.

With regards to the two sets of Alternate Corridors, the corridors north of the Aleris Aluminum Mill (LAM 2) are broader and have more possibilities than those to the south (LAM 1). This has to do with the relative distance between the starting point and the two endpoints. To the south, there is an abundance of co-location opportunities that the corridors naturally gravitate towards.

1. Engineering Considerations Alternate Corridor

When the Alternate Route Analysis was performed on the Engineering Considerations Weighted Suitability Surface, the results were the Engineering Considerations Alternate Corridors displayed in Figure 33. Because Slope was removed from the analysis, the Engineering Considerations Perspective is heavily weighted toward co-location with existing transmission lines. The next highest suitability type is "Background." This causes the corridor to broaden in areas where no co-location opportunities exist.

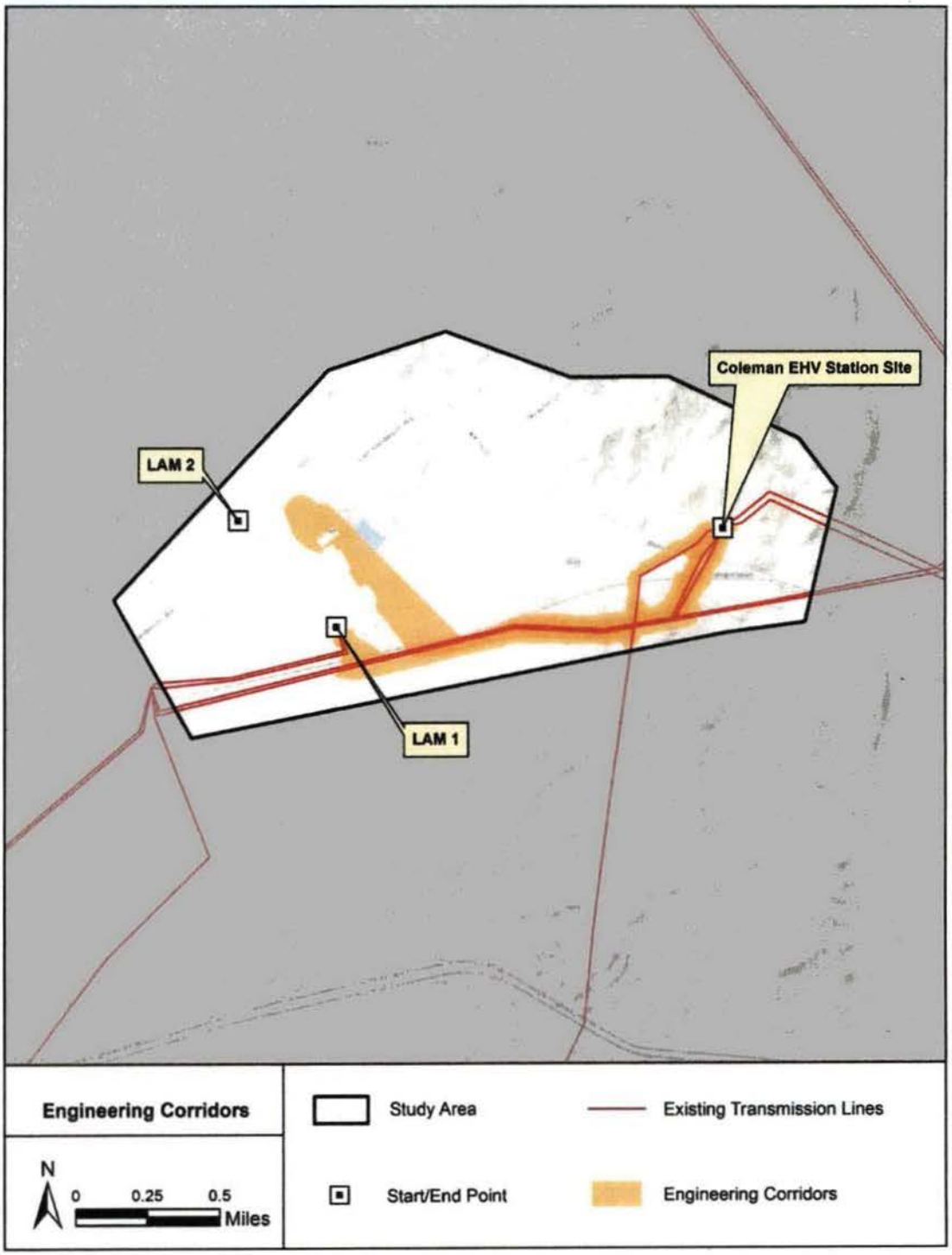
LAM 1

The corridor that corresponds with LAM 1 leaves the Coleman EHV substation site going in a southwestern direction. While avoiding a few residences, the corridor changes direction to follow the existing right-of-way. The width of the corridor matches that of the existing right-of-way to avoid the surrounding forested areas. The corridor then goes in a northwestern direction to finish at the LAM 1 site. The Engineering Considerations Corridor approximately is 1.6 miles in length.

LAM 2

From the Coleman EHV Substation site, the LAM 2 Engineering Considerations Corridor splits into two sections. One of these sections is very thin and reconnects with the other two sections after about 0.5 miles. Both sections go in a southwestern direction out of the Coleman EHV substation. The corridor then turns to a western direction once it hits the existing right-of-way. The width of the corridor corresponds with the width of the right-of-way. Since the corridor is going along the right-of-way, it is avoiding any avoidances and even forested areas that surround the corridor. After 0.8 miles, the corridor redirects towards the northwest to go towards LAM 2. The corridor widens to approximately 0.15 miles wide. The corridor then stretches to the endpoint while avoiding the existing Henderson Cemetery and industrial site to the west. The overall length of the corridor is approximately 1.9 miles.

FIGURE 33: ENGINEERING CONSIDERATIONS ALTERNATE CORRIDOR



2. Natural Environment Alternate Corridor

When the Alternate Route Analysis was performed on the Natural Environment Weighted Suitability Surface, the result was the Natural Environment Alternate Corridors shown in Figure 34. The Natural Environment Corridor seeks to limit impacts to naturally occurring areas. Avoiding wildlife habitat and streams / wetland areas are the most important criteria to this portion of the analysis. As a result, upland and developed areas will be the most preferred avenue for the Natural Environment Corridors.

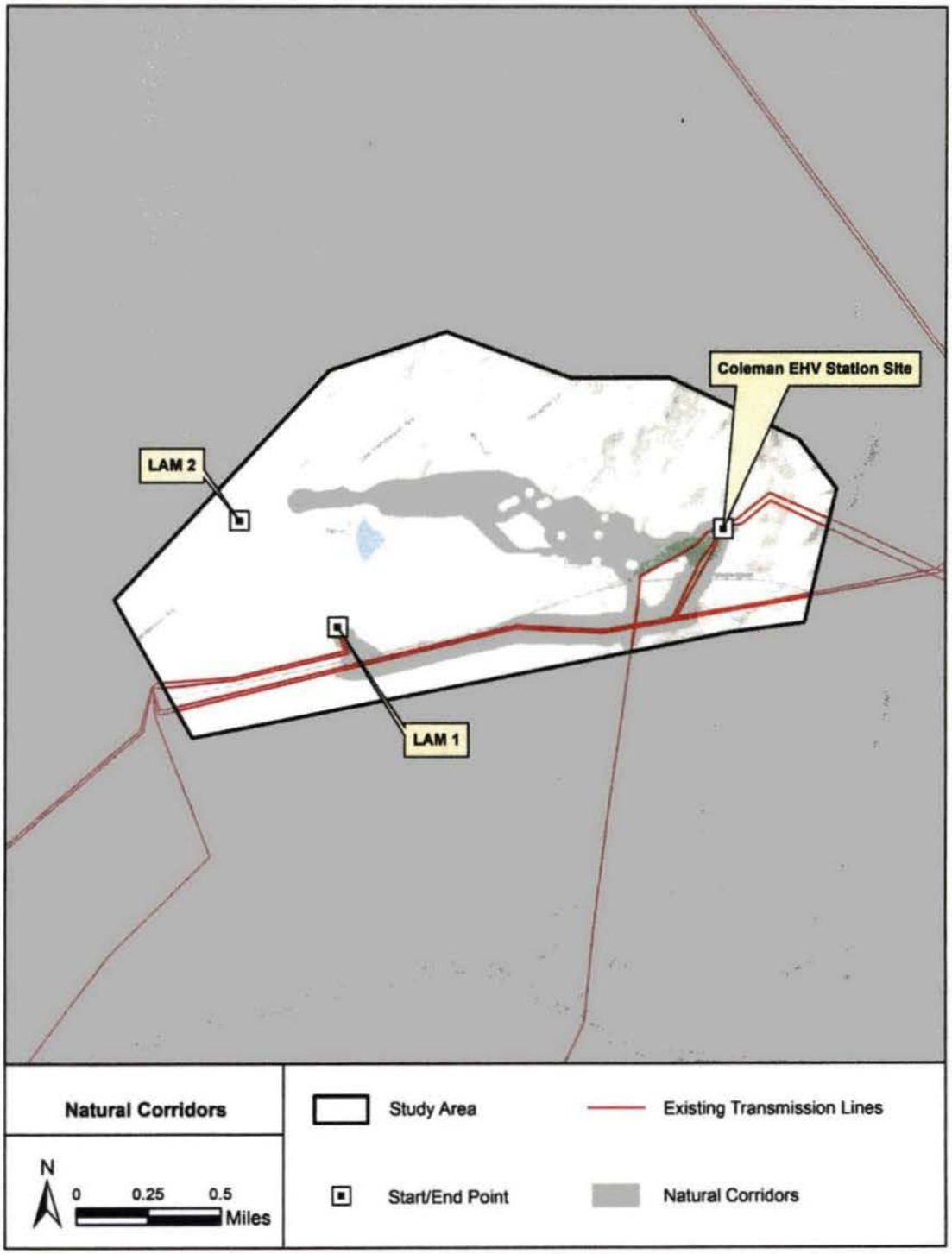
LAM 1

The LAM 1 Natural Environment Corridor leaves the Coleman EHV substation site in a western direction. The corridor goes almost in a direct line to the LAM 1 site, while avoiding developed land use and getting thinner in an area where wetlands exist. There is some developed land usage that the corridor also avoids near LAM 1 site. Overall, the Natural Environment Corridor covers a distance of approximately 1.4 miles.

LAM 2

The LAM 2 Natural Environment Corridor beings headed in a southwestern direction from the Coleman EHV substation site. Then the corridor begins to go in a western and then northwestern direction, while avoiding the developed land. About 0.6 miles from the substation, a small sub-corridor splits off to avoid isolated residential buildings and reconnects with the main corridor after 0.25 miles. The corridor then goes directly west towards LAM 2 and narrows to avoid the waterbody and the finishes its route. The LAM 2 Natural Environment Corridor is approximately 1.6 miles long.

FIGURE 34: NATURAL ENVIRONMENT ALTERNATE CORRIDOR



3. Built Environment Alternate Corridor

When the Alternate Route Analysis was performed on the Built Environment Weighted Suitability Surface, the results were the Built Environment Alternate Corridors shown in Figure 35.

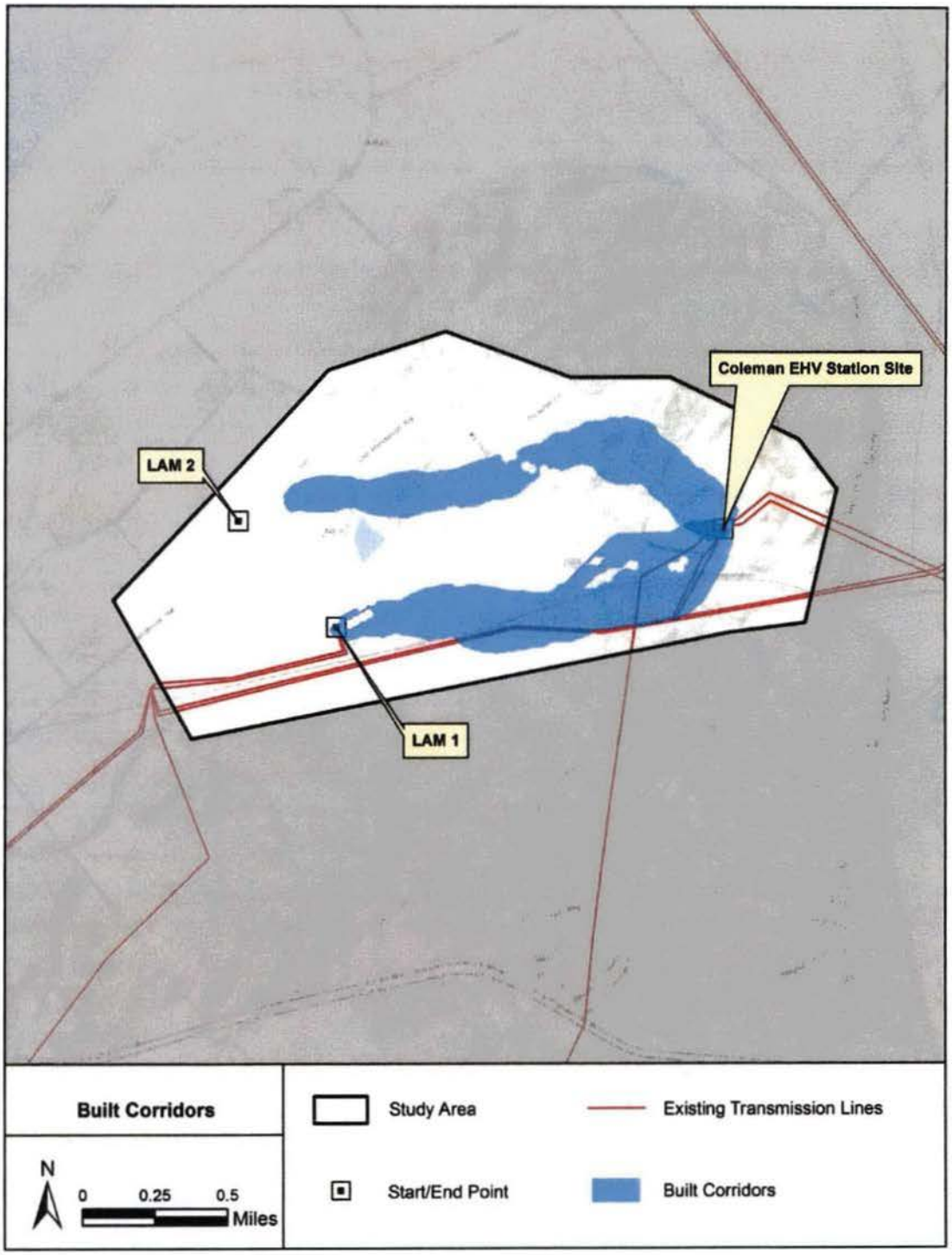
LAM 1

Beginning at the Coleman EHV substation site, the LAM 1 Built Environment Alternate Corridor starts off relatively wide at about 0.2 miles in a southwestern direction. There are five residential buildings that are avoided. The corridor goes for the shortest path to LAM 1 by paralleling the existing railroad right-of-way to the south. The Built Environment Alternate corridor for LAM 1 is approximately 1.4 miles in length.

LAM 2

The LAM 2 Built Environment Corridor exits the Coleman EHV substation site and immediately goes in a northwestern direction. This continues for about 0.5 miles and then the corridor turns to the west. The corridor gets thinner to avoid the residential buildings and impact as little of the residential land use as possible. After the residential area is passed, the corridor then widens up to about 0.2 miles wide and continues until it finishes at LAM 2. The length of the Built Environment Corridor for LAM 2 is about 1.6 miles.

FIGURE 35: BUILT ENVIRONMENT ALTERNATE CORRIDOR



4. Simple Average Alternate Corridor

When the Alternate Route Analysis was performed on the Simple Average Suitability Surfaces, the results were the Simple Average Alternate Corridors shown in Figure 36. Since the Simple Average Suitability weighs the other three perspectives of the model equally, the Simple Average Corridor usually resembles elements of the other corridors.

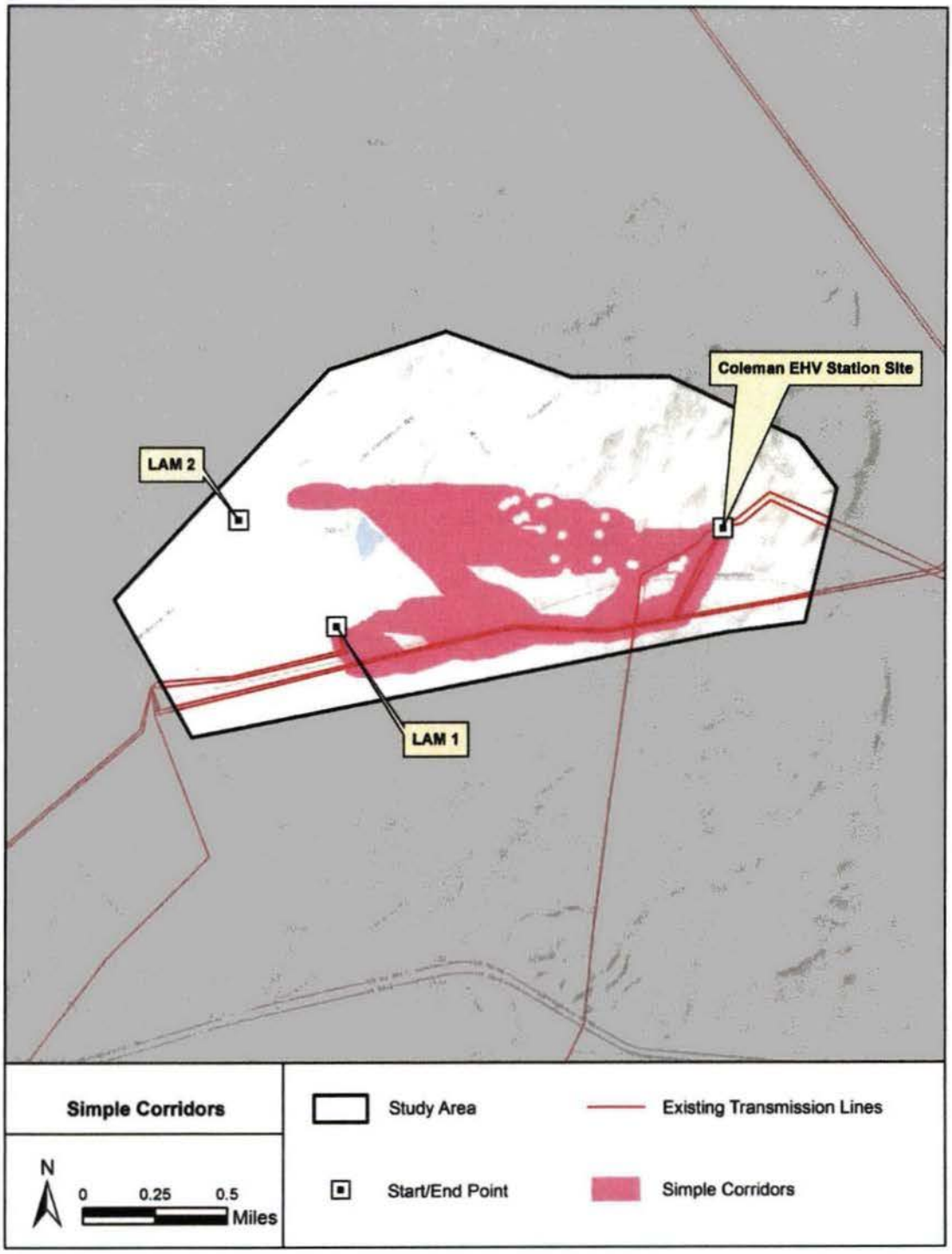
LAM 1

Beginning at the Coleman EHV substation site, the LAM 1 Simple Average Corridor starts in a southwestern direction for about 0.2 miles. The corridor then splits off into 2 sub-corridors that split due to wetlands and residential buildings. Once the sub-corridors reconvene, the corridor narrows to follow the railroad and existing right-of-way. Once the corridor passes a wetland on the northern side, it widens and continues westward. Before the corridor reaches its endpoint, it avoids another wetland and a few industrial structures. The total length of the LAM 1 Simple Average Corridor is approximately 1.6 miles.

LAM 2

The LAM 2 Simple Average Corridor has two sub-corridors, northern and southern. The northern and southern sub-corridors break away from the main corridor after approximately 0.2 miles. The reason for this split is the corridor reaching towards the existing right-of-way to the south while avoiding the forested and residential areas directly north. The northern sub-corridor continues in a directly western orientation while avoiding residential buildings. The southern sub-corridor follows the existing right-of-way and goes northwest before it comes to a wetland. After approximately 1 mile, the two sub-corridors merge together to form a main corridor once again. The corridor then continues in a west-northwestern direction until it narrows due to a waterbody and the Henderson Cemetery on either side. After 1.9 miles, the Simple Average Corridor terminated at LAM 2.

FIGURE 36: SIMPLE AVERAGE ALTERNATE CORRIDOR

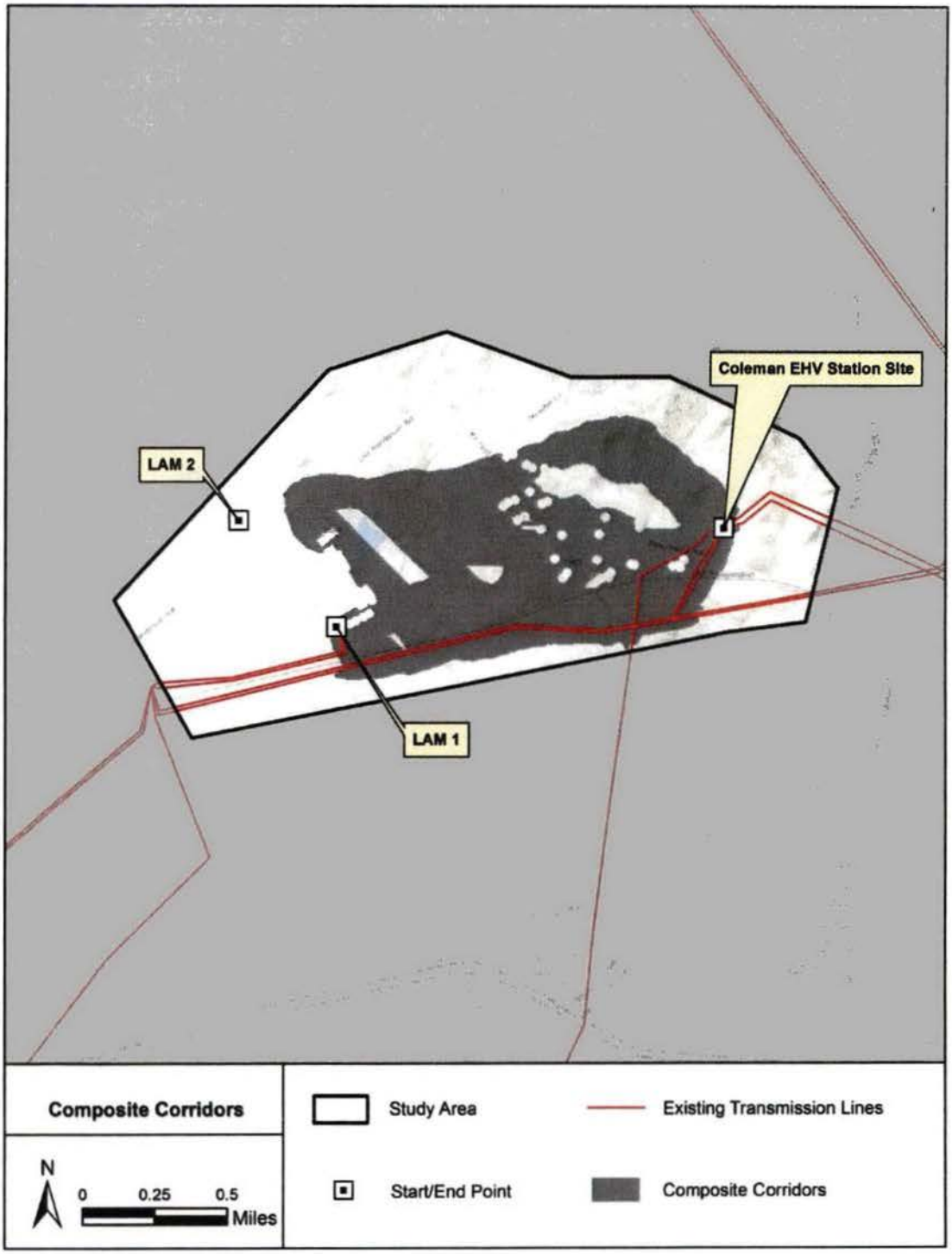


5. Composite and Comparison of Alternate Corridors

A composite of all four Alternate Corridors is shown in Figure 39. The Composite Corridor is simply the combination of the four Alternate Corridors. The figure shows the Composite Corridors for both transmission lines. The area represented by the Composite Corridor serves as the base for the Phase II data collection Study Area.

Whereas the Phase I Study Area was examined almost exclusively through aerial photography and commercially available off of the shelf GIS data, the features in the Phase II Study Area were verified by Big Rivers' staff members in the field. This level of verification provides the project team with the most accurate data needed to develop alternate routes.

FIGURE 37: COMPOSITE OF ALTERNATE CORRIDORS



Part X: Alternate Routes

Together with Quantum Spatial, the BREC project team reviewed and analyzed the Alternate Corridors and developed Alternate Routes. This report will examine and discuss the data associated with the Alternate Routes.

1. Alternate Routes

After reviewing the Alternate Corridors, the BREC project team identified five Alternate Routes. Three Alternate Routes connect the Coleman EHV substation site with LAM 1 transmission line south of the Aleris Aluminum Mill. The two remaining route alternates connect the substation site with LAM 2 north of the Aleris Aluminum Mill. These Alternate Routes are shown with the Alternate Corridors in Figure 38 and without the Alternate Corridors in Figure 39.

FIGURE 38: ALTERNATE ROUTES WITH COMPOSITE CORRIDOR

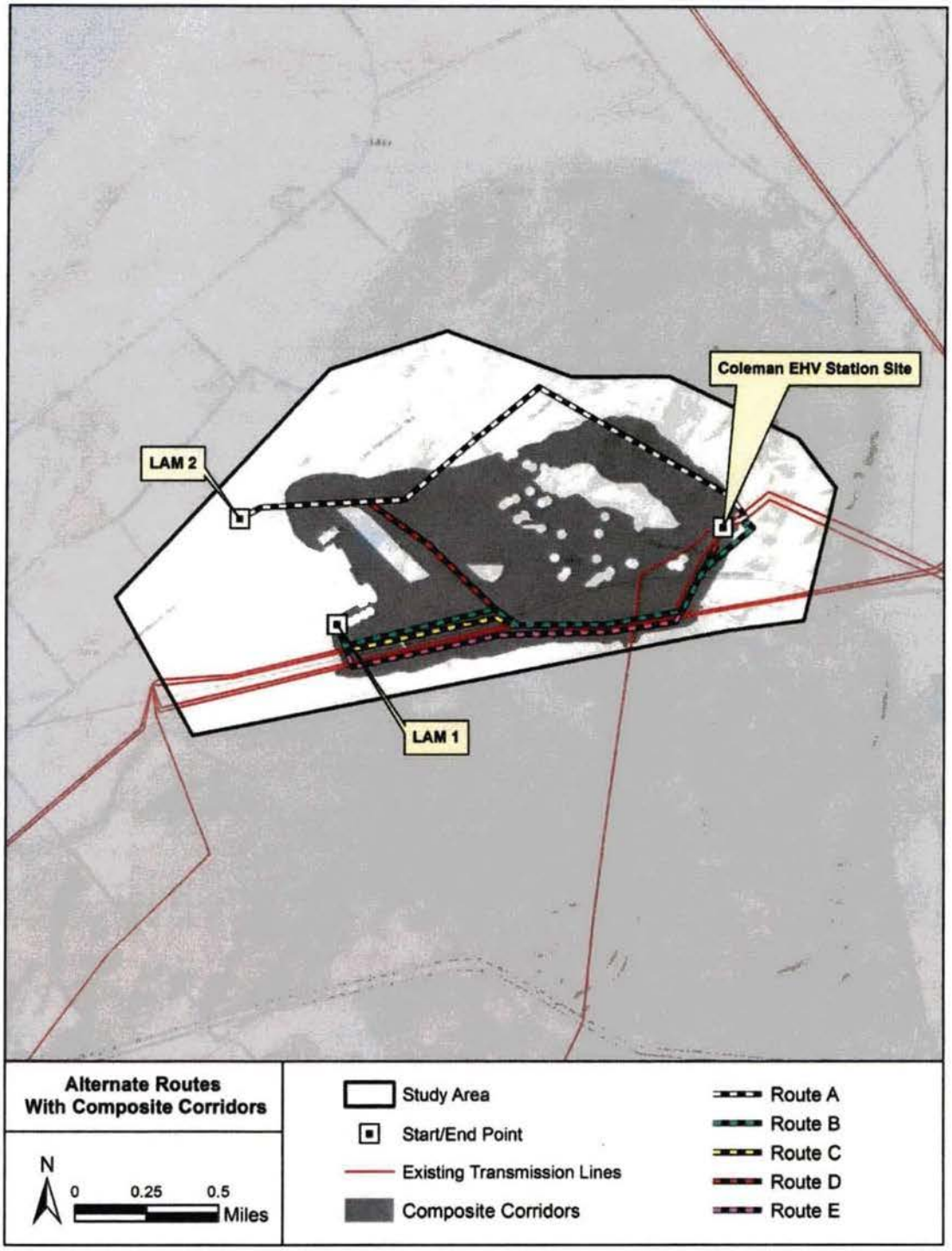
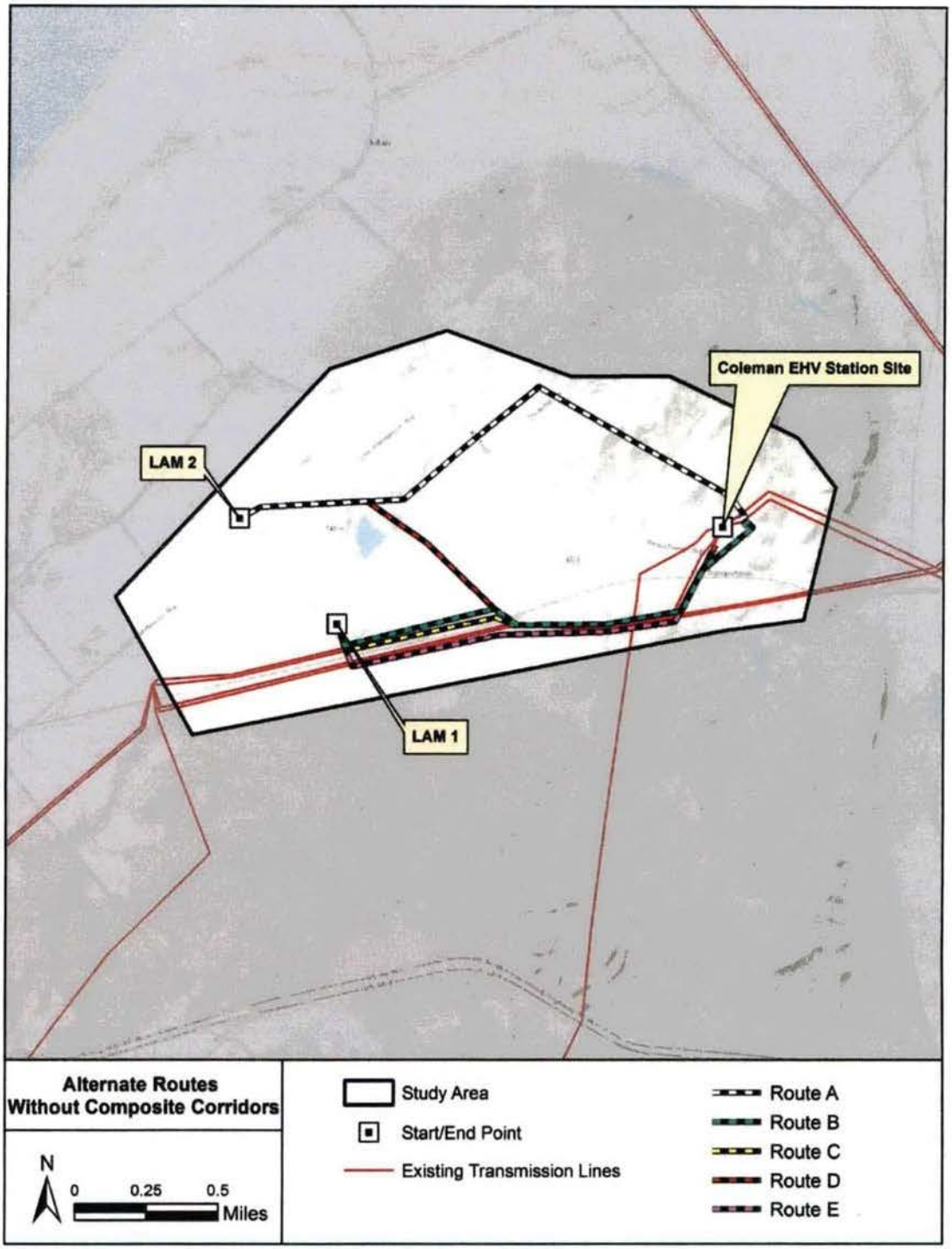


FIGURE 39: ALTERNATE ROUTES WITHOUT COMPOSITE CORRIDOR



2. Alternate Route Evaluation

Statistics were collected for the five Alternate Routes, according to the criteria in the Alternate Route Evaluation Model. The criteria were divided into three categories: Built Environment, Natural Environment, and Engineering Considerations perspectives. These perspectives are similar to those used to create the Alternate Corridors; however, while the Alternate Corridor phase utilized general datasets, the Alternate Route Evaluation phase uses more refined data. This allows for a better idea of the specific features associated with each route. The statistics were then normalized and weights assigned based on the Alternate Route Evaluation Model. Those criteria not found within the Study Area were removed from consideration, and their weight distributed proportionally among the remaining features/layers. Finally, any feature or layer that has the same value for all routes is removed because, with respect to that particular criterion, there will be no relatively more suitable alternate route. These feature or layer weights are also redistributed.

Table 14 shows the model weights and values assuming all features and layers are present within the Study Area. Table 15 shows the project-adjusted values that reflect only the actual features and layers that are actually present within the Study Area.

TABLE 14: ALTERNATE ROUTE CRITERIA & WEIGHTS (MODEL VALUES)

FOR ALL ROUTES RANK	Weights
Built	
Segments	
Feature	
Relocated Residences	54.0%
Weighted	
Proximity to Residences (300')	15.9%
Weighted	
Proposed Developments	3.8%
Weighted	
Proximity to Commercial Buildings (300')	2.6%
Weighted	
Proximity to Industrial Buildings (300')	1.5%
Weighted	
School, DayCare, Church, Cemetery, Park Parcels (#)	7.7%
Weighted	
NRHP Listed/Eligible Strucs./Districts (1500' from edge of R/W)	14.5%
Weighted	
TOTAL	100.0%
WEIGHTED TOTAL	
Natural	
Natural Forests (Acres)	42.6%
Weighted	
Stream/River Crossings	12.0%
Weighted	
Wetland Areas (Acres)	41.9%
Weighted	
Floodplain Areas (Acres)	3.5%
Weighted	
TOTAL	100.0%
WEIGHTED TOTAL	
Engineering	
Percent of Rebuild with Existing T/L*	33.3%
Weighted	
Percent of Co-location with Existing TL*	52.7%
Weighted	
Total Project Costs	14.0%
Weighted	
TOTAL	100.0%
WEIGHTED TOTAL	
SUM OF WEIGHTED TOTALS	
RANK	

* Inverted for calculations — Lowest Number is Best

TABLE 15.1: ALTERNATE ROUTE ADJUSTED CRITERIA & WEIGHTS FOR LAM 1

FOR ALL ROUTES RANK	Weights
Built	
Segments	
Feature	
Relocated Residences	0.0%
Weighted	
Proximity to Residences (300')	0.0%
Weighted	
Proposed Developments	0.0%
Weighted	
Proximity to Commercial Buildings (300')	0.0%
Weighted	
Proximity to Industrial Buildings (300')	0.0%
Weighted	
School, DayCare, Church, Cemetery, Park Parcels (#	0.0%
Weighted	
NRHP Listed/Eligible Strucs./Districts (1500' from edge of R/W)	0.0%
Weighted	
TOTAL	0.0%
WEIGHTED TOTAL	
Natural	
Natural Forests (Acres)	44.2%
Weighted	
Stream/River Crossings	12.4%
Weighted	
Wetland Areas (Acres)	43.4%
Weighted	
Floodplain Areas (Acres)	0.0%
Weighted	
TOTAL	100.0%
WEIGHTED TOTAL	
Engineering	
Percent of Rebuild with Existing T/L*	0.0%
Weighted	
Percent of Co-location with Existing TL*	79.0%
Weighted	
Total Project Costs	21.0%
Weighted	
TOTAL	100.0%
WEIGHTED TOTAL	
SUM OF WEIGHTED TOTALS	
RANK	

TABLE 15.2: ALTERNATE ROUTE ADJUSTED CRITERIA & WEIGHTS FOR LAM 2

FOR ALL ROUTES RANK	Weights
Built	
Segments	
Feature	
Relocated Residences	0.0%
Weighted	
Proximity to Residences (300')	53.5%
Weighted	
Proposed Developments	0.0%
Weighted	
Proximity to Commercial Buildings (300')	0.0%
Weighted	
Proximity to Industrial Buildings (300')	0.0%
Weighted	
School, DayCare, Church, Cemetery, Park Parcel	0.0%
Weighted	
NRHP Listed/Eligible Strucs./Districts (1500' from edge of R/W)	46.5%
TOTAL	100.0%
WEIGHTED TOTAL	
Natural	
Natural Forests (Acres)	78.1%
Weighted	
Stream/River Crossings	21.9%
Weighted	
Wetland Areas (Acres)	0.0%
Weighted	
Floodplain Areas (Acres)	0.0%
Weighted	
TOTAL	100.0%
WEIGHTED TOTAL	
Engineering	
Percent of Rebuild with Existing T/L*	0.0%
Weighted	
Percent of Co-location with Existing TL*	79.0%
Weighted	
Total Project Costs	21.0%
Weighted	
TOTAL	100.0%
WEIGHTED TOTAL	
SUM OF WEIGHTED TOTALS	
RANK	

3. Raw Statistics and Normalized Statistics

The next step of the analysis is to normalize the raw statistics to the routes. Table 16 shows raw and normalized statistics for the Alternate Routes. The statistics were normalized (that is, distributed along a scale from zero to one) in order to allow comparison between each of the layers. Routes with a value closer to zero represent more suitable routes, while routes with a value closer to one represent less suitable routes. The values associated with "Miles of Co-location with Existing Transmission Line" and "Miles of Co-location with Roads" were inverted since a higher value in this category is seen as desirable, not as a detriment.

TABLE 16.1: RAW STATISTICS AND NORMALIZED STATISTICS FOR LAM 1

ROUTE DATA	Route C	Route D	Route E
Feature			
Built			
Relocated Residences	0	0	0
Proximity to Residences (300')	0	0	0
Proposed Residential Developments	0	0	0
Proximity to Commercial Buildings (300')	0	0	0
Proximity to Industrial Buildings (300')	1	1	1
School, DayCare, Church, Cemetery, Park Parcels (#)	0	0	0
NRHP Listed/Eligible Strucs./Districts (1500' from edge of R/W)	0	0	0
Natural			
Natural Forests (Acres)	7.36	7.13	4.36
Stream/River Crossings	3	3	5
Wetland Areas (Acres)	0.21	0.00	0.00
Floodplain Areas (Acres)	0.00	0.00	0.00
Engineering			
Length (Miles)	1.73	1.73	1.79
Miles of Rebuild with Existing T/L	0.00	0.00	0.00
% Rebuild with Existing T/L	0.00%	0.00%	0.00%
Miles of Co-location w/ Existing T/L or other major utilities	0.84	0.83	1.44
% Co-location w/ Existing T/L or other major utilities	48.44%	48.06%	80.63%
Number of Parcels	5	4	4
Construction	$147,390	$146,795	$151,810
Land	$9,109	$9,145	$8,808
Clearing ($4,500 per acre)	$33,120	$32,085	$19,620
50 Year RR Crossing Fees	$80,000	$80,000	$80,000
High Angle Structure Costs (Total)	$868,000	$868,000	$712,000
Angle is > 30 degrees	$708,000	$708,000	$472,000
Angle is <= 30 degrees	$160,000	$160,000	$240,000
Total Project Costs	$1,137,619	$1,136,025	$972,238

TABLE 16.1: RAW STATISTICS AND NORMALIZED STATISTICS FOR LAM 2

ROUTE DATA	Route A	Route B
Feature		
Built		
Relocated Residences	0	0
Proximity to Residences (300')	1	0
Proposed Residential Developments	0	0
Proximity to Commercial Buildings (300')	0	0
Proximity to Industrial Buildings (300')	0	0
School, DayCare, Church, Cemetery, Park Parcels (#)	0	0
NRHP Listed/Eligible Strucs./Districts (1500' from edge of R/W)	2	0
Natural		
Natural Forests (Acres)	6.84	7.25
Stream/River Crossings	4	3
Wetland Areas (Acres)	0.00	0.00
Floodplain Areas (Acres)	0.00	0.00
Engineering		
Length (Miles)	2.09	1.98
Miles of Rebuild with Existing T/L	0.00	0.00
% Rebuild with Existing T/L	0.00%	0.00%
Miles of Co-location w/ Existing T/L or other major utilities	0.00	0.84
% Co-location w/ Existing T/L or other major utilities	0.00%	42.40%
Number of Parcels	5	6
Construction	$177,395	$168,385
Land	$3,854	$8,597
Clearing ($4,500 per acre)	$30,780	$32,625
50 Year RR Crossing Fees	$0	$80,000
High Angle Structure Costs (Total)	$514,000	$792,000
Angle is > 30 degrees	$354,000	$472,000
Angle is <= 30 degrees	$160,000	$320,000
Total Project Costs	$726,029	$1,081,607

The "Total Project Costs" criterion is intended to provide an approximate cost for the construction of the project. These figures are planning-grade cost estimates for comparison purposes only, and are not intended to precisely represent the actual final cost of construction of any particular alternate route. The cost calculations were assessed by combining several related factors. All costs metrics were unit-based and provided by BREC.

For all routes, $85,000 per mile was used for construction of a single steel pole 161 kV transmission line. The land acquisition costs were calculated by using the PVA land value. The ROW clearing costs for the ROW for the routes are estimated at $4,500 per naturally vegetated acre. There is a 50 years' railroad crossing fee that is calculated by multiplying $800 per year by 50, and then multiplied again by the number of times the proposed route crosses the railroad. Finally, there is a cost per high angle structure within each proposed route. If the angle is greater than 30 degrees, then the cost is $118,000 per structure. If the angle is less than or equal to 30 degrees, then the cost is $80,000 per structure. Detailed cost estimates are provided in Table 17.

TABLE 17: COST CALCULATIONS

	LAM 2		LAM 1		
ROUTE DATA	**Route A**	**Route B**	**Route C**	**Route D**	**Route E**
Construction	$177,395	$168,385	$146,390	$146,795	$151,810
Land	$3,854	$8,597	$9,109	$9,145	$8,808
Clearing	$30,780	$32,625	$32,120	$32,085	$19,620
50 Year RR Crossing Fees	$0	$80,000	$80,000	$80,000	$80,000
Angle Cost (> 30 degrees)	$354,000	$472,000	$708,000	$708,000	$472,000
Angle Cost (> 30 degrees)	$160,000	$320,000	$160,000	$160,000	$240,000
Total Project Costs	**$726,029**	**$1,081,607**	**$1,137,619**	**$1,136,025**	**$972,238**

Tables 18, 19, 20 and 21 illustrate the Alternate Route Evaluation Matrix emphases on Engineering Considerations, the Natural Environment, the Built Environment, and the Simple Average perspectives. The tables show each perspective and their weighted values. Like the Alternate Corridors, each perspective has a five times emphasis, or 72%, on the features within that perspective. The remaining perspectives have a weight of 14% each. The Simple Average perspective has an equal amount of weight assigned to each of the three perspectives (33.3%). The routes are also ranked in order of their suitability, with the lower values being the most preferable. Each of the routes is ranked according to its values with respect to the individual environment being emphasized.

4. Emphasis on Engineering Considerations

TABLE 18: ALTERNATE ROUTE EVALUATION MATRIX EMPHASIS ON ENGINEERING CONSIDERATIONS FOR LAM 1

FOR ALL ROUTES	Weights			
RANK		3	2	1
Built	14%	Route C	Route D	Route E
Segments				
Feature		Unit	Unit	Unit
Relocated Residences	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
Proximity to Residences (300')	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
Proposed Developments	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
Proximity to Commercial Buildings (300')	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
Proximity to Industrial Buildings (300')	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
School, DayCare, Church, Cemetery, Park Parcels (#	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
NRHP Listed/Eligible Strucs./Districts (1500' from edge of R/W)	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
TOTAL	0.0%	0.00	0.00	0.00
WEIGHTED TOTAL		0.00	0.00	0.00
Natural	14%			
Natural Forests (Acres)	44.2%	1.00	0.92	0.00
Weighted		0.44	0.41	0.00
Stream/River Crossings	12.4%	0.00	0.00	1.00
Weighted		0.00	0.00	0.12
Wetland Areas (Acres)	43.4%	1.00	0.00	0.00
Weighted		0.43	0.00	0.00
Floodplain Areas (Acres)	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
TOTAL	100.0%	0.88	0.41	0.12
WEIGHTED TOTAL		0.12	0.06	0.02
Engineering	72%			
Percent of Rebuild with Existing T/L*	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
Percent of Co-location with Existing TL*	79.0%	0.99	1.00	0.00
Weighted		0.78	0.79	0.00
Total Project Costs	21.0%	1.00	0.99	0.00
Weighted		0.21	0.21	0.00
TOTAL	100.0%	0.99	1.00	0.00
WEIGHTED TOTAL		0.71	0.72	0.00
SUM OF WEIGHTED TOTALS		0.84	0.78	0.02
RANK		3	2	1
* Inverted for calculations	Lowest Number is Best			

TABLE 19: ALTERNATE ROUTE EVALUATION MATRIX EMPHASIS ON ENGINEERING CONSIDERATIONS FOR LAM 2

FOR ALL ROUTES	Weights		
RANK		2	1
Built	14%	Route A	Route B
Segments			
Feature		Unit	Unit
Relocated Residences	0.0%	0.00	0.00
Weighted		0.00	0.00
Proximity to Residences (300')	53.5%	1.00	0.00
Weighted		0.54	0.00
Proposed Developments	0.0%	0.00	0.00
Weighted		0.00	0.00
Proximity to Commercial Buildings (300')	0.0%	0.00	0.00
Weighted		0.00	0.00
Proximity to Industrial Buildings (300')	0.0%	0.00	0.00
Weighted		0.00	0.00
School, DayCare, Church, Cemetery, Park Parcels (#	0.0%	0.00	0.00
Weighted		0.00	0.00
NRHP Listed/Eligible Strucs./Districts (1500' from edge of R/W)	46.5%	1.00	0.00
		0.47	0.00
TOTAL	100.0%	1.00	0.00
WEIGHTED TOTAL		0.14	0.00
Natural	14%		
Natural Forests (Acres)	78.1%	0.00	1.00
Weighted		0.00	0.78
Stream/River Crossings	21.9%	1.00	0.00
Weighted		0.22	0.00
Wetland Areas (Acres)	0.0%	0.00	0.00
Weighted		0.00	0.00
Floodplain Areas (Acres)	0.0%	0.00	0.00
Weighted		0.00	0.00
TOTAL	100.0%	0.22	0.78
WEIGHTED TOTAL		0.03	0.11
Engineering	72%		
Percent of Rebuild with Existing T/L*	0.0%	0.00	0.00
Weighted		0.00	0.00
Percent of Co-location with Existing TL*	79.0%	1.00	0.00
Weighted		0.79	0.00
Total Project Costs	21.0%	0.00	1.00
Weighted		0.00	0.21
TOTAL	100.0%	0.79	0.21
WEIGHTED TOTAL		0.57	0.15
SUM OF WEIGHTED TOTALS		0.74	0.26
RANK		2	1

* Inverted for calculations

Lowest Number is Best

5. Emphasis on Natural Environment

TABLE 20: ALTERNATE ROUTE EVALUATION MATRIX EMPHASIS ON NATURAL ENVIRONMENT FOR LAM 2

FOR ALL ROUTES	Weights			
RANK		3	2	1
Built	14%	Route C	Route D	Route E
Segments				
Feature		Unit	Unit	Unit
Relocated Residences	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
Proximity to Residences (300')	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
Proposed Developments	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
Proximity to Commercial Buildings (300')	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
Proximity to Industrial Buildings (300')	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
School, DayCare, Church, Cemetery, Park Parcels	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
NRHP Listed/Eligible Strucs./Districts (1500' from edge of R/W)	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
TOTAL	0.0%	0.00	0.00	0.00
WEIGHTED TOTAL		0.00	0.00	0.00
Natural	72%			
Natural Forests (Acres)	44.2%	1.00	0.92	0.00
Weighted		0.44	0.41	0.00
Stream/River Crossings	12.4%	0.00	0.00	1.00
Weighted		0.00	0.00	0.12
Wetland Areas (Acres)	43.4%	1.00	0.00	0.00
Weighted		0.43	0.00	0.00
Floodplain Areas (Acres)	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
TOTAL	100.0%	0.88	0.41	0.12
WEIGHTED TOTAL		0.63	0.29	0.09
Engineering	14%			
Percent of Rebuild with Existing T/L*	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
Percent of Co-location with Existing TL*	79.0%	0.99	1.00	0.00
Weighted		0.78	0.79	0.00
Total Project Costs	21.0%	1.00	0.99	0.00
Weighted		0.21	0.21	0.00
TOTAL	100.0%	0.99	1.00	0.00
WEIGHTED TOTAL		0.14	0.14	0.00
SUM OF WEIGHTED TOTALS		0.77	0.43	0.09
RANK		3	2	1
* Inverted for calculations	Lowest Number is Best			

TABLE 21: ALTERNATE ROUTE EVALUATION MATRIX EMPHASIS ON NATURAL ENVIRONMENT FOR LAM 2

FOR ALL ROUTES	Weights		
RANK		1	2
Built	14%	Route A	Route B
Segments			
Feature		Unit	Unit
Relocated Residences	0.0%	0.00	0.00
Weighted		0.00	0.00
Proximity to Residences (300')	53.5%	1.00	0.00
Weighted		0.54	0.00
Proposed Developments	0.0%	0.00	0.00
Weighted		0.00	0.00
Proximity to Commercial Buildings (300')	0.0%	0.00	0.00
Weighted		0.00	0.00
Proximity to Industrial Buildings (300')	0.0%	0.00	0.00
Weighted		0.00	0.00
School, DayCare, Church, Cemetery, Park Parcels	0.0%	0.00	0.00
Weighted		0.00	0.00
NRHP Listed/Eligible Strucs./Districts (1500' from edge of R/W)	46.5%	1.00	0.00
		0.47	0.00
TOTAL	100.0%	1.00	0.00
WEIGHTED TOTAL		0.14	0.00
Natural	72%		
Natural Forests (Acres)	78.1%	0.00	1.00
Weighted		0.00	0.78
Stream/River Crossings	21.9%	1.00	0.00
Weighted		0.22	0.00
Wetland Areas (Acres)	0.0%	0.00	0.00
Weighted		0.00	0.00
Floodplain Areas (Acres)	0.0%	0.00	0.00
Weighted		0.00	0.00
TOTAL	100.0%	0.22	0.78
WEIGHTED TOTAL		0.16	0.56
Engineering	14%		
Percent of Rebuild with Existing T/L*	0.0%	0.00	0.00
Weighted		0.00	0.00
Percent of Co-location with Existing TL*	79.0%	1.00	0.00
Weighted		0.79	0.00
Total Project Costs	21.0%	0.00	1.00
Weighted		0.00	0.21
TOTAL	100.0%	0.79	0.21
WEIGHTED TOTAL		0.11	0.03
SUM OF WEIGHTED TOTALS		0.41	0.59
RANK		1	2
* Inverted for calculations	Lowest Number is Best		

6. Emphasis on Built Environment

TABLE 22: ALTERNATE ROUTE EVALUATION MATRIX EMPHASIS ON BUILT ENVIRONMENT FOR LAM 1

FOR ALL ROUTES	Weights			
RANK		3	2	1
Built	72%	Route C	Route D	Route E
Segments				
Feature		Unit	Unit	Unit
Relocated Residences	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
Proximity to Residences (300')	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
Proposed Developments	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
Proximity to Commercial Buildings (300')	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
Proximity to Industrial Buildings (300')	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
School, DayCare, Church, Cemetery, Park Parcels (	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
NRHP Listed/Eligible Strucs./Districts (1500' from edge of R/W)	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
TOTAL	0.0%	0.00	0.00	0.00
WEIGHTED TOTAL		0.00	0.00	0.00
Natural	14%			
Natural Forests (Acres)	44.2%	1.00	0.92	0.00
Weighted		0.44	0.41	0.00
Stream/River Crossings	12.4%	0.00	0.00	1.00
Weighted		0.00	0.00	0.12
Wetland Areas (Acres)	43.4%	1.00	0.00	0.00
Weighted		0.43	0.00	0.00
Floodplain Areas (Acres)	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
TOTAL	100.0%	0.88	0.41	0.12
WEIGHTED TOTAL		0.12	0.06	0.02
Engineering	14%			
Percent of Rebuild with Existing T/L*	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
Percent of Co-location with Existing TL*	79.0%	0.99	1.00	0.00
Weighted		0.78	0.79	0.00
Total Project Costs	21.0%	1.00	0.99	0.00
Weighted		0.21	0.21	0.00
TOTAL	100.0%	0.99	1.00	0.00
WEIGHTED TOTAL		0.14	0.14	0.00
SUM OF WEIGHTED TOTALS		0.26	0.20	0.02
RANK		3	2	1
* Inverted for calculations		Lowest Number is Best		

TABLE 23: ALTERNATE ROUTE EVALUATION MATRIX EMPHASIS ON BUILT ENVIRONMENT FOR LAM 2

FOR ALL ROUTES	Weights		
RANK		2	1
Built	72%	Route A	Route B
Segments			
Feature		Unit	Unit
Relocated Residences	0.0%	0.00	0.00
Weighted		0.00	0.00
Proximity to Residences (300')	53.5%	1.00	0.00
Weighted		0.54	0.00
Proposed Developments	0.0%	0.00	0.00
Weighted		0.00	0.00
Proximity to Commercial Buildings (300')	0.0%	0.00	0.00
Weighted		0.00	0.00
Proximity to Industrial Buildings (300')	0.0%	0.00	0.00
Weighted		0.00	0.00
School, DayCare, Church, Cemetery, Park Parcels (	0.0%	0.00	0.00
Weighted		0.00	0.00
NRHP Listed/Eligible Strucs./Districts (1500' from edge of R/W)	46.5%	1.00	0.00
Weighted		0.47	0.00
TOTAL	100.0%	1.00	0.00
WEIGHTED TOTAL		0.72	0.00
Natural	14%		
Natural Forests (Acres)	78.1%	0.00	1.00
Weighted		0.00	0.78
Stream/River Crossings	21.9%	1.00	0.00
Weighted		0.22	0.00
Wetland Areas (Acres)	0.0%	0.00	0.00
Weighted		0.00	0.00
Floodplain Areas (Acres)	0.0%	0.00	0.00
Weighted		0.00	0.00
TOTAL	100.0%	0.22	0.78
WEIGHTED TOTAL		0.03	0.11
Engineering	14%		
Percent of Rebuild with Existing T/L*	0.0%	0.00	0.00
Weighted		0.00	0.00
Percent of Co-location with Existing TL*	79.0%	1.00	0.00
Weighted		0.79	0.00
Total Project Costs	21.0%	0.00	1.00
Weighted		0.00	0.21
TOTAL	100.0%	0.79	0.21
WEIGHTED TOTAL		0.11	0.03
SUM OF WEIGHTED TOTALS		0.86	0.14
RANK		2	1
* Inverted for calculations	Lowest Number is Best		

7. Equal Consideration of Categories (Simple Average)

TABLE 24: ALTERNATE ROUTE EVALUATION MATRIX EQUAL CONSIDERATION OF PERSPECTIVES FOR LAM 1

FOR ALL ROUTES	Weights			
RANK		3	2	1
Built	33%	Route C	Route D	Route E
Segments				
Feature		Unit	Unit	Unit
Relocated Residences	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
Proximity to Residences (300')	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
Proposed Developments	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
Proximity to Commercial Buildings (300')	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
Proximity to Industrial Buildings (300')	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
School, DayCare, Church, Cemetery, Park Parcels	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
NRHP Listed/Eligible Strucs./Districts (1500' from edge of R/W)	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
TOTAL	0.0%	0.00	0.00	0.00
WEIGHTED TOTAL		0.00	0.00	0.00
Natural	33%			
Natural Forests (Acres)	44.2%	1.00	0.92	0.00
Weighted		0.44	0.41	0.00
Stream/River Crossings	12.4%	0.00	0.00	1.00
Weighted		0.00	0.00	0.12
Wetland Areas (Acres)	43.4%	1.00	0.00	0.00
Weighted		0.43	0.00	0.00
Floodplain Areas (Acres)	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
TOTAL	100.0%	0.88	0.41	0.12
WEIGHTED TOTAL		0.29	0.14	0.04
Engineering	33%			
Percent of Rebuild with Existing T/L*	0.0%	0.00	0.00	0.00
Weighted		0.00	0.00	0.00
Percent of Co-location with Existing TL*	79.0%	0.99	1.00	0.00
Weighted		0.78	0.79	0.00
Total Project Costs	21.0%	1.00	0.99	0.00
Weighted		0.21	0.21	0.00
TOTAL	100.0%	0.99	1.00	0.00
WEIGHTED TOTAL		0.33	0.33	0.00
SUM OF WEIGHTED TOTALS		0.62	0.47	0.04
RANK		3	2	1
* Inverted for calculations	Lowest Number is Best			

TABLE 25: ALTERNATE ROUTE EVALUATION MATRIX EQUAL CONSIDERATION OF PERSPECTIVES FOR LAM 2

FOR ALL ROUTES	Weights		
RANK		2	1
Built	33%	Route A	Route B
Segments			
Feature		Unit	Unit
Relocated Residences	0.0%	0.00	0.00
Weighted		0.00	0.00
Proximity to Residences (300')	53.5%	1.00	0.00
Weighted		0.54	0.00
Proposed Developments	0.0%	0.00	0.00
Weighted		0.00	0.00
Proximity to Commercial Buildings (300')	0.0%	0.00	0.00
Weighted		0.00	0.00
Proximity to Industrial Buildings (300')	0.0%	0.00	0.00
Weighted		0.00	0.00
School, DayCare, Church, Cemetery, Park Parcel	0.0%	0.00	0.00
Weighted		0.00	0.00
NRHP Listed/Eligible Strucs /Districts (1500' from edge of R/W)	46.5%	1.00	0.00
		0.47	0.00
TOTAL	100.0%	1.00	0.00
WEIGHTED TOTAL		0.33	0.00
Natural	33%		
Natural Forests (Acres)	78.1%	0.00	1.00
Weighted		0.00	0.78
Stream/River Crossings	21.9%	1.00	0.00
Weighted		0.22	0.00
Wetland Areas (Acres)	0.0%	0.00	0.00
Weighted		0.00	0.00
Floodplain Areas (Acres)	0.0%	0.00	0.00
Weighted		0.00	0.00
TOTAL	100.0%	0.22	0.78
WEIGHTED TOTAL		0.07	0.26
Engineering	33%		
Percent of Rebuild with Existing T/L*	0.0%	0.00	0.00
Weighted		0.00	0.00
Percent of Co-location with Existing TL*	79.0%	1.00	0.00
Weighted		0.79	0.00
Total Project Costs	21.0%	0.00	1.00
Weighted		0.00	0.21
TOTAL	100.0%	0.79	0.21
WEIGHTED TOTAL		0.26	0.07
SUM OF WEIGHTED TOTALS		0.67	0.33
RANK		2	1
* Inverted for calculations	Lowest Number is Best		

8. Overall Scores of Each Route

LAM 1

The Alternate Route Analysis compares Alternate Routes using a standard set of criteria. After evaluating the three routes, and recalling that lower scores better, E scored the best in all categories. It is important to note that routes B and C are similar, both in terms of length and the physical and cultural geography they traverse. Therefore, small differences between these two routes, once normalized, may have inflated effects on the routing analysis.

With respect to the Built Environment, there was only one criterion present within the Study Area which affected the routes. That criterion is "Proximity to Buildings," however, all routes have the same statistics. Therefore, there overall score is equal in terms of only the built features.

Within the Engineering Environment perspective, Route E has less Total Project Costs and has the most co-location opportunity. All are similar in length. Route E had a slightly higher Construction Cost, however, it had a lower Land, Clearing, and Angle costs than both Routes C and D. Route E scored the best according to the Engineering Environment Perspective.

When examining the layers that constitute the Natural Considerations portion of the Alternate Route Analysis, Route E goes though approximately 3 fewer acres Natural Forest compared to Routes C and D. However, Route E crosses two more rivers and streams than Routes C and D. Route C is the only proposed route to cross a wetland. None of the proposed routes came into contact with any floodplain areas. Within the Natural Considerations, Route E scored the best.

The Simple Average portion of the Alternate Route Analysis is an even weighting of all the perspectives. Since there are no Built features in the Study area affecting these three proposed routes, the Simple Average just utilized the Natural and Engineering statistics. Route E scored the best in both the Natural and Engineering perspective, since the only feature that affected it was the stream/river crossings.

LAM 2

Route B had the best overall score. These proposed routes go through relatively different sections of the Study Area and the statistics display that accordingly.

The Built Environment had only two criteria present affecting the proposed routes, proximity to residences and NRHP listed/eligible structures/district. Route A was within proximity of one more residence and two more NRHP listed/eligible

structures/districts. Therefore, Route B had the better score in regards to the Built Environment.

In the Engineering perspective, Route B is 0.09 miles shorter then Route A. Neither proposed route had any miles for potential Rebuild of Existing Transmission Line. Route B had a small co-location opportunity that helped bolster its score. Route A was less expensive in all of the Total Project Costs criteria except for the Construction cost. Route B was approximately $9,000 less than Route A. Route B had the better score in the Engineering perspective.

Route A and Route B evenly split the two criteria present in the Natural perspective. Route A has 0.41 acres of natural forests less than Route B, while Route B has one less stream/river crossing. However, due to the weights assigned to these two features, Route A had the better score in the Natural perspective.

The Simple Average portion of the Alternate Route Analysis is an even weighting of all the perspectives. Route B had the better score in the Built and Engineering perspectives, while Route A had the better score in the Natural perspective. Therefore, Route B had the better overall Simple Average score.

Figure 40-41 compares the results of the Natural Environment and Engineering Considerations analysis in tabular and graphical forms.

FIGURE 40: COMPARISON OF THE ROUTES FOR LAM 1

	Route C	Route D	Route E
Built	0.26	0.20	0.02
Engineering	0.84	0.78	0.02
Natural	0.77	0.43	0.09
Simple	0.62	0.47	0.04

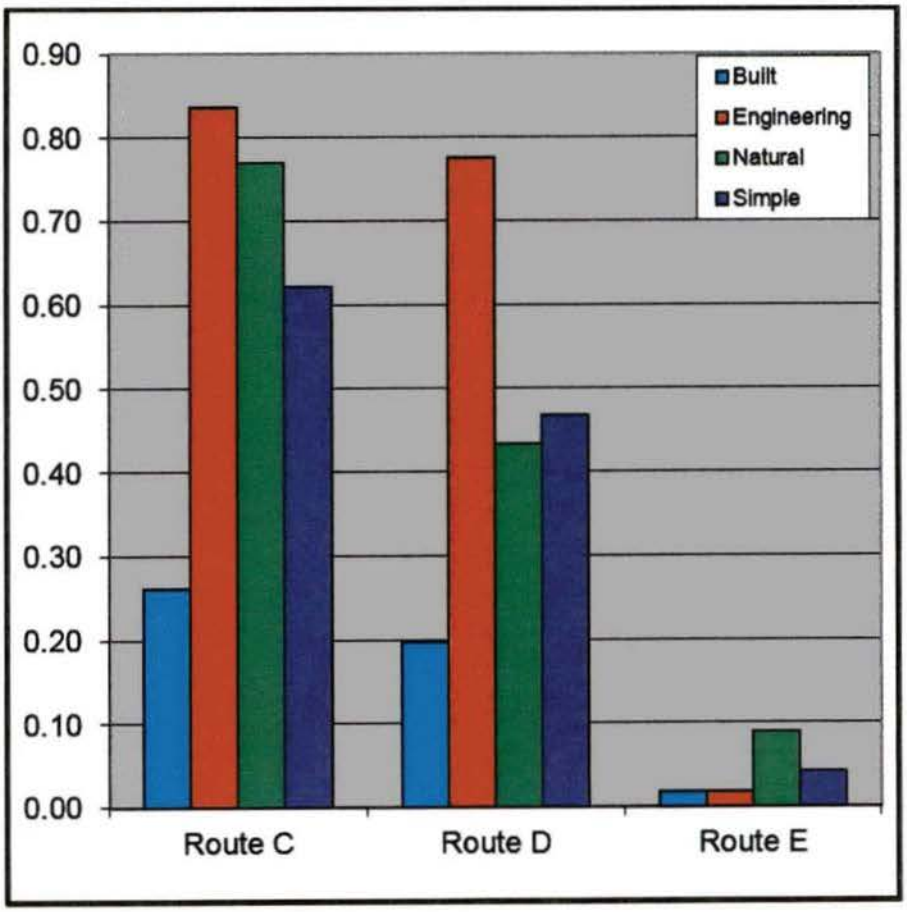
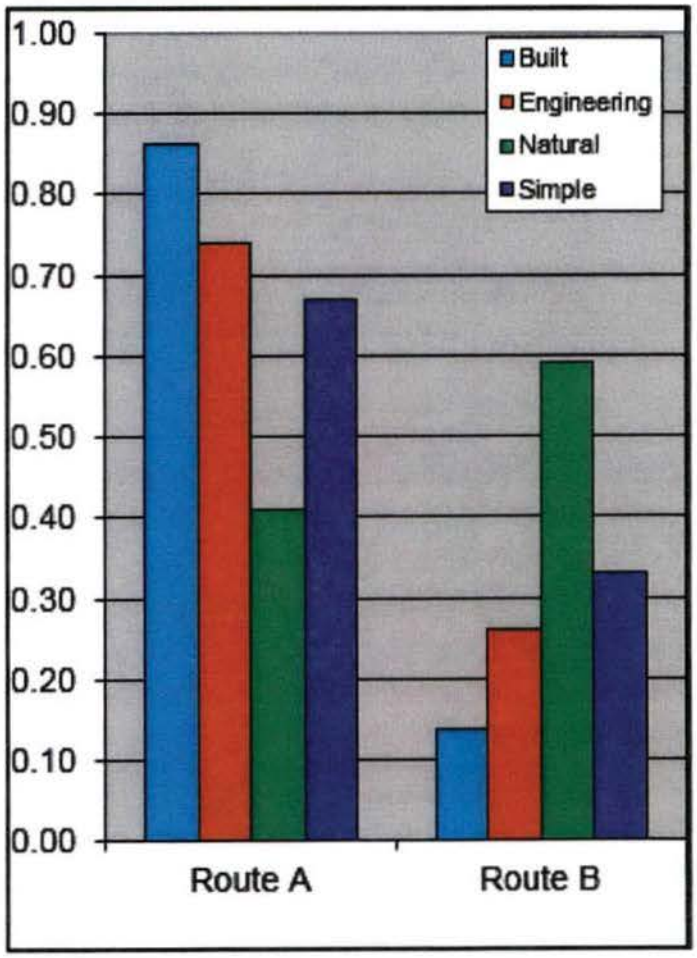


FIGURE 41: COMPARISON OF THE ROUTES FOR LAM 2

	Route A	Route B
Built	0.86	0.14
Engineering	0.74	0.26
Natural	0.41	0.59
Simple	0.67	0.33



At the conclusion of the Alternate Route Analysis, the top routes are carried over into the Expert Judgment phase of the siting process. The top routes are analyzed by the project team using a new set of criteria. This analysis identifies the Preferred Route. Because only three routes were considered during the Alternate Route Analysis for LAM 1 and only two routes for LAM 2, all were carried over into the Expert Judgment phase.

It is important to note that the routes considered in these analyses may not exactly match the constructed line. Adjustments may be made during centerlining, surveying, land acquisition, and design activities, resulting in slight alterations or adjustments to the statistics.

9. Route Descriptions

Route A (LAM 2)

Route A leaves the Coleman EHV substation site going northeast then turning at a 90 degree angle to the northwest. After a slight slant to the west, the route continues for 0.78 miles until it turns sharply to the southwest. The route then goes 0.61 miles before turning due west and then proceeds 0.5 miles at the final turn in a southwestern fashion to end at LAM 2.

Route B (LAM 2)

Route B exits the Coleman EHV substation site on the opposite side from where Route A exited. The route goes in a southwestern orientation for 0.25 miles before following the existing right-of way for another 0.58 miles. Then the route turns towards the northwest until it passes the waterbody to the east of the Aleris Aluminum Mill. At that point, the route turns and progresses in a westward direction for 0.37 miles. The route turns once more in a southwestern direction to finish at LAM 2.

Route C (LAM 1)

Route C exits the Coleman EHV substation site going in a northwest direction before making two 90 degree turns to go in the opposite direction. The route then goes 0.39 miles before it intersects the existing right-of-way and follows that for 0.59 miles. The route then crosses the railroad the changes directions to go southwest for 0.54 miles. The route then takes a sharp turn to go northwest and finish at LAM 1.

Route D (LAM 1)

Route D follows the exact same progression as Route C does until after the existing right-of-way. At that point, Route D goes 0.03 miles further north and changes directions to go in a southwestern direction. This continues until a sharp turn is made after 0.54 miles to go into LAM 1 in a northwestern direction.

Route E (LAM 1)

Route E uses the same path as Routes C and D until the beginning of the existing right-of-way. Route E goes about 0.04 miles further south than Routes C and D. The route goes in a west fashion following the right-of-way until a slant is made after 0.62 miles. This slant goes in a southwestern direction and continues until a sharp northwestern turn is made to go into LAM 1.

10. Expert Judgment

In the Expert Judgment phase, the team considers factors that do not readily lend themselves to quantification but which are nevertheless important in the selection of a preferred route. Each factor is assigned a percentage weight by the project team based on its overall importance. The judgments are derived from the project team's awareness of the project area, particularly its geographical and sociological makeup. Any comments from the public and/or elected officials that have been provided during the routing process are considered. The selected routes are then discussed, reviewed, compared. Each route receives a value between 1 and 3, with lower values indicating higher suitability

LAM 1

1. **Visual (5%)**
   Visual concerns are defined as those considerations pertaining to the preservation of existing views within the project study area.

   - There are few occupied houses along any of the 3 proposed routes.
   - Routes C, D, and E all had equal values in the Built environment.
   - Routes C, D, and E received an Expert Judgment value of "1" for Visual concerns.

2. **Community (15%)**
   Community concerns are defined as those considerations that encompass the non-visual concerns of a new transmission line. This includes consideration of the impact of a new transmission line on the existing land uses in the study area.

   - The project team determined there were no significant Community Concerns associated with Routes C, D, and E. Thus, they all received Expert Judgment values of "1" for Community issues.

3. **Project Management (15%)**
Project Management concerns are defined as those considerations with the potential to drive up project cost and delay the project schedule. Overall length, total project cost, crossing or paralleling existing linear infrastructure, permitting, stream crossings, and number of required easements are considered under Project Management.

- Route E has an extra transmission line crossing that contributes to a higher cost.
- Routes D and E are impacted by a small wetland.
- Route E does not have any double circuit opportunity, but Routes C and D cross a railroad to the north.
- Route E received an Expert Judgment value of "3" for Project Management, Route D got an Expert Judgment value of "1", and Route C got an Expert Judgment value of "2".

4. **Special Permit (5%)**
Some routes require special permitting for crossing or paralleling existing features. These features include railroads, state roads, existing transmission lines owned by other companies, and existing gas pipelines. All routes would require a Certificate of Public Convenience and Necessity from the Kentucky Public Service Commission.

- Routes C, D, and E would need special permits to cross the railroad.
- Route E would also need special permits for the extra transmission line crossing.
- Route C and D got Expert Judgment values of "2" for Special Permit issues, while Route E got an Expert Judgment Value of "3" for Special Permit issues.

5. **Accessibility (10%)**
Accessibility concerns are those considerations pertaining to the ease with which the new transmission line route may be accessed during construction and maintenance.

- Routes C, D, and E all have similar surroundings as it pertains to accessibility.
- Routes C, D, and E all got an Expert Judgment value of "1" for Accessibility issues.

6. **Reliability (10%)**
   Reliability concerns arise from natural (weather) or human (accidents) sources which may cause outages on the new transmission line or on the entire area electrical grid.

   - Route E has an extra transmission line crossing compared to Routes D and C.
   - Route E got an Expert Judgment value of "3" for Reliability issues.
   - Route D does not have any reliability issues, so it received an Expert Judgment value of "1" for Reliability issues.
   - Route C received an Expert Judgment value of "2" for Reliability issues because it is better than Route E, but worse than Route D.

7. **Maintenance Cost (15%)**
   Maintenance Cost concerns are defined as those considerations with the potential to contribute to the cost of maintaining a transmission line after construction. Length and forests were considered, among other factors.

   - Route D is further away from the railroad compared to routes C and E, and there are no administration fees to cut trees in the railroad easement.
   - Route E received an Expert Judgment value of "3" since it has a double circuit opportunity, this would mean that there is more maintenance needed on this line then Routes C and D.
   - Route D got an Expert Judgment value of "1" for Maintenance Costs, while Route C received an Expert Judgment value of "2" for Maintenance Costs since it crosses a railroad.

8. **Double Circuit Opportunity (15%)**
   The Double Circuit Opportunity is how capable a route is to be circuited with another transmission line. This would allow for less right-of-way maintenance, less installation/construction costs, and less impacts to property owners. There would also be less of a negative impact of the Indiana Bat population.

   - Route E has no co-location opportunities, while Routes C and D do.
   - Route E was given an Expert Judgment value of "3" for the Double Circuit Opportunity.
   - Routes C and D have co-location opportunities, thus they received Expert Judgment values of "1" for Double Circuit Opportunities.

LAM 2

1. **Visual (5%)**
   Visual concerns are defined as those considerations pertaining to the preservation of existing views within the project study area.

   - There are few occupied houses along the two proposed routes.
   - Route A had two NRHP structures and one occupied house that would be affected by this line.
   - Route A received an Expert Judgment value of "3"for Visual concerns and Route B got an Expert Judgment value of "1" for Visual concerns.

2. **Community (15%)**
   Community concerns are defined as those considerations that encompass the non-visual impacts of a new transmission line. This includes consideration of the impact of a new transmission line on the existing land uses in the study area.

   - Route A is within a buffer from occupied houses and NRHP structures, while Route B does not have any considerations within a buffer.
   - Route A received an Expert Judgment value of "3" and Route B received an Expert Judgment value of "1" for Community issues.

3. **Project Management (15%)**
   Project Management concerns are defined as those considerations with the potential to drive up project cost and delay the project schedule. Overall length, total project cost, crossing or paralleling existing linear infrastructure, permitting, stream crossings, and number of required easements are considered under Project Management.

   - Route A's schedule will be impacted by the negotiation with property owners.
   - Property owners will be nearer to Route A than Route B.
   - Route A will be cheaper to build, but does not have any double-circuit capability.
   - Railroad crossings on Route B have an effect on cost, but shouldn't delay construction.
   - Route A received an Expert Judgment value of "3" for Project Management issues, while Route B got an Expert Judgment value of "1" for Project Management issues.

4. **Special Permit Issues**
   Some routes require special permitting for crossing or paralleling existing features. These features include the railroads, state roads, existing transmission lines owned by other companies, and existing gas pipelines. All routes would require a Certificate of Public Convenience and Necessity from the Kentucky Public Service Commission.

   - Both Routes A and B would need an FAA permit, while only Route B would need a special permit from the railroad.
   - Route A received an Expert Judgment value of "1" for Special Permit issues, while Route B received an Expert Judgment value of "3" for Special permit issues.

5. **Accessibility (10%)**
   Accessibility concerns are those considerations pertaining to the ease with which the new transmission line route may be accessed during construction and maintenance.

   - There are no wetlands that would hinder any access to the routes, based on their location.
   - Routes A and B both go through similar land use patterns and are similar distances from roads.
   - Route A received an Expert Judgment value of "2" for Accessibility issues, while Route B also received an Expert Judgment value of "2" for Accessibility issues.

6. **Reliability (10%)**
   Reliability concerns arise from natural (weather) or human (accidents) sources which may cause outages on the new transmission line or on the entire area electrical grid.

   - Route A crosses distribution lines and is longer, which means it has a higher likelihood of lightning strikes compared to Route B.
   - Route B crosses a transmission line and a railroad.
   - Route A received an Expert Judgment value of "2" for Reliability issues, while Route B got an Expert Judgment value of "3" for Reliability issues.

7. **Maintenance Cost (15%)**
   Maintenance Cost concerns are defined as those considerations with the potential to contribute to the cost of maintaining a transmission line after construction. Length and forests were considered, among other factors.

   - Route A is longer than Route B and Route A has a double circuit opportunity.
   - Route A received an Expert Judgment value of "3" for Maintenance Costs, while Route B got an Expert Judgment value of "1" for Maintenance Costs.

8. **Double Circuit Opportunity (15%)**
   The Double Circuit Opportunity is how capable a route is to be circuited with another transmission line. This would allow or less right-of-way maintenance, less installation/construction costs, and less impacts to property owners. There would also be less of a negative impact of the Indiana Bat population.

   - Route A has no Double Circuit Opportunity, so it received an Expert Judgment value of "3".
   - Route B has a Double Circuit Opportunity and got an Expert Judgment value of "1".

Table 22 summarizes the relative values that each Alternate Route received in each the Expert Judgment analysis. After completing the Expert Judgment exercise, Routes B and D emerged as the best scoring routes. That is, Route B and Route D had a lower (better) overall impact score than Routes A, C, and E. Route B is the preferred route for the LAM 2 and Route D is the preferred route for LAM 1.

TABLE 26: EXPERT JUDGMENT MATRIX FOR LAM 1

EXPERT JUDGMENT TABLE	1 = Low Impact	2 = Med. Impact	3 = High Impact	
	Per Project	Route C	Route D	Route E
Visual Issues	5%	1	1	1
Weighted		0.05	0.05	0.05
Community Issues (relocation, prox. Homes, property owner impacts)	15%	1	1	1
Weighted		0.15	0.15	0.15
Project Management (Sch, Cost)	15%	2	1	3
Weighted		0.3	0.15	0.45
Special Permit Issues	5%	2	2	3
Weighted		0.1	0.1	0.15
Accessibility (Construction/Maintenance)	10%	1	1	1
Weighted		0.1	0.1	0.1
Reliability	20%	2	1	3
Weighted		0.4	0.2	0.6
Maintenance Cost (Forest, length)	15%	2	1	3
Weighted		0.3	0.15	0.45
Double Circuit Opportunities	15%	1	1	3
Weighted		0.15	0.15	0.45
TOTAL				
	100%	1.55	1.05	2.4

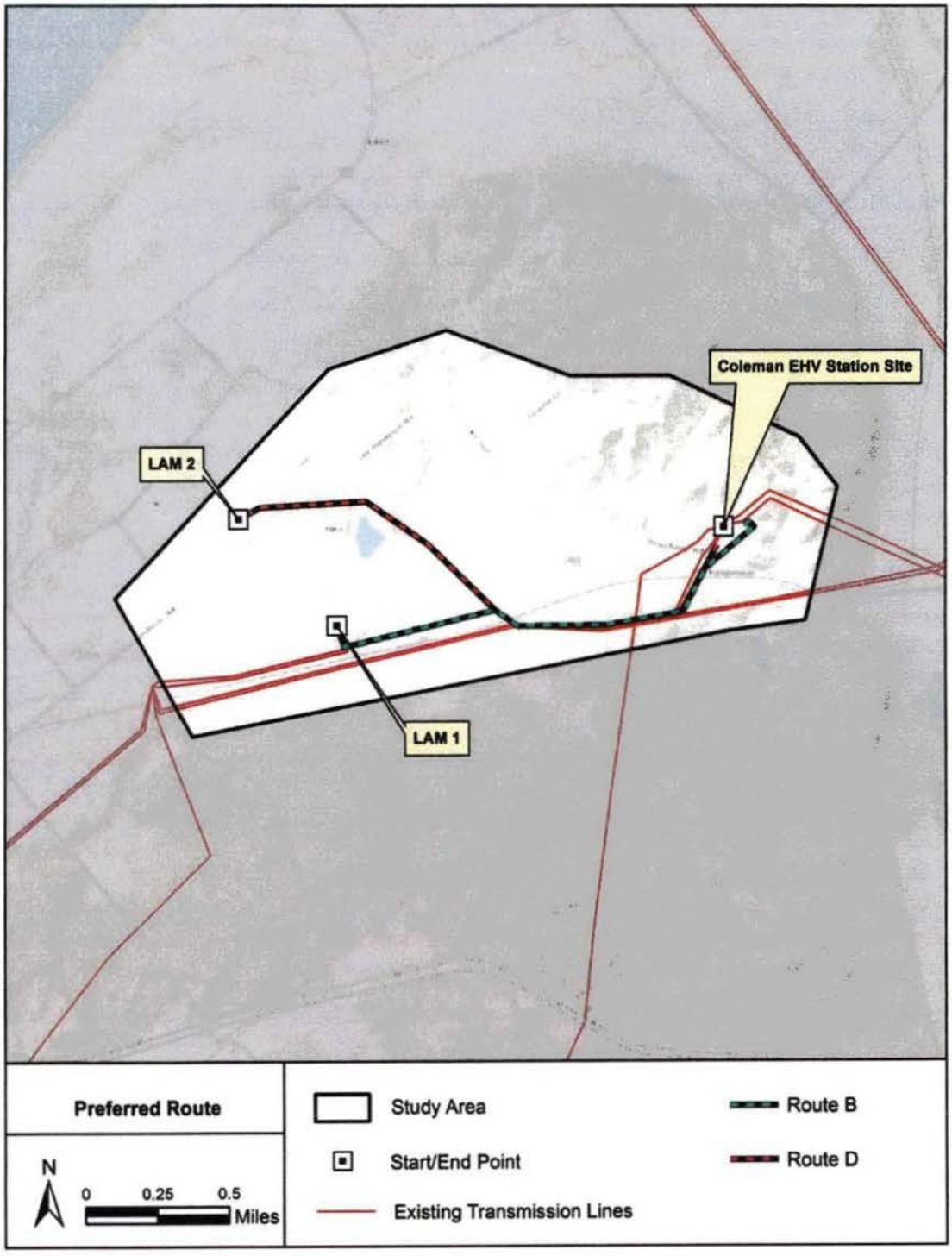
TABLE 27: EXPERT JUDGMENT MATRIX FOR LAM 1

EXPERT JUDGMENT TABLE	1 = Low Impact	2 = Med. Impact	3 = High Impact
	Per Project	Route A	Route B
Visual Issues	5%	3	1
Weighted		0.15	0.05
Community Issues (relocation, prox. Homes, property owner impacts)	15%	3	1
Weighted		0.45	0.15
Project Management (Sch, Cost)	15%	3	1
Weighted		0.45	0.15
Special Permit Issues	5%	1	3
Weighted		0.05	0.15
Accessibility (Construction/Maintenance)	10%	2	2
Weighted		0.2	0.2
Reliability	20%	2	3
Weighted		0.4	0.6
Maintenance Cost (Forest, length)	15%	3	1
Weighted		0.45	0.15
Double Circuit Opportunities	15%	3	1
Weighted		0.45	0.15
TOTAL			
	100%	2.6	1.6

Part XI: Conclusion

This study is based on the EPRI-GTC siting methodology as calibrated for use in the Commonwealth of Kentucky. This study has identified two preferred routes for a new dual 161 kV transmission line right-of-way connecting the Coleman EHV substation site to LAM 1 and LAM 2. Through the application of the Kentucky Model, the BREC project team has demonstrated that the preferred routes, Route B and D, are reasonable routes for the construction of the new transmission lines.

FIGURE 42: PREFERRED ROUTE



Part XII: References

EPRI-GTC Overhead Electric Transmission Line Siting Methodology. Electric Power Research Institute, Palo Alto, CA, and Georgia Transmission Corporation, Tucker, GA: 2006. EPRI Document 1013080.

Kentucky Transmission Line Siting Methodology. Electric Power Research Institute, Palo Alto, CA, Kentucky Power Cooperative, Winchester, KY, and E.ON U.S., Louisville, KY: 2007. EPRI Document 1016198.

U.S. Census Bureau State and County Quick Facts

http://quickfacts.census.gov/qfd/states/

Kentucky Geological Survey, University of Kentucky

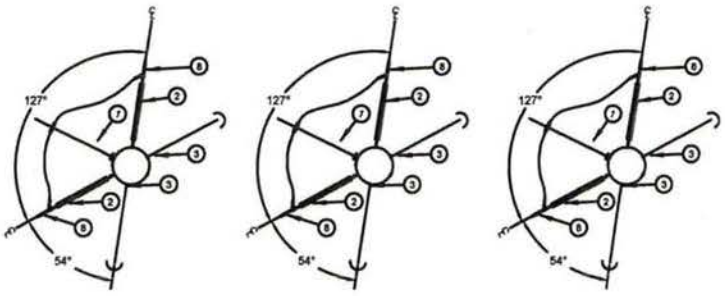
http://www.uky.edu/KGS/geoky/regionbluegrass.htm

Woods, A.J., Omernik, J.M., Martin, W.H., Pond, G.J., Andrews, W.M., Call, S.M, Comstock, J.A., and Taylor, D.D., 2002, Ecoregions of Kentucky (color poster with map, descriptive text, summary tables, and photographs): Reston, VA., U.S. Geological Survey (map scale 1:1,000,000). ftp://ftp.epa.gov/wed/ecoregions/ky/ky_eco_lg.pdf

McMahon, Gerard, Gregonis, S.M., Waltman, S.W., Omernik, J.M., Thorson, T.D., Freeouf, J.A., Rorick, A.H., and Keys, J.E., 2001, "Developing a spatial framework of common ecological regions for the conterminous United States." Environmental Management, v. 28, no. 3, p. 293-316.

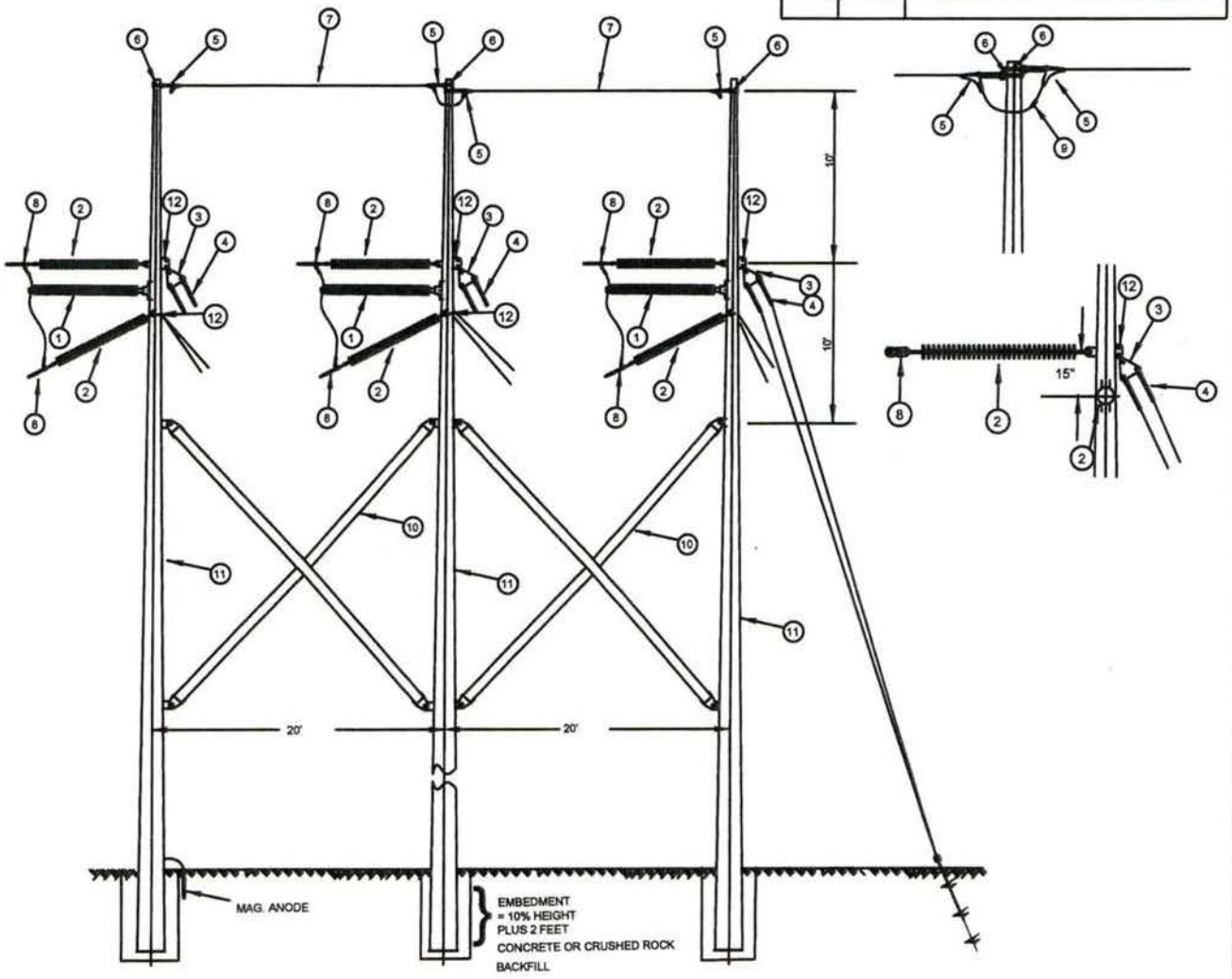
Hermes, Kim; Slone, Tim; Wethington, Traci; and Deborah White. Kentucky's Threatened and Endangered Species. Frankfort, KY: Kentucky Department of Fish and Wildlife Resources and Kentucky State Nature Preserves Commission, 1998, Revised 2001.

TOP -DOWN VIEW



ALL GUY LEADS ARE TO BE AT LEAST 50 FEET FROM THE POLES BOTH BACK AND AHEAD IN-LINE

LIST OF MATERIALS		
ITEM	QTY	DESCRIPTION
1	3	161 Kv HORIZONTAL POST (JUMPER SUPPORT)
2	6	161 Kv DEAD-END POLY INSULATOR
3	6	TG=92 TYPE 2 GUY PLATE ASSEMBLY
4	9	GUY GRIPS (SETS)
5	4	3/8 " OPGW OHSW DEAD-END ASSEMBLY
6	4	7/8" SHOULDER EYE BOLTS
7	30' or 40 '	POLE TOP 3/8" H.S.S. GROUND TIE
8	6	795 KCM ACSS HI-TEMP COMPRESSION DEAD-END ASSY.
9	3	3 BOLT CLAMP
10	2	X-BRACE ASSY
11	3	LD5 (H4) STEEL POLE : REQUIRED HEIGHT
12	12	WELDED THRU-VANG OR TG-27D GUYING & DEAD-END T

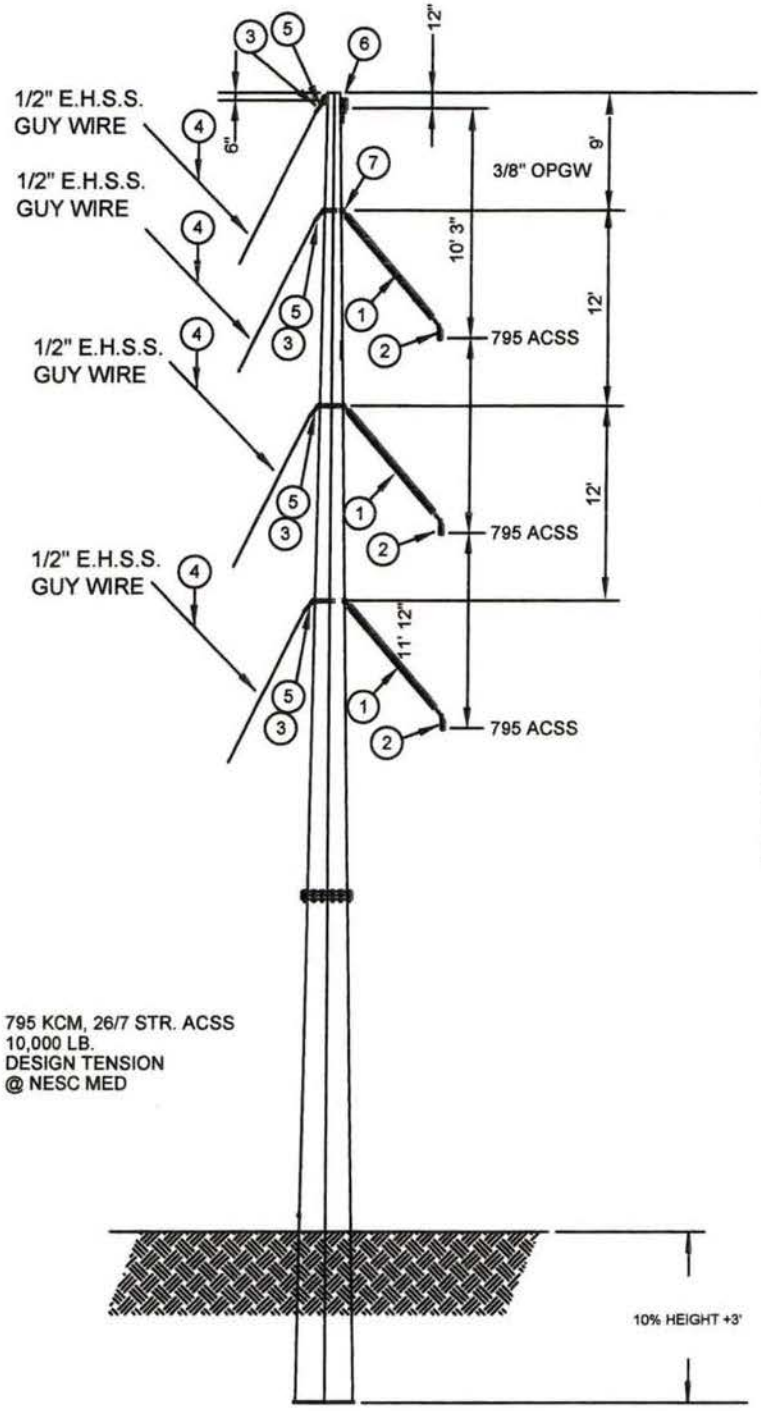


Big Rivers Electric Corporation — Your Touchstone Energy Cooperative

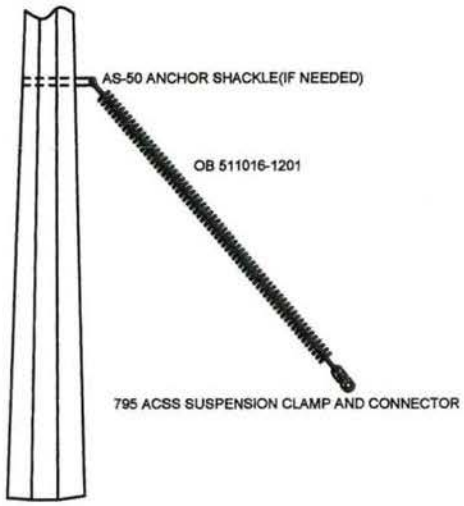
TSH-15-DEXX 3-POLE STEEL DOUBLE DEAD END STRUCTURE		C.D.Rector
	LINES : 6-D, 3-K and 3-L	2/10/2015

LIST OF MATERIAL

ITEM	QTY.	DESCRIPTION
1	3	OHIO BRASS POLYMER HI-LITE
		INSULATOR WITH Y-CLEVIS/BALL END FITTING
		OB (51106-1001)
2	3	795 KCM ACSS HI TEMP CONDUCTOR SUSPENSION CLAMPS/
		WITH CONNECTOR
3	6	PREFORMED GUY GRIPS FOR 1/2" E.H.S.S.
4	4	1/2" E.H.S.S. GUY WIRES
5	4	GUY GRIP ATTACH TO- TRIANGULAR GUY PLATES WITH
		ROLLERS, NUTS & DEEP THROAT ANCHOR SHACKEL
6	1	3/8" H.S.S. SUSPENSION CLAMPS/CONNECTOR
7	3	INSULATOR ATTACHMENT VANG



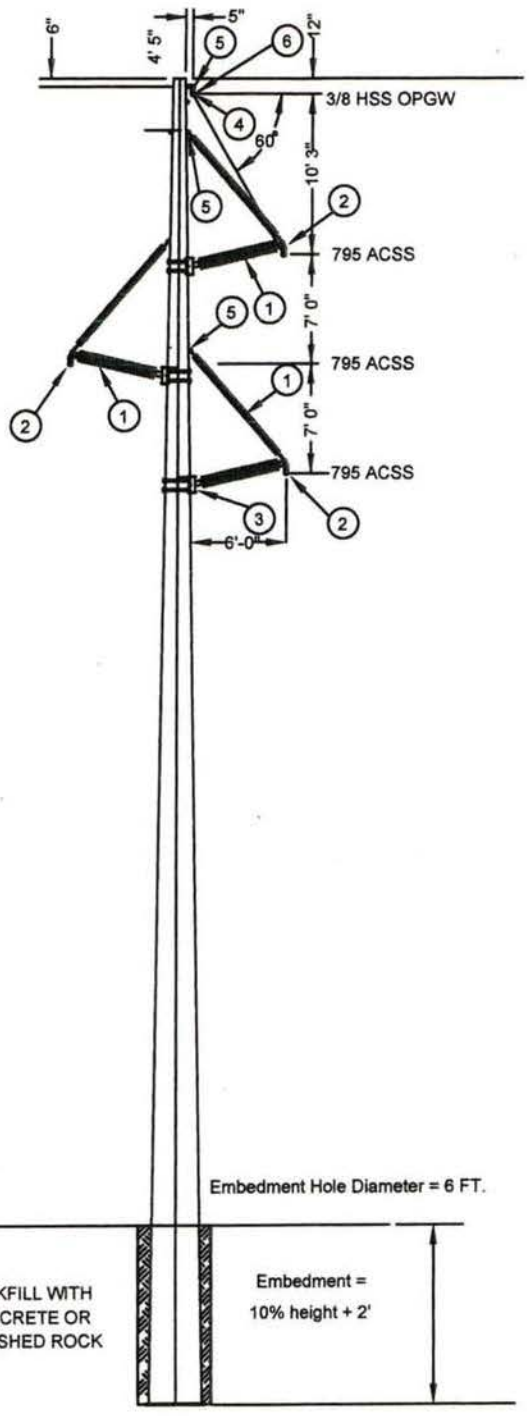
GUYED LARGE ANGLE 161 KV LINES 3-K AND 3-L



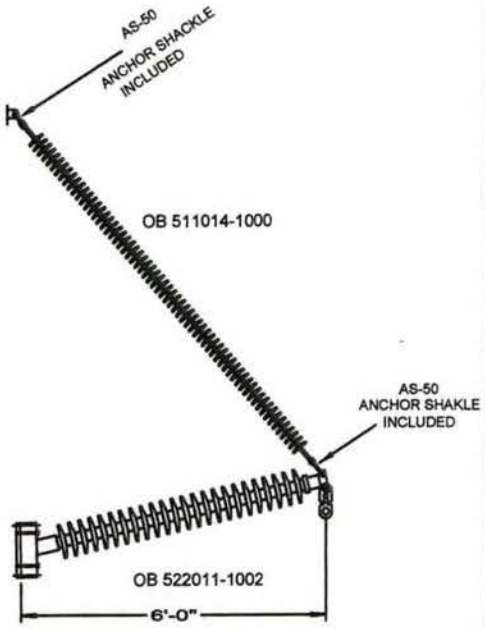
795 KCM 26/7 STR. ACSS HI-TEMP CONDUCTOR
10,000 LB. DESIGN TENSION @ NESC MED

Big Rivers ELECTRIC CORPORATION
Your Touchstone Energy Cooperative

TSS-161-LA	
GUYED LARGE ANGLE SINGLE CIRCUIT	
CDRector	2-5-2015

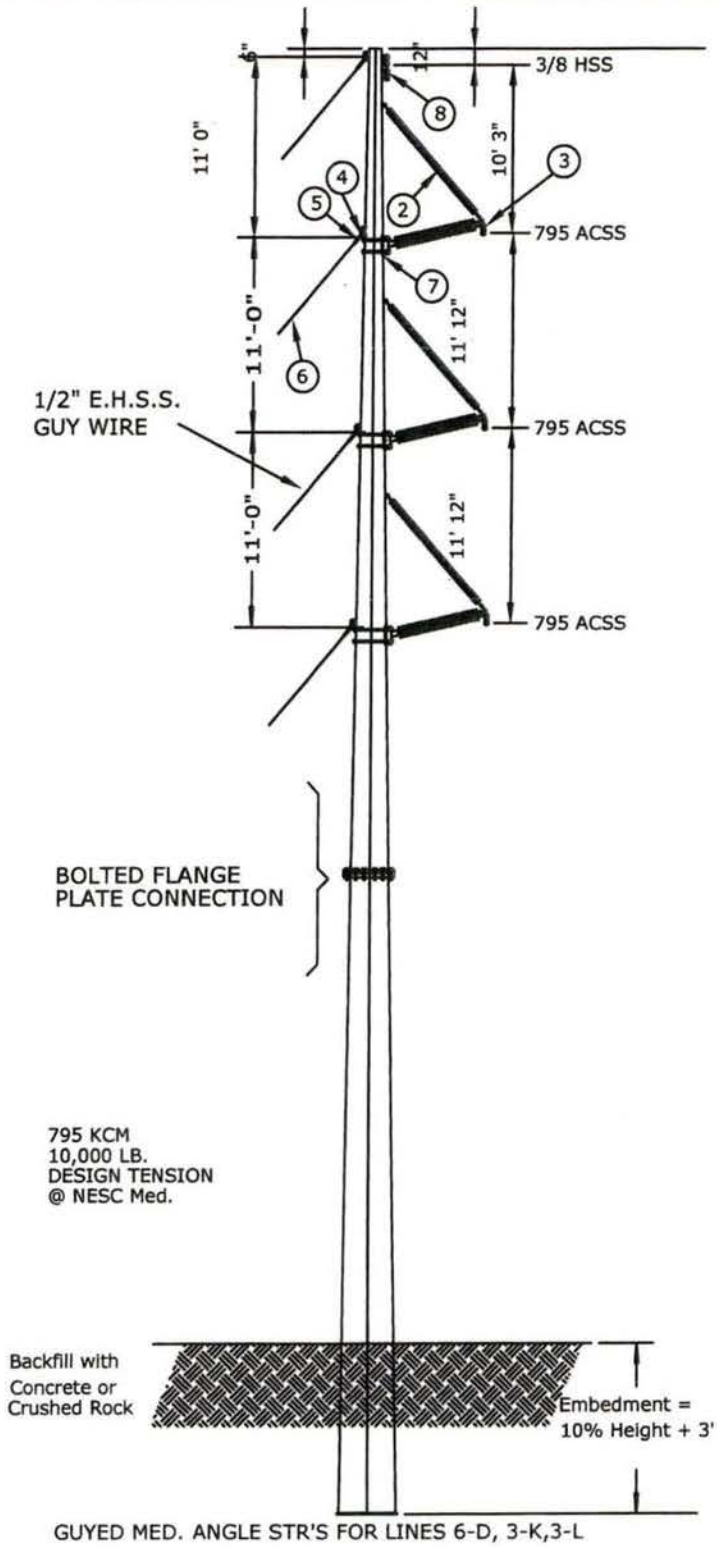


LIST OF MATERIALS		
ITEM	QTY	DESCRIPTION
1	6	BRACED POST INSULATOR EQIV. TO HUBBELL 234226-3001 WITH (2) AS-50 ANCHOR SHACKLES
2	6	795 KCM ACSS, 26/7 STR., HI TEMP CONDUCTOR SUSPENSION CLAMP WITH CONNECTOR
3	12	7/8 in. X VARIOUS LENGTH MACHINE BOLT WITH NUT/WASHER
4	1	3/8" H.S.S. SUSPENSION CLAMP
5	4	ATTACHMENT THRU-VANG FOR SUSPENSION INSULATOR
6	1	ANCHOR SHACKLE TO CONNECT 3/8" SUSPENSION CLAMP



Big Rivers ELECTRIC CORPORATION — Your Touchstone Energy Cooperative

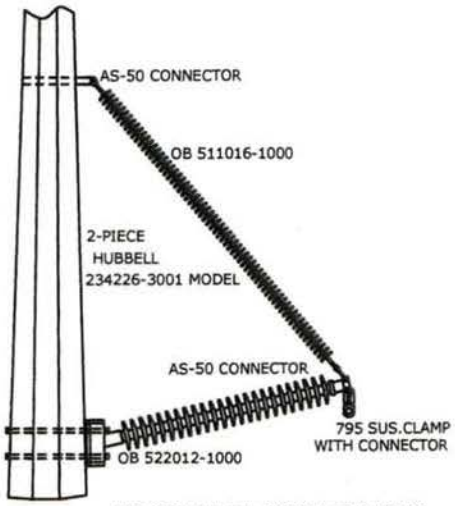
TSP-161 STEEL POLE TANGENT	C.D.Rector
161 kV Lines:6-D, 3-K,3-L	Rev 2-10-15



GUYED MED. ANGLE STR'S FOR LINES 6-D, 3-K,3-L

LIST OF MATERIAL

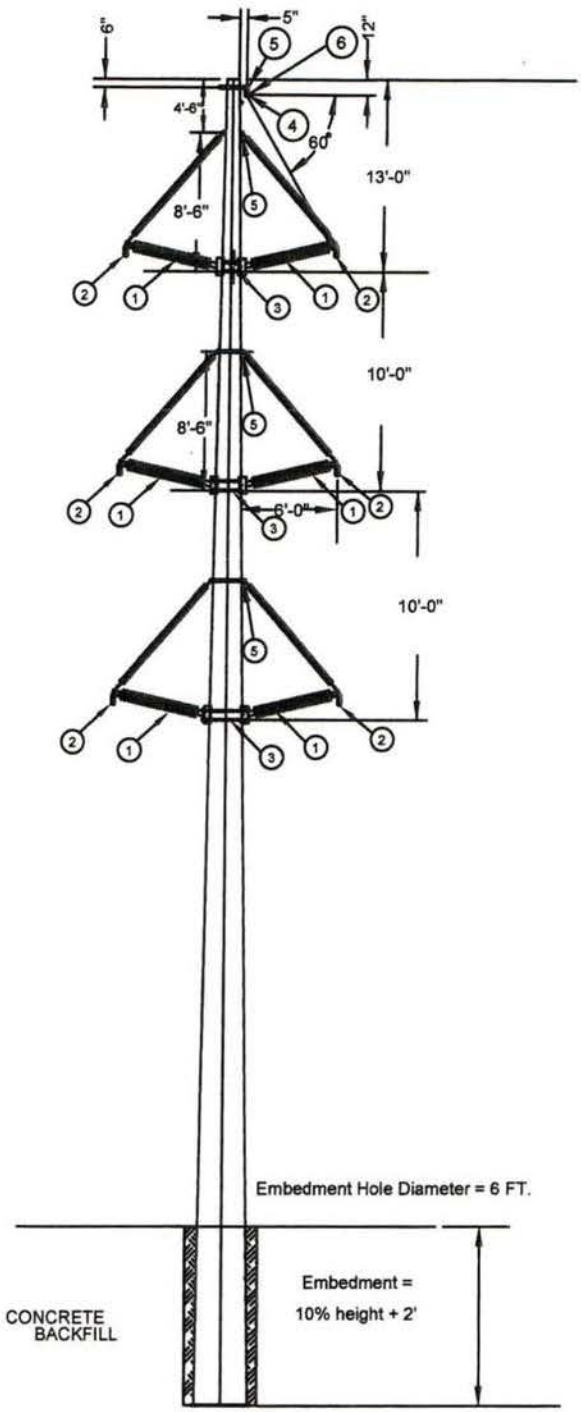
ITEM	QTY.	DESCRIPTION
1	3	OHIO BRASS POLYMER HI-LITE BRACED POST
		INSULATOR WITH TEAR DROP END FITTING
		OB 522012-1000
2	3	OHIO BRASS POLYMER INSULATOR CAT. NO.
		OB 511016-1000 (Y-CLEVIS END FITTING)
3	3	795 KCM ACSS SUSPENSION CLAMPS/
		WITH CONNECTOR AND AS-50 ANCHOR SHACKLES
4	6	GUY GRIPS ATTACHEMENT- ANCHOR SHACKEL
		WITH GUY PLATES, ROLLERS AND NUT
5	8	PREFORMED GUY GRIPS FOR 1/2" E.H.S.S.
6	4	1/2" E.H.S.S. GUY WIRES
7	4	7/8 " GALV. MACHINE BOLTS WITH LOCK
8	2	3/8" H.S.S. SUSPENSION CLAMPS/CONNECTOR



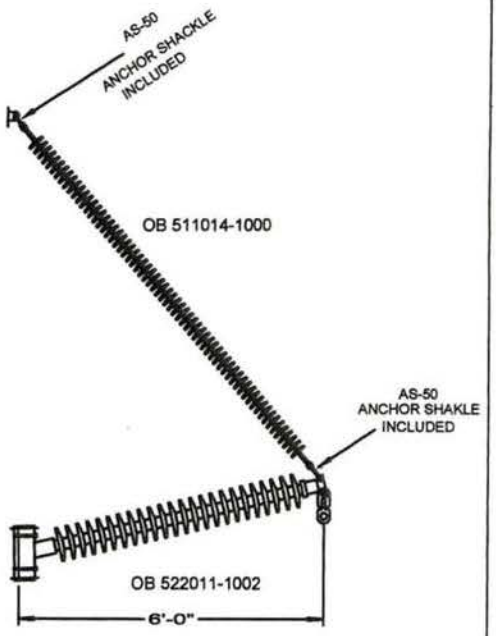
795 KCM 26/7 STR. ACSS HI-TEMP DRAKE
10,000 LB. DESIGN TENSION @ NESC Med

Big Rivers Your Touchstone Energy Cooperative

TSP-161-MA	
GUYED STEEL POLE MED. ANGLE	
C.D. Rector	2-2015
TSP-161-MA.DWG	



LIST OF MATERIALS		
ITEM	QTY	DESCRIPTION
1	6	BRACED POST INSULATOR EQIV. TO HUBBELL 234226-3001 WITH (2) AS-50 ANCHOR SHACKLES
2	6	795 KCM ACSS, 26/7 STR. HI TEMP CONDUCTOR SUSPENSION CLAMP WITH CONNECTOR
3	12	7/8" X VARIOUS LENGTH MACHINE BOLT WITH NUT/WASHER
4	1	3/8" OPGW AND SUSPENSION CLAMP
5	4	ATTACHMENT THRU-VANG FOR SUSPENSION INSULATOR
6	1	ANCHOR SHACKLE TO CONNECT 3/8" SUSPENSION CLAMP



Big Rivers ELECTRIC CORPORATION — Your Touchstone Energy Cooperative

DOUBLE CIRCUIT DC-TSP-161 STEEL POLE TANGENT		C.D. Rector
	161 kV Line 3-K,3-L	Rev 2-10-15

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
2601 Meacham Boulevard
Fort Worth, TX 76193

Aeronautical Study No.
2015-ASO-429-OE

Issued Date: 02/03/2015

Terril Riley
Big Rivers Electric Corporation
201 Third Street
Henderson, KY 42419-0024

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Transmission Line Aleris Substation 2
Location:	Lewisport, KY
Latitude:	37-57-17.00N NAD 83
Longitude:	86-51-01.00W
Heights:	415 feet site elevation (SE)
	70 feet above ground level (AGL)
	485 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/ lighting are accomplished on a voluntary basis, we recommend it be installed and maintained in accordance with FAA Advisory circular 70/7460-1 K Change 2.

This determination expires on 08/03/2016 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates , heights, frequency(ies) and power . Any changes in coordinates , heights, and frequencies or use of greater power will void this determination. Any future construction or alteration , including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

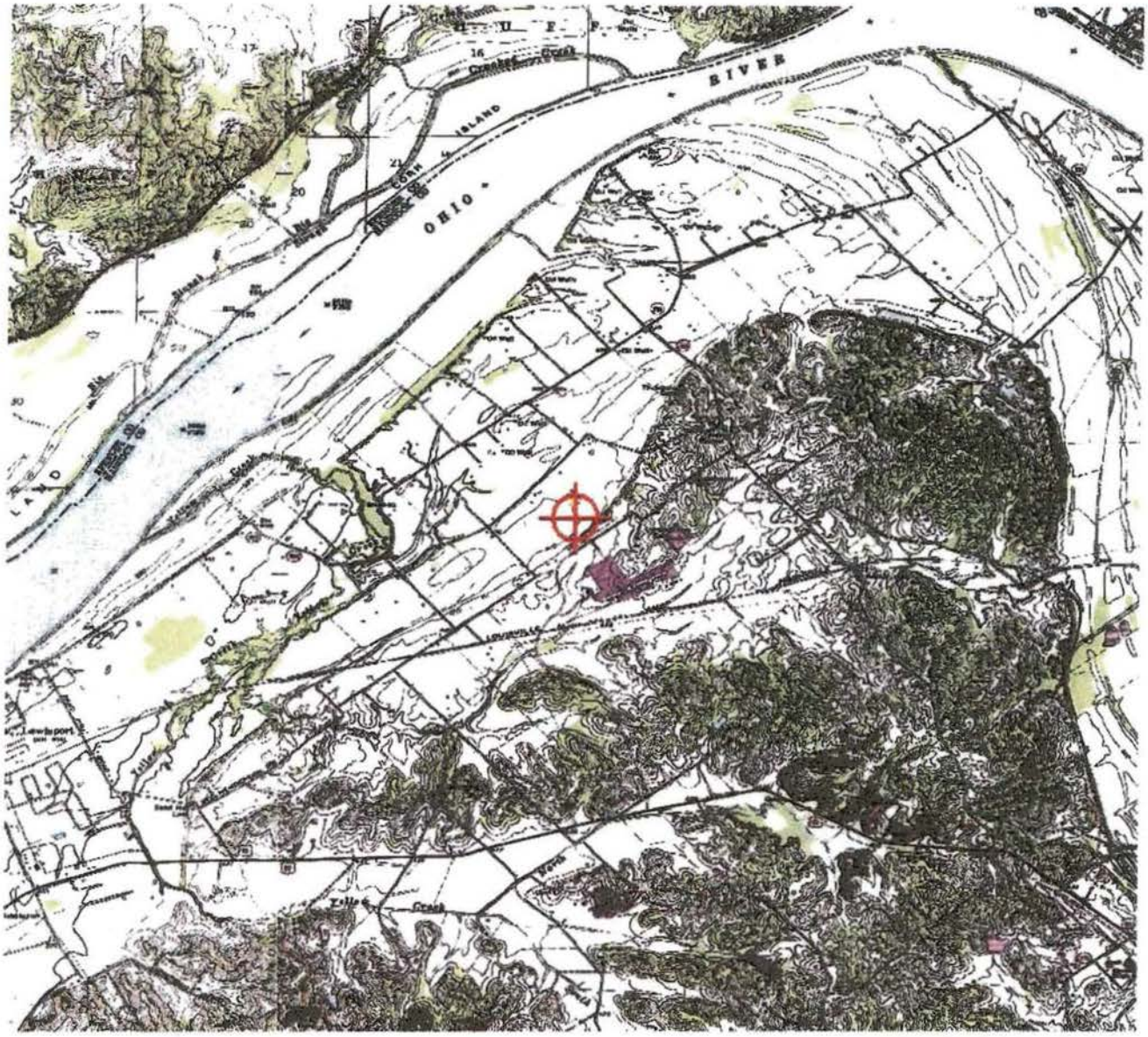
Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

If we can be of further assistance, please contact our office at (816) 329-2523. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2015-ASO-429-OE.

Signature Control No: 240702595-242246619 (DNE)
Steve Phillips
Specialist

Attachment(s)
Map(s)

TOPO Map for ASN 2015-ASO-429-OE

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Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
2601 Meacham Boulevard
Fort Worth, TX 76193

Aeronautical Study No.
2015-ASO-450-OE

Issued Date: 02/03/2015

Terril Riley
Big Rivers Electric Corporation
201 Third Street
Henderson, KY 42419-0024

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Power Line First CEHV TL Structure
Location:	Lewisport, KY
Latitude:	37-57-17.57N NAD 83
Longitude:	86-50-57.48W
Heights:	418 feet site elevation (SE)
	80 feet above ground level (AGL)
	498 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/ lighting are accomplished on a voluntary basis, we recommend it be installed and maintained in accordance with FAA Advisory circular 70/7460-1 K Change 2.

This determination expires on 08/03/2016 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates , heights, frequency(ies) and power . Any changes in coordinates , heights, and frequencies or use of greater power will void this determination. Any future construction or alteration , including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

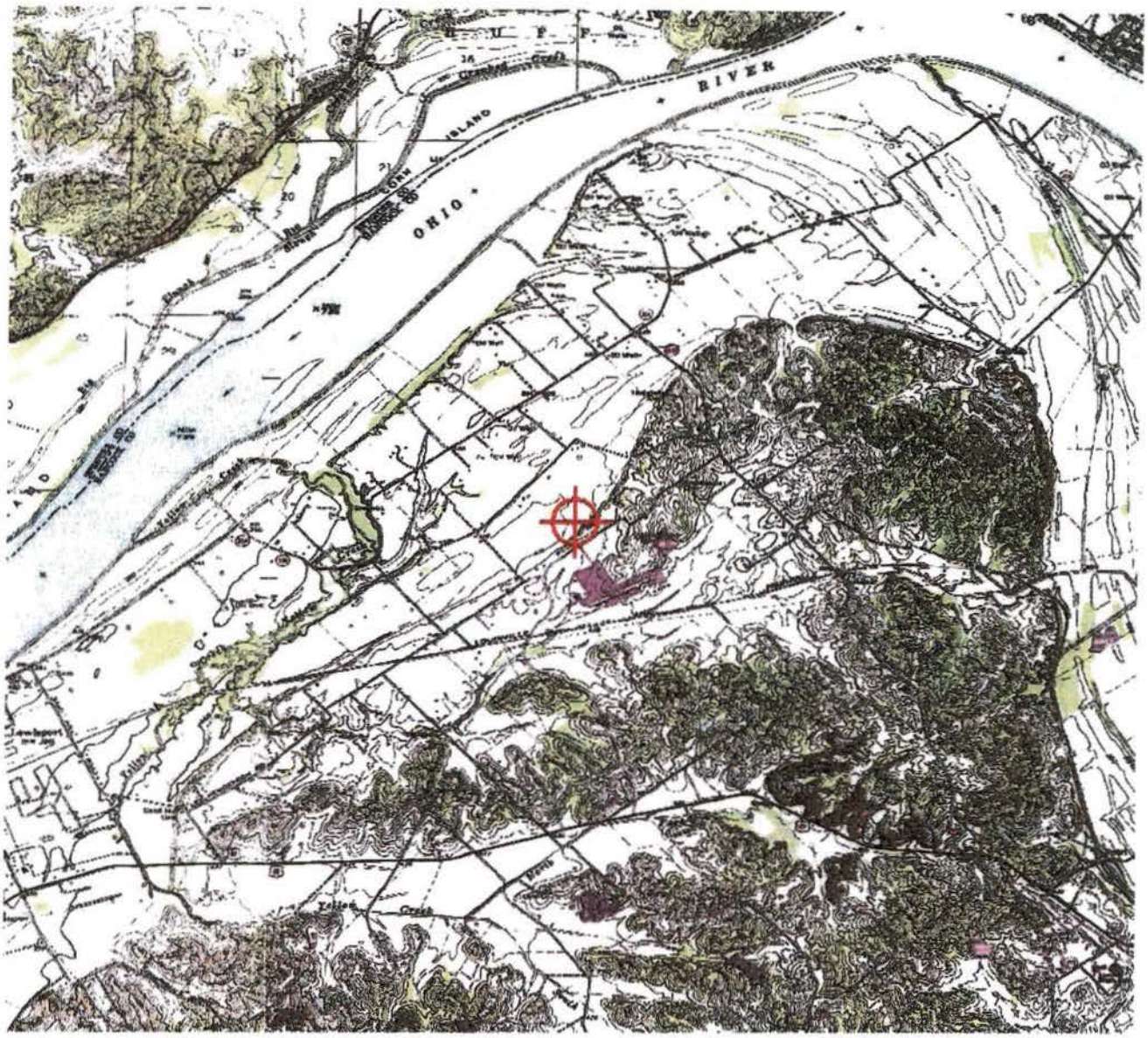
Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

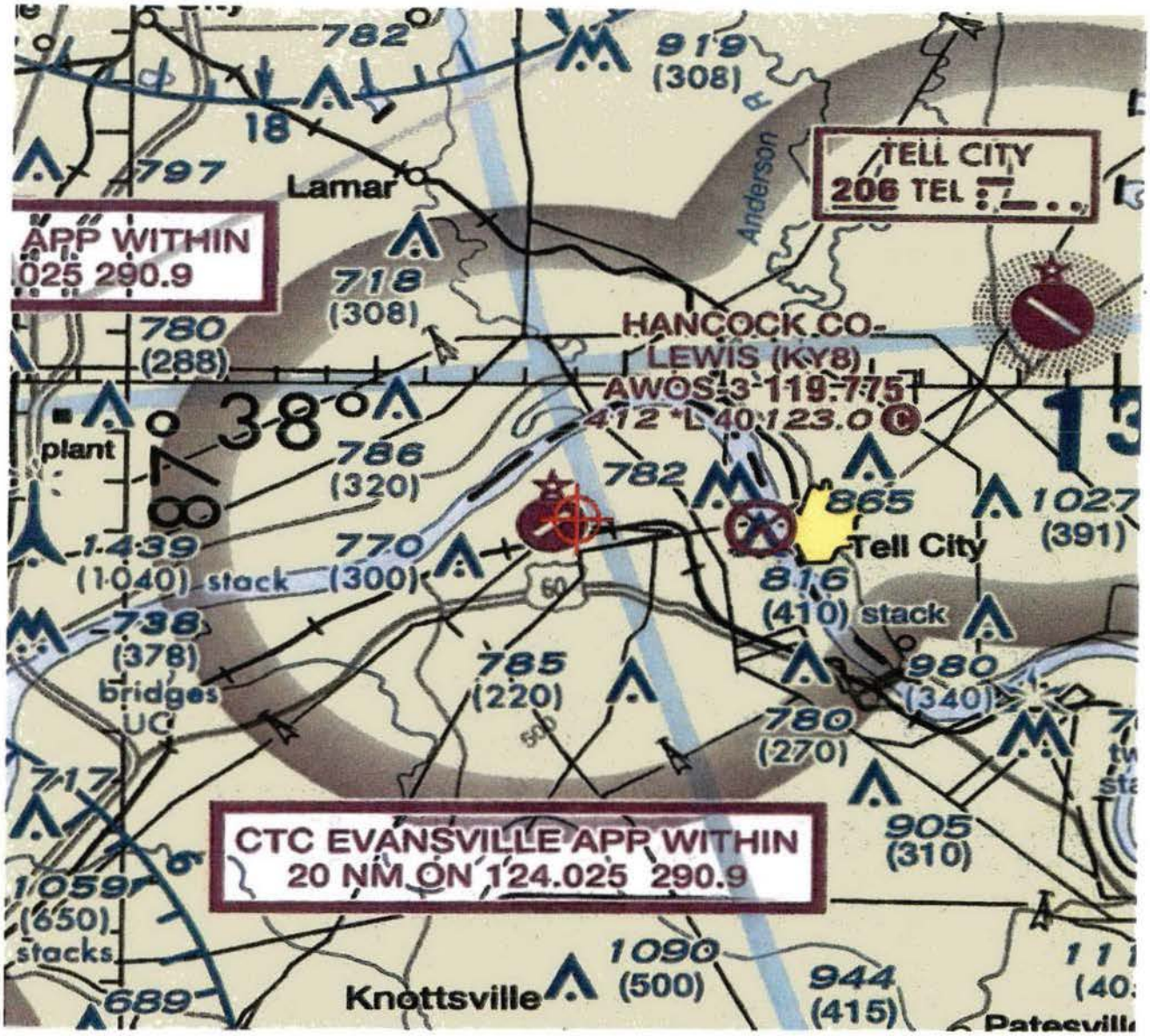
If we can be of further assistance, please contact our office at (816) 329-2523. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2015-ASO-450-OE.

Signature Control No: 240821797-242246621 (DNE)
Steve Phillips
Specialist

Attachment(s)
Map(s)

TOPO Map for ASN 2015-ASO-450-OE

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Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
2601 Meacham Boulevard
Fort Worth, TX 76193

Aeronautical Study No.
2015-ASO-451-OE

Issued Date: 02/03/2015

Terril Riley
Big Rivers Electric Corporation
201 Third Street
Henderson, KY 42419-0024

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Power Line First Hancock TL Structure
Location:	Lewisport, KY
Latitude:	37-57-15.19N NAD 83
Longitude:	86-50-58.82W
Heights:	412 feet site elevation (SE)
	80 feet above ground level (AGL)
	492 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/ lighting are accomplished on a voluntary basis, we recommend it be installed and maintained in accordance with FAA Advisory circular 70/7460-1 K Change 2.

This determination expires on 08/03/2016 unless:

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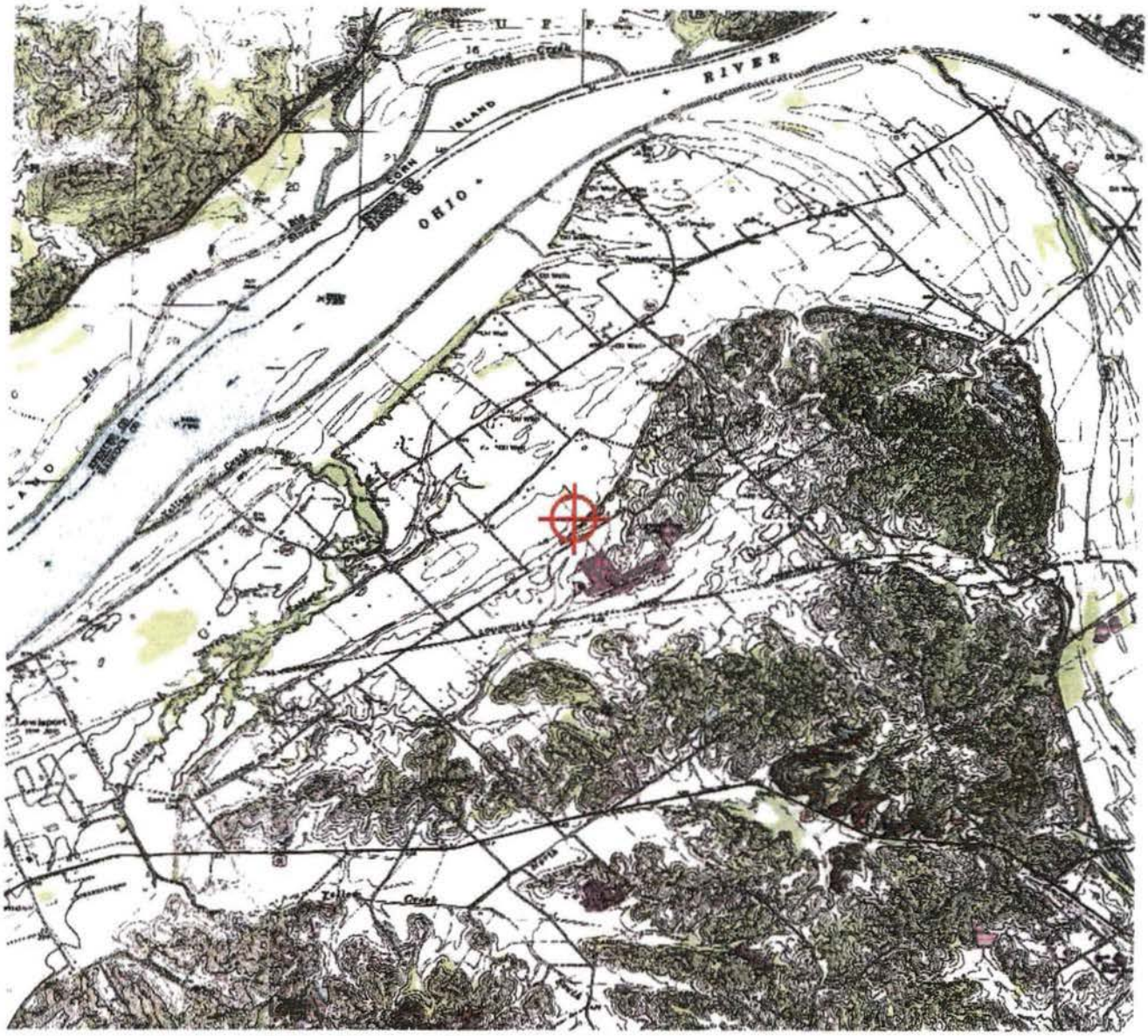
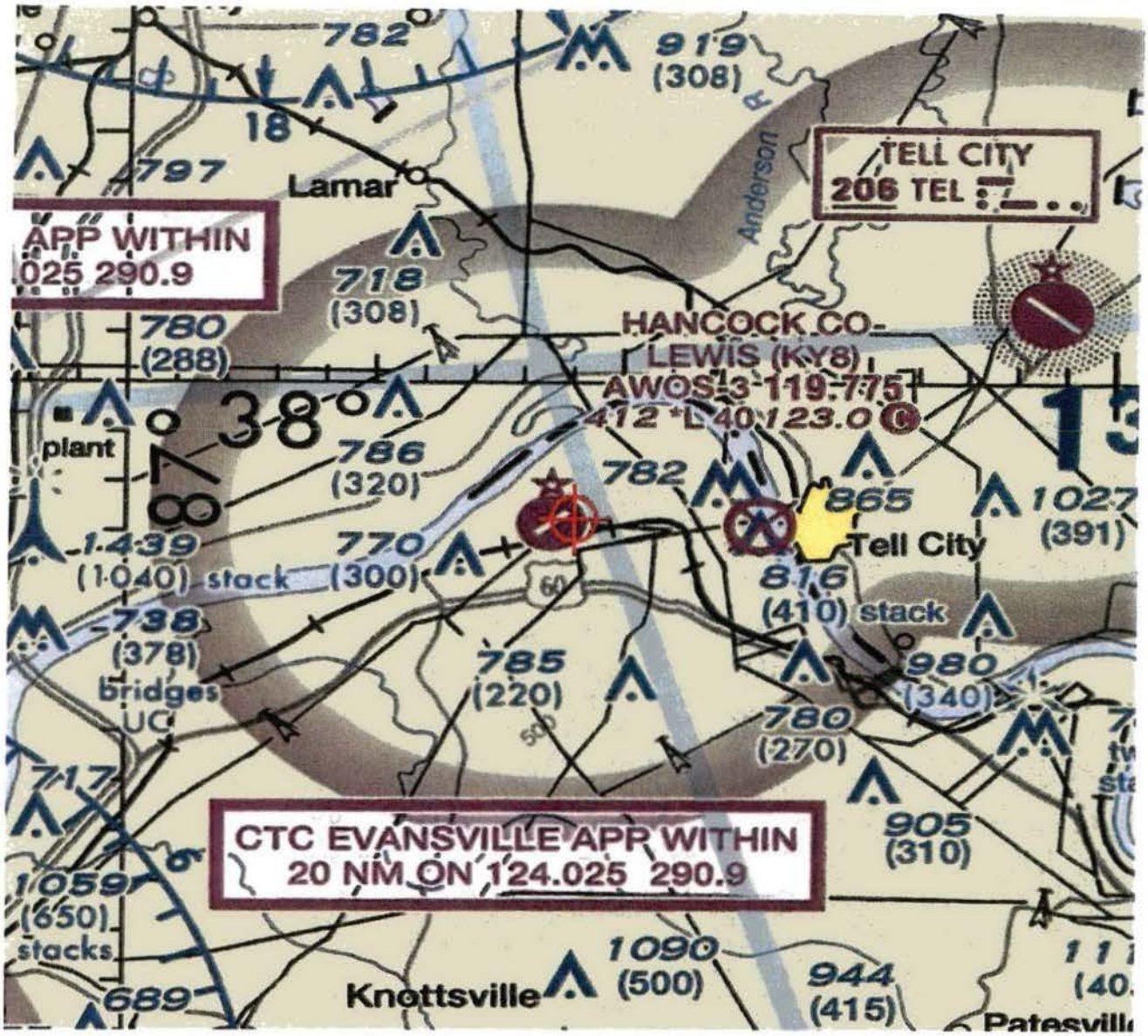
If we can be of further assistance, please contact our office at (816) 329-2523. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2015-ASO-451-OE.

Signature Control No: 240821798-242246620 (DNE)
Steve Phillips
Specialist

Attachment(s)
Map(s)

TOPO Map for ASN 2015-ASO-451-OE

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Big Rivers
ELECTRIC CORPORATION

201 Third Street
P.O. Box 24
Henderson, KY 42419-0024
270-827-2561
www.bigrivers.com

February 16, 2015

Thomas K. Baird
1092 Howard Mill Road
Calhoun, KY 42327

RE: Notice of Proposed Electric Transmission Lines Construction Project

Dear Mr. Baird:

Big Rivers Electric Corporation ("Big Rivers"), a Western Kentucky electric generation and transmission cooperative, proposes to construct two 2.0 mile 161 kilovolt ("kV") transmission lines in northern Hancock County, Kentucky. The purpose of the proposed transmission lines is to serve a proposed expansion at the Aleris Rolled Products, Inc. ("Aleris") aluminum mill located on State Road 1957 in Lewisport, Kentucky.

It is expected that one or both of these lines may cross property you own in northern Hancock County. If so, Terril Riley, Real Estate Agent at Big Rivers, or another Big Rivers representative will be in contact with you to discuss a line-of-sight centerline survey, and the possibility of purchasing an easement from you across your property for the proposed electric lines.

The route for the proposed lines begins at a point at an existing Big Rivers substation located on Beauchamp Road (CR 1314) in Hancock County. From this tap point, the lines will extend west approximately 2.0 miles to two substations located at the Aleris mill. A map showing the route of the proposed lines is attached to this letter. The transmission lines will typically be constructed using single pole steel structures.

Big Rivers plans to file an application with the Kentucky Public Service Commission ("Commission"), on or about March, 2015, seeking a certificate of public convenience and necessity authorizing this project. The purpose of the Commission's review of Big Rivers' application is to determine whether the proposed transmission lines are required by the public convenience and necessity. You have the right to move to intervene and participate in the proceeding.

You also have the right to request the Commission to conduct a public hearing on that application in Hancock County.

To request to intervene in the Commission's proceeding on Big Rivers' application for a certificate of public convenience and necessity, or to request a public hearing in that case, you should contact the Executive Director, Public Service Commission, 211 Sower Boulevard, P.O. Box 615, Frankfort, Kentucky 40602-0615, telephone number (502) 564-3940. The docket number under which this application will be processed is 2015-00051. If you have any questions for me, you may reach me at (270) 844-6212.

Sincerely yours,

BIG RIVERS ELECTRIC CORPORATION

Robert M. Warren, P.E.
Manager Engineering

Big Rivers Electric Corporation
Case No. 2015-00051
Property Owners Notified
Coleman EHV to Lewisport Aluminum Mill 161 kV
T-Lines 3-K 3-L

Affected Property Owner(s)	Address	Parcel
Hocker Heirs - c/o Fulkerson, Tamara	1612 Prince Avenue Owensboro, KY 42303-0962	19-00-00-11
Hocker, Greg	3522 Oaklane Drive Owensboro, KY 42366	
Hocker, Jeffery S.	3227 Bridle Way Owensboro, KY 42303	
Newton, Harold W.	P.O. Box 355 Hawesville, KY 42348	
Bland, Kenneth W.	10215 River Road Lewisport, KY 42351-6979	19-00-00-05
Baird, Thomas K.	1092 Howard Mill Road, Calhoun, KY 42327-9719	19-00-00-28
Emmick, Jesse P..	8500 River Road Lewisport, KY 42351-6801	19-00-00-29
Emmick, Shelby S.	10383 River Road Lewisport, KY 42351	
Aleris Rolled Products	1372 State Road 1957 Lewisport, KY 42351-0480	12-00-00-05
Marvel, John L. & Robyn	1955 Adair Road Lewisport, KY 42351-6923	19-00-00-27
Ray, Loyd P. Jr.	9722 River Road Lewisport, KY 42351	12-00-00-12

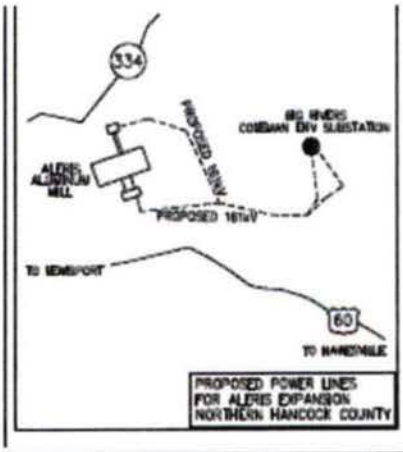
Notice of Proposed Electric Transmission Line Construction Project

Big Rivers Electric Corporation, a Western Kentucky electric generation and transmission cooperative ("Big Rivers") proposes to construct two 2.0 mile 161 kilovolt transmission lines in northern Hancock County, Kentucky. The purpose of the proposed transmission lines is to serve the proposed Aleris International Aluminum Mill.

The route for the proposed lines begins at a point of the existing Big Rivers' Coleman EHV Substation in northern Hancock County. This substation is located east of the Aleris Lewisport Aluminum Mill. From this substation the lines will extend to the west to two substations at the aluminum mill. The transmission lines will typically be constructed using single pole steel structures. Big Rivers either has or will send a letter to each property owner (according to Property Valuation Administrators records) over whose property the transmission lines are expected to cross.

Big Rivers plans to file an application with the Kentucky Public Service Commission ("Commission"), in or about March, 2015, seeking a Certificate of Public Convenience and Necessity authorizing this project. The purpose of the Commission's review of Big Rivers' application is to determine whether the proposed transmission lines are required for public convenience and necessity. Interested persons have the right to move to intervene and participate in the proceeding. They also have the right to request the Commission to conduct a public hearing in Hancock County on that application.

Interested parties may request to intervene in the Commission's proceeding on Big Rivers' application for a Certificate of Public Convenience and Necessity, or may request a public hearing in that case by contacting the Executive Director, Public Service Commission, 211 Sower Boulevard, P.O. Box 615, Frankfort, Kentucky 40602-0615, telephone number (502) 564-3940. The docket number under which this application will be processed is 2015-00051. You may also direct questions to Big Rivers by contacting Robert M. Warren, Big Rivers Manager Engineering, at (270) 827-2561.



LEGAL NOTICE

NOTICE OF PROPOSED ELECTRIC TRANSMISSION LINE CONSTRUCTION PROJECT

Big Rivers Electric Corporation, a Western Kentucky Electric Generation and Transmission Cooperative ("Big Rivers") proposes to construct two 2.0 mile 161 kilovolt transmission lines in northern Hancock County, Kentucky. The purpose of the proposed transmission lines is to serve the proposed Aleris International Aluminum Mill.

The route for the proposed lines begins at a point of the existing Big Rivers' Coleman EHV Substation in northern Hancock County. This substation is located east of the Aleris Lewisport Aluminum Mill. From this substation the lines will extend to the west to two substations at the aluminum mill. The transmission lines will typically be constructed using single pole steel structures. Big Rivers either has or will send letter to each property owner (according to Property Valuation Administrators records) over whose property the transmission lines are expected to cross.

Big Rivers plans to file an application with the Kentucky Public Service Commission ("Commission"), in or about March, 2015, seeking a Certificate of Public Convenience and Necessity authorizing this project. The purpose of the Commission's review of Big Rivers' application is to determine whether the proposed transmission lines are required for public convenience and necessity. Interested persons have the right to move to intervene and participate in the proceeding. They also have the right to request the Commission to conduct a public hearing in Hancock County on that application.

Interested parties may request to intervene in the Commission's proceeding on Big Rivers' application for a Certificate of Public Convenience and Necessity or may request a public hearing in that case by contacting the Executive Director, Public Service Commission, 211 Sower Boulevard, P.O. Box 615, Frankfort, Kentucky 40602-0615, telephone number (502)564-3940. The docket number under which this application will be processed is 2015-00051. You may also direct questions to Big Rivers by contacting Robert M. Warren, Big Rivers Manager Engineering, at (270)827-2561.

Application

CONTAINS

LARGE OR OVERSIZED

MAP(S)

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