COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

| | | |
|---|---|---|
| ELECTRONIC APPLICATION OF KENTUCKY UTILITIES COMPANY FOR A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY FOR THE CONSTRUCTION OF TRANSMISSION FACILITIES IN HARDIN COUNTY, KENTUCKY | ) ) ) ) ) | CASE NO. 2022-00066 |

## NOTICE OF FILING

Notice is given to all parties that the following materials have been filed into the record of this proceeding:

- The digital video recording of the evidentiary hearing conducted on June 1, 2022 in this proceeding;

- Certification of the accuracy and correctness of the digital video recording;

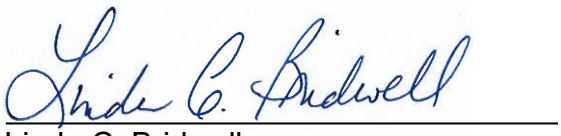
- All exhibits introduced at the evidentiary hearing conducted on June 1, 2022 in this proceeding;

- A written log listing, inter alia, the date and time of where each witness' testimony begins and ends on the digital video recording of the evidentiary hearing conducted on June 1, 2022.

A copy of this Notice, the certification of the digital video record, and hearing log have been served upon all persons listed at the end of this Notice. Parties desiring to view the digital video recording of the hearing may do so at https://youtu.be/ndtjP92FrZs.

Parties wishing an annotated digital video recording may submit a written request by electronic mail to pscfilings@ky.gov. A minimal fee will be assessed for a copy of this recording.

Done at Frankfort, Kentucky, this 7th day of July 2022.



Linda C. Bridwell
Executive Director
Public Service Commission of Kentucky

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

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| ELECTRONIC APPLICATION OF KENTUCKY UTILITIES COMPANY FOR A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY FOR THE CONSTRUCTION OF TRANSMISSION FACILITIES IN HARDIN COUNTY, KENTUCKY | ) ) ) ) ) | CASE NO. 2022-00066 |

## CERTIFICATION

I, Candace H. Sacre, hereby certify that:

1. The attached flash drive contains a digital recording of the Formal Hearing conducted in the above-styled proceeding on June 1, 2022. The Formal Hearing Log, Exhibits List, and Exhibits are included with the recording on June 1, 2022;

2. I am responsible for the preparation of the digital recording;

3. The digital recording accurately and correctly depicts the Formal Hearing of June 1, 2022; and

4. The Formal Hearing Log attached to this Certificate accurately and correctly states the events that occurred at the Formal Hearing of June 1, 2022, and the time at which each occurred.

Signed this 30th day of June, 2022.

Candace H. Sacre
Administrative Specialist III

Stephanie Schweighardt
Notary Public State at Large ID#: 614400
Commission Expires: January 14, 2023

# Session Report - Detail

**2022-00066 01Jun2022**

**Kentucky Utilities Company (KU)**

| Date: | Type: | Location: | Department: |
|---|---|---|---|
| 6/1/2022 | Public Hearing\Public Comments | Hearing Room 1 | Hearing Room 1 (HR 1) |

Witness: Michael Billings; Robert Conroy; Gunes Demirbas; Marty Marchaterre; Elizabeth McFarland; Allen Summers; Thomas Wade
Judge: Kent Chandler
Clerk: Candace Sacre

| Event Time | Log Event | |
|---|---|---|
| 9:11:28 AM | Session Started | |
| 9:11:55 AM | Chairman Chandler | |
| | Note: Sacre, Candace | Good morning. We are on the record in Case No. 2022-00066, Electronic Application of Kentucky Utilities Company for a Certificate of Public Convenience and Necessity for the Construction of Transmission Facilities in Hardin County, Kentucky. |
| 9:12:11 AM | Chairman Chandler | |
| | Note: Sacre, Candace | My name is Kent Chandler. I am Chairman of the Kentucky Public Service Commission, and I will be presiding over the hearing today. |
| 9:12:16 AM | Chairman Chandler | |
| | Note: Sacre, Candace | Hearing and videoconferencing recommendations. (Click on link for further comments.) |
| 9:13:02 AM | Chairman Chandler | |
| | Note: Sacre, Candace | The hearing today is for the purpose of taking evidence in this request for a certificate of public convenience and necessity. |
| 9:13:08 AM | Chairman Chandler | |
| | Note: Sacre, Candace | Entry of appearance of counsel and introduction of parties. (Click on link for further comments.) |
| 9:13:17 AM | Atty Ingram KU | |
| | Note: Sacre, Candace | Lindsey Ingram and Allyson Sturgeon. |
| 9:13:38 AM | Atty Samford Wade Family | |
| | Note: Sacre, Candace | David Samford and Allyson Honaker. |
| 9:14:03 AM | Atty Glass Brown Family | |
| | Note: Sacre, Candace | Katie Glass and also Morgan Ward. |
| 9:14:23 AM | Chairman Chandler | |
| | Note: Sacre, Candace | Introduction of remaining intervenors appearing pro se. (Click on link for further comment.) |
| 9:15:59 AM | Staff Atty Tussey PSC | |
| | Note: Sacre, Candace | Moriah Tussey and Tina Frederick. |
| 9:16:05 AM | Chairman Chandler | |
| | Note: Sacre, Candace | Filed witness list, withdrawing? (Click on link for further comments.) |
| 9:16:49 AM | Chairman Chandler | |
| | Note: Sacre, Candace | Intend on asking any questions of witnesses today? (Click on link for further comments.) |
| 9:17:46 AM | Chairman Chandler | |
| | Note: Sacre, Candace | Public notice. (Click on link for further comments.) |
| 9:18:23 AM | Chairman Chandler | |
| | Note: Sacre, Candace | Public comments. (Click on link for further comments.) |
| 9:20:34 AM | Chairman Chandler | |
| | Note: Sacre, Candace | Call first witness. (Click on link for further comments.) |
| 9:21:13 AM | Atty Ingram KU | |
| | Note: Sacre, Candace | Beth McFarland. |

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| 9:22:05 AM | Chairman Chandler | |
| | Note: Sacre, Candace | Witness is sworn. |
| 9:22:15 AM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Examination. Name and address? |
| 9:22:26 AM | Atty Ingram KU - witness McFarland | |
| | Note: Sacre, Candace | Direct Examination. Title? |
| 9:22:35 AM | Atty Ingram KU - witness McFarland | |
| | Note: Sacre, Candace | Cause be filed direct testimony? |
| 9:22:47 AM | Atty Ingram KU - witness McFarland | |
| | Note: Sacre, Candace | Also cause be filed rebuttal? |
| 9:22:54 AM | Atty Ingram KU - witness McFarland | |
| | Note: Sacre, Candace | Also responsible witness numerous data requests? |
| 9:23:02 AM | Atty Ingram KU - witness McFarland | |
| | Note: Sacre, Candace | Corrections? |
| 9:23:15 AM | Atty Ingram KU - witness McFarland | |
| | Note: Sacre, Candace | What materials with you on stand? |
| 9:23:36 AM | Atty Ingram KU - witness McFarland | |
| | Note: Sacre, Candace | Both in record? |
| 9:23:42 AM | Chairman Chandler | |
| | Note: Sacre, Candace | Questions? |
| 9:24:02 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Cross Examination. Pg 5, rebuttal, line 1, reading (click on link for further comments), see that? |
| 9:24:42 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | KU Response, Commission Third Request, Item 3, pgs 26 27 28, parcel designated as No. 189-00-00-005.01 on east side of Gaither Station Road, see that? |
| 9:26:00 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Under Route A or Route D, western transmission line proposed would cross that parcel? |
| 9:26:53 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Another map at beginning, full transmission line for western route? |
| 9:27:05 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Look at that and figure out where page 26 27 and 28 of map be located? |
| 9:27:19 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Agree with me original Route D intersected Gaither Station Road farther to north than Route A? |
| 9:28:01 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Team Spatial report, page 51, see Route D located? |
| 9:28:57 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Know where that is in relation proposed Route A? |
| 9:29:08 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Agree Route A and Route D in same location as cross property previously identified on pages 26 27 and 28 of map? |
| 9:29:35 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Property asked specifically look at three prior pages of map book? |
| 9:30:12 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Look at page 47 of Team Spatial report, all four alternatives for western route? |
| 9:30:23 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Agree where Route D intersects and begins turn south on Gaither Station Road is north of where proposed west Route A would do so? |

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| 9:30:54 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Agree Wade family farm is located where western Route A is coming south but makes jog towards southeast? |
| 9:31:37 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Agree where western Route A coming south but makes cut toward southeast that is at Wade family farm property? |
| 9:31:54 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | That cut to avoid pivot irrigation system in middle of field? |
| 9:32:20 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Agree where cut is that is Wade family farm property? |
| 9:32:35 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | From point where Route A intersects with Gaither Station Road from there south all the way to substation, that part of line segment is common to all four alternatives? |
| 9:33:05 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Page 27 of Response to Third Request, Question 3, see property number on right side of Gaither Station? |
| 9:34:00 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | See property parcel number on left side of Gaither Station? |
| 9:34:10 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Parcel numbers same? |
| 9:34:16 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | That farm is Wade family farm? |
| 9:34:29 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Cut on page 27, top is where line made cut back to southeast, where crosses Gaither Station Road, would be point where all routes converged to move farther south to the substation? |
| 9:34:53 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Sworn testimony Route D not cross Wade property if family had its way, not correct? |
| 9:35:27 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Because property on both sides of Gaither Station Road, regardless whether Route A or Route B is chosen, still be impacted? |
| 9:35:46 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Aware concerns expressed by Wade family regarding proposed transmission line crossing property on east side of Gaither Station Road? |
| 9:36:16 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | So answer is not know specific concerns expressed about transmission line crossing farm on eastern side of Gaither Station Road? |
| 9:36:44 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Agree those all located on western side Gaither Station Road? |
| 9:37:03 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Question is aware concern raised transmission line on eastern side of road on their property? |
| 9:37:30 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Aware alternative routing proposals provided by Wade family to KU? |
| 9:37:57 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Fair to characterize alternative pushing cut farther north along Gaither Station Road? |
| 9:38:19 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Assume that was what alternative route be, actually push more transmission line to eastern side of property? |

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| 9:38:36 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Purpose of project to serve Ford battery plant? |
| 9:38:47 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | But for project, KU not be proposing any facilities included within application? |
| 9:39:00 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | No reliability concerns with current transmission serving existing load? |
| 9:39:08 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Fair to say KU position two 345 kV transmission lines needed to reliably serve Ford and future load growth? |
| 9:39:22 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Refer KU Response to Wade Family Farm 1, Question 4, provide all documents support expected need future development in area including other customers, see that? |
| 9:39:59 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Any documents attached to response? |
| 9:40:29 AM | Atty Ingram KU | |
| | Note: Sacre, Candace | Interrupt just a second? (Click on link for further comments.) |
| 9:40:37 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | No documents attached to response to Wade family, but referred to prior response to PSC data request? |
| 9:40:48 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Look at Response, PSC Second, Question 3, not see anything definitive, first line say could be possible, next sentence highly likely, and last sentence say likely, but no statement it will happen, that is definitive? |
| 9:42:54 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Not holding yourself out as expert in economic development? |
| 9:43:00 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Only document attached Question 3 brochure from Cabinet for Economic Development? |
| 9:44:16 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Look at document from Economic Development, page 2, last sentence, reading (click on link for further comments), see that? |
| 9:44:42 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Look at Response to data request, second sentence, reading (click on link for further comments), overstates what cabinet says by about 15 percent? |
| 9:46:53 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Agree Ford is in manufacturing industry? |
| 9:46:58 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Manufacturing number there is 270, 100 direct and 170 indirect? |
| 9:47:07 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Bottom of page 1, first column, reading (click on link for further comments), see that? |
| 9:47:39 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Not all changes occur within Kentucky? |
| 9:47:48 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Could be more than just in particular region where manufacturer located? |
| 9:48:11 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Is entire thing relying upon to show need for future load growth in area? |

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| 9:48:36 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | KU not have single document other than brochure to support statement? |
| 9:48:46 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Bottom page 2 of document, appear to be letters missing, see where says information provided herein? |
| 9:49:19 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Agree that says, reading (click on link for further comments), informational purposes only? |
| 9:49:34 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Goes on to say, reading (click on link for further comments)? |
| 9:49:51 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Aware of disclaimer before providing as only document supporting this data request? |
| 9:50:02 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Familiar with Toyota facility? |
| 9:50:08 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Actually manufactures vehicles? |
| 9:50:13 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | All things come into factory, and finished vehicles come out other side? |
| 9:50:20 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Ford plant not manufacture cars? |
| 9:50:25 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Only be manufacturing batteries? |
| 9:50:32 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | If read resume correctly, began career engineer with Ford? |
| 9:50:38 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Generally familiar automotive engineering as result prior work experience? |
| 9:50:45 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Agree battery just one component of electric vehicle? |
| 9:51:03 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Supply chain completed vehicle tend be larger than supply chain for single component? |
| 9:51:20 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Based upon experience with Ford, takes more pieces put together vehicle or battery? |
| 9:52:20 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Not talking about process, talking supply chain, supply chain for particular component smaller than supply chain for entire vehicle? |
| 9:53:00 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | As former Ford engineer, not familiar with relative supply chains of a vehicle component? |
| 9:53:19 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Battery still just part of it? |
| 9:53:32 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Agree proposed Ford battery manufacturing in Glendale less likely spur supply chain than Toyota that manufactures entire vehicle? |
| 9:53:57 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | All of which part of Ford project? |
| 9:54:16 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Reliability, most recent IRP 2021-00393, approximately 28,000 miles electric transmission and distribution lines on KU system? |

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| 9:54:43 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Tell me how many miles transmission lines? |
| 9:54:51 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | How much 345 kV? |
| 9:55:15 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Approximately 5400 miles transmission and approximately 300 of 345 kV? |
| 9:55:38 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Response Wade supplemental, Question 3, asking total duration outages on 345 kV system prior three years? |
| 9:56:16 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Agree, for 2019, 345 kV outages system wide about 8,000 minutes, or 133.6 hours? |
| 9:56:42 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | For 2020, 4,190 minutes, or 69.8 hours? |
| 9:56:53 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | For 2021, 6,098 minutes, or 101.6 hours, so if average three years together, approximate period of outage any KU 345 transmission lines of 101.7 hours entire year? |
| 9:57:18 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Equals 98.9 percent reliability? |
| 9:57:26 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Entire 345 kV transmission system? |
| 9:57:32 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Averages out to 98.9 percent? |
| 9:57:41 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Consider good reliability? |
| 9:57:48 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Rebuttal, page 2, first question, asked summarize testimony about Wade testimony? |
| 9:58:42 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | On line 17, characterizing Team Spatial report, read those two sentences? |
| 9:59:30 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Page 4, rebuttal, line 15 through 18? |
| 10:00:00 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Say same methodology but is that strictly accurate? |
| 10:00:38 AM | Atty Samford Wade Family | |
| | Note: Sacre, Candace | Have exhibit, complete siting model of Team Spatial report. (Click on link for further comments.) |
| 10:01:18 AM | Chairman Chandler | |
| | Note: Sacre, Candace | Mark as Wade Family Farm Exhibit 1. |
| 10:02:23 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Does document look familiar? |
| 10:02:30 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | One referring to in rebuttal? |
| 10:02:41 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | If referred to it, how not looked at it previously? |
| 10:03:03 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | May want to also reference Team Spatial report filed in record of this case, page 8 of report, have different perspectives, engineering environment, natural environment, and built environment? |
| 10:04:03 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Page 8 of your study, page 7 of Big Rivers, agree three perspectives? |

10:04:26 AM Atty Samford Wade Family - witness McFarland
Note: Sacre, Candace Within each different layers?
10:04:36 AM Atty Samford Wade Family - witness McFarland
Note: Sacre, Candace Within each layer, elements included in each layer?
10:04:53 AM Atty Samford Wade Family - witness McFarland
Note: Sacre, Candace Features, for each of layers within a perspective must equal 100 percent?
10:05:07 AM Atty Samford Wade Family - witness McFarland
Note: Sacre, Candace For each of features, value between 1 and 9?
10:05:21 AM Atty Samford Wade Family
Note: Sacre, Candace Second document, actual Kentucky state siting model. (Click on link for further comments.)
10:05:54 AM Chairman Chandler
Note: Sacre, Candace Mark as Wade Family Exhibit 2.
10:06:33 AM Atty Samford Wade Family - witness McFarland
Note: Sacre, Candace Familiar with document?
10:06:42 AM Atty Samford Wade Family - witness McFarland
Note: Sacre, Candace Reviewed Kentucky electric transmission siting model previously?
10:07:04 AM Atty Samford Wade Family - witness McFarland
Note: Sacre, Candace Aware Kentucky transmission siting model developed as part of collaborative process?
10:07:10 AM Atty Samford Wade Family - witness McFarland
Note: Sacre, Candace Aware EKPC and E.ON two leading principles in process?
10:07:22 AM Atty Samford Wade Family - witness McFarland
Note: Sacre, Candace Team Spatial report in Big Rivers Case 2019-00417 and Team Spatial report in this case based upon original Kentucky transmission siting model?
10:07:42 AM Atty Samford Wade Family - witness McFarland
Note: Sacre, Candace Would agree are changes?
10:08:36 AM Atty Samford Wade Family - witness McFarland
Note: Sacre, Candace If look under natural environment perspective at flood plains layer, values are same across all three versions of siting model?
10:09:01 AM Atty Samford Wade Family - witness McFarland
Note: Sacre, Candace Referring to original Kentucky state siting model, Team Spatial report in 2019-00417, and Team Spatial report this case?
10:09:39 AM Atty Samford Wade Family - witness McFarland
Note: Sacre, Candace Appendix page G-2?
10:09:53 AM Atty Samford Wade Family - witness McFarland
Note: Sacre, Candace Deviation in value ascribed to layers but when look at features either a 1 or a 9 across all three documents?
10:10:41 AM Atty Samford Wade Family - witness McFarland
Note: Sacre, Candace Value ascribed, the percentage ascribed, to layers may change based upon whether particular layer is present in given context?
10:11:18 AM Atty Samford Wade Family - witness McFarland
Note: Sacre, Candace Within given layer, who assigns value to particular feature?
10:12:17 AM Atty Samford Wade Family - witness McFarland
Note: Sacre, Candace Asking about features, how values for features determined?
10:13:17 AM Atty Samford Wade Family - witness McFarland
Note: Sacre, Candace Model same, but values can change based upon particular transmission lines context?
10:13:25 AM Atty Samford Wade Family - witness McFarland
Note: Sacre, Candace Who assigns values to features, something KU did or something Team Spatial did?

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| 10:14:19 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Confusion, not able get straight answer, who ultimately assigns value to features used in transmission siting model in this case? |
| 10:15:05 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Under engineering perspective, linear infrastructure layer, numbers appear be different, parallel existing transmission lines, 1 in all three versions? |
| 10:15:36 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Background, Kentucky transmission line siting model value of 4.4, Big Rivers transmission siting model value of 4.6, not see where exists in step transmission siting model in this one but assume no linear infrastructure value of 5.4? |
| 10:16:13 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Situation where three different transmission siting models each with different values assigned features within same layer, in particular case, who made decision to depart from Kentucky transmission siting model? |
| 10:17:10 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Asked for documentation how process occurred documenting when process took place and did not receive anything. |
| 10:17:59 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Is there documentation that exists that documents decisions on when difference would take place when siting model this case modified from what in original Kentucky transmission siting model, is there documentation as to how decisions to make modifications occurred? |
| 10:18:44 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Post-hearing data request? |
| 10:18:45 AM | POST-HEARING DATA REQUEST | |
| | Note: Sacre, Candace | ATTY SAMFORD WADE FAMILY - WITNESS MCFARLAND |
| | Note: Sacre, Candace | DOCUMENTS ON DECISIONS WHEN DIFFERENCE IN SITING MODEL IN THIS CASE MODIFIED FROM WHAT IN ORIGINAL KENTUCKY TRANSMISSION SITING MODEL |
| 10:18:54 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | When say siting model KU used this case is same as in 2019-00417, may be true regard process but values have modifications, differences between values assigned features and layers? |
| 10:20:25 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Rebuttal, model used robust and comprehensive? |
| 10:20:38 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | And stand by that? |
| 10:20:40 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Figure 51, Team Spatial report this case, page 59 out of 87, agree chart summarizes outcome of transmission siting model that KU modified and reduces perspectives to numerical values? |
| 10:21:40 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Under this context, lower score is preferred outcome? |
| 10:21:51 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Look at Route D, route not chosen, it outscores all other routes in all categories? |
| 10:22:21 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Not really tied, close .25 to .26? |
| 10:22:34 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Look at built perspective, Route A scores .26, Route B scores .25? |

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| 10:22:41 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Only one really close, look at natural perspective Route A scores .7 and Route D scores .32? |
| 10:22:55 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Same thing for engineering perspective, Route A scores .6, Route D scores .24? |
| 10:23:06 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | When average three perspectives, Route A scores .54 and Route D scores .27? |
| 10:23:13 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Route D twice as preferable as Route A? |
| 10:23:26 AM | Atty Ingram KU | |
| | Note: Sacre, Candace | Object to that. (Click on link for further comments.) |
| 10:23:49 AM | Chairman Chandler | |
| | Note: Sacre, Candace | Sustain. (Click on link for further comments.) |
| 10:24:06 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | .27 numerical value half that is half of numerical value of .54? |
| 10:26:12 AM | Chairman Chandler | |
| | Note: Sacre, Candace | Short recess back at 10:45. |
| 10:26:23 AM | Session Paused | |
| 10:47:25 AM | Session Resumed | |
| 10:47:39 AM | Chairman Chandler | |
| | Note: Sacre, Candace | Back on the record in Case No. 2022-00066. |
| 10:47:47 AM | Chairman Chandler | |
| | Note: Sacre, Candace | Continue? |
| 10:47:51 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Cross Examination (cont'd). Understand still under oath? |
| 10:47:56 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Where left off, finished talking siting model outcome and agreed Route D scored lower than Route A on western transmission line? |
| 10:48:10 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Move on and talk about expert judgment process, reversed outcome where Route A became preferable route over Route D? |
| 10:48:24 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Look at page 60 Team Spatial report, see heading western preferred route selection, reading (click on link for further comments), read that right? |
| 10:48:57 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Who is team referred to there? |
| 10:49:14 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Ultimately who was person who said these are criteria and this is weighting want assigned to criteria? |
| 10:49:25 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Ultimately was that you then? |
| 10:49:33 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Who is ultimate decider? |
| 10:49:35 AM | Atty Ingram KU | |
| | Note: Sacre, Candace | Question asked and answered. (Click on link for further comments.) |
| 10:49:53 AM | Atty Samford Wade Family | |
| | Note: Sacre, Candace | May I rephrase? |
| 10:49:55 AM | Chairman Chandler | |
| | Note: Sacre, Candace | Certainly. |

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| 10:49:56 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Your testimony no single person at KU who made decision use those criteria in that way? |
| 10:50:09 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Same process for other business decisions where no single person makes those decisions? |
| 10:50:25 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | High level siting criteria and assigned weights recommended to KU by Team Spatial, or did Team Spatial receive recommendations initially from KU? |
| 10:50:51 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | But not recall who came up with first draft? |
| 10:51:03 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Recall any give and take and discussion what relative weights and criteria be? |
| 10:51:13 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Documents that would describe process and document correspondence and communications took place? |
| 10:51:57 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Personal knowledge, email exchanges with anybody about weighting criteria? |
| 10:52:08 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Aware subordinate that would have had that? |
| 10:52:14 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Not aware received from Team Spatial? |
| 10:52:27 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Communications purely verbal? |
| 10:52:44 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | When criteria and weighting assigned for this process? |
| 10:53:26 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | As far as you know, all verbal? |
| 10:53:33 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | No notes, no minutes? |
| 10:53:54 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Were criteria and weights assigned before or after siting model process applied? |
| 10:54:13 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Expert judgment phase, criteria and weight assigned determined and finalized prior to or after transmission siting model having been performed and applied? |
| 10:54:48 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | My questions weights assigned before or after transmission siting, before or after knew outcome? |
| 10:55:19 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Frustration in this, asked for any documentation that substantiates that and haven't received a thing, anything aware of KU or Team Spatial have weight assigned before analysis completed? |
| 10:56:15 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Think weight applied is material to outcome? |
| 10:59:28 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Line on page 60 of report, one sentence describes actual process expert judgment phase conducted, reading (click on link for further comments), rest describes outcome? |

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| 10:59:56 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | That sentence does not tell us who, how, when, how expect Commission able judge reasonableness of process if questions not answered? |
| 11:01:15 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Said KU used same process for siting model used in Big Rivers case, remember saying that? |
| 11:01:36 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Use same expert judgment process? |
| 11:01:43 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | But used different values? |
| 11:01:45 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Part of Exhibit 1 previously tendered, page 56? |
| 11:02:05 AM | Atty Samford Wade Family | |
| | Note: Sacre, Candace | Move Exhibit 1 and 2 into evidence? |
| 11:02:12 AM | Chairman Chandler | |
| | Note: Sacre, Candace | Objection? |
| 11:02:15 AM | Chairman Chandler | |
| | Note: Sacre, Candace | Wade Family Farm Exhibit 1 and 2. |
| 11:02:16 AM | WADE FAMILY FARM EXHIBIT 1 | |
| | Note: Sacre, Candace | ATTY SAMFORD WADE FAMILY - WITNESS MCFARLAND |
| | Note: Sacre, Candace | TEAM SPATIAL SITING REPORT |
| 11:02:17 AM | WADE FAMILY FARM EXHIBIT 2 | |
| | Note: Sacre, Candace | ATTY SAMFORD WADE FAMILY - WITNESS MCFARLAND |
| | Note: Sacre, Candace | KENTUCKY STATE SITING MODEL |
| 11:02:48 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | On page 56, Team Spatial report, Case No. 2019-00417? |
| 11:02:57 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Agree represents same expert judgment model, same chart, provided as page 61 Team Spatial report? |
| 11:03:12 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Refer back to both documents, criteria are same? |
| 11:03:35 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Because Big Rivers case first, did Team Spatial recommend this be criteria use or criteria KU suggested, how ended up with same criteria? |
| 11:04:08 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | And then KU agreed with recommendation? |
| 11:04:13 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Criteria same for both cases? |
| 11:04:26 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Weighting different? |
| 11:04:31 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Schedule delay risk was scored as more important than Case Number 2019-00417 than here? |
| 11:04:38 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | This case, construction maintenance accessibility scored at 25 percent but only five percent in 2019-00417? |
| 11:04:49 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Significantly, cost assigned 35 percent in Case No. 2019-00417 but only 25 percent this case? |
| 11:05:03 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Who person who made decision to change weighting in this case as opposed to Big Rivers? |

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| 11:05:29 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Can't tell me if was Team Spatial recommendation use weights used this case or whether was KU recommended weights assigned in this case? |
| 11:05:51 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | In this case, expert judgment uses either 1 or 2 for all but one of categories? |
| 11:06:13 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Really best or worst in that category? |
| 11:06:33 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | In all other categories binary, either 1 or 2? |
| 11:06:48 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | In cost, KU/Team Spatial used relative cost factor, assigned 1.1 value? |
| 11:07:11 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | If KU been consistent in methodology and had used 1 or 2 value across board, would have changed impact to scoring of two routes under expert judgment phase? |
| 11:08:42 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Your position consistent with Kentucky Transmission Siting Model use one set of value systems for five out of six criteria in expert judgment phase but use different one in sixth category? |
| 11:09:20 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | If had used 1.0/2.0 methodology across all six criteria in expert judgement category, agree Route A more expensive than Route D? |
| 11:09:31 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Agree Route A more expensive than Route D? |
| 11:09:42 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Agree Route A more expensive than Route D as proposed in application? |
| 11:09:55 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Using 1.0/2.0 expert judgment process, Route A would have received 2.0 and Route D would have received the 1.0? |
| 11:10:17 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | If be consistent expert judgement phase like did for five out of six categories, Route A received 2.0 value? |
| 11:10:48 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Not think that's reasonable? |
| 11:13:04 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | KU assigned weight to each of six criteria? |
| 11:13:10 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Assigned 25 percent of weight to cost category? |
| 11:13:18 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Same as construction maintenance accessibility? |
| 11:13:25 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Tied for second with most important factor behind community issues 30 percent? |
| 11:13:35 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Agree, in community issues, score 1.0 for one route and 2.0 for other route? |
| 11:13:47 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | For community issues, Route A scored 1.0 and Route D scored 2.0? |
| 11:13:52 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | For schedule delay risk, Route A scored 1.0 and Route D scored 1.0, they tied? |

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| 11:14:04 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | For natural environment considerations, Route A scored 2.0 and Route D scored 1.0? |
| 11:14:10 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | For construction maintenance accessibility, Route A scored 1.0 and Route D scored 1.0? |
| 11:14:18 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | For cost, instead of 1.0 or 2.0, it's a 1.1 and 1.0, they were tied? |
| 11:15:50 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Transparency big part of process, but can't tell me who made decisions, how made decisions, why made decisions, or when made decisions? |
| 11:16:01 AM | Atty Ingram KU | |
| | Note: Sacre, Candace | Object to all those questions. (Click on link for further comments.) |
| 11:16:06 AM | Chairman Chandler | |
| | Note: Sacre, Candace | Sustained. |
| 11:16:09 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Coming back to cost category, yes or no, Route 1 assigned value of 1.1 and Route D assigned value of 1.0? |
| 11:16:22 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | If Route A been assigned 2.0 value because more expensive and not tied in cost to Route D, what would outcome been? |
| 11:16:53 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | What would final score have been if Route A been scored as 2.0? |
| 11:17:14 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | That doesn't make sense, make value judgment what weighting could be, so clearly changed it? |
| 11:17:21 AM | Atty Ingram KU | |
| | Note: Sacre, Candace | Is there a question there? |
| 11:18:21 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Subject to check, if KU used 2.0 for Route A on cost, Route D would not have scored better than Route A? |
| 11:18:51 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Page 5, rebuttal, lines 5-9, you say Route A center line within 300 feet of only seven residences, correct? |
| 11:19:51 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Route D within 300 feet of 14 residences? |
| 11:19:55 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Line 8, proximity to residences is and should be highly significant? |
| 11:20:05 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Written policy? |
| 11:20:22 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | That statement, is personal opinion or KU statement? |
| 11:21:12 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Line 10 of that page, go on to say that fact means Route D more susceptible to construction delays? |
| 11:21:23 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Referring to distinction between seven and 14 residences on two lines? |
| 11:21:40 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | How many transmission projects sited in career? |
| 11:21:55 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Familiar with gaining access to property? |
| 11:22:17 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Process for gaining access to land for transmission any different? |

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| 11:22:39 AM | Atty Ingram KU | |
| | Note: Sacre, Candace | Object to that, calls for legal conclusion. (Click on link for further comments.) |
| 11:22:58 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Aware of differences in process gaining access to construct transmission line based on land use? |
| 11:23:39 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Schedule delay risk significant in your mind? |
| 11:24:06 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | In this case, say is sense of urgency project delivered on time? |
| 11:24:17 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | What weight given to schedule delay risk this case? |
| 11:24:28 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Relative weight assigned schedule delay risk in Case No. 2019-00417? |
| 11:24:47 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Who made determination to lower schedule delay risk waiting in this case? |
| 11:26:05 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Page 5, lines 10 and 11, Route D required actual purchase of two residences? |
| 11:26:18 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Actual knowledge or just what told? |
| 11:26:30 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Detailed maps alternative routes not selected not filed in record? |
| 11:26:40 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Not have map book for alternatives? |
| 11:26:47 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Provide detailed map Route D as post-hearing data request? |
| 11:27:39 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Page 46 of Team Spatial report, map shows various routes for western transmission line, corridors shaded in purple? |
| 11:28:03 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Then have residences which are white dots? |
| 11:28:26 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Identify on map, where are two residential structures would have to be purchased? |
| 11:28:33 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Right of way 100 feet each side of center line? |
| 11:28:41 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | If homes purchased, then be demolished? |
| 11:28:58 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Right of way 100 feet each side center line? |
| 11:29:04 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Either of residences within right of way of Route D? |
| 11:29:36 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Difference, asked if residential structures purchased and demolished, told residential structures within right of way of Route D? |
| 11:30:08 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Page 56 of siting study, very top row, residences within right of way, Routes A B C D, not see any residences, reading correctly? |
| 11:30:52 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Testimony today KU purchasing residences outside of right of way? |

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| 11:31:21 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Not know distance from proposed center line, know not within right of way? |
| 11:31:30 AM | Atty Ingram KU | |
| | Note: Sacre, Candace | Not what she said. (Click on link for further comments.) |
| 11:31:48 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Testimony was wrong, as we sit here today can't substantiate testimony two residences be purchased? |
| 11:32:08 AM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Examination. Why Route D require purchase of two residences? |
| 11:32:40 AM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | I get that, my question what are safety or overhead clearing issues? |
| 11:33:14 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Cross Examination (cont'd). Page 17 of Team Spatial report, proximity historical sites? |
| 11:33:45 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Identify whether Wade family farm represented by bullseyes? |
| 11:34:11 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | That information derived from data provided by historical preservation office? |
| 11:34:28 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Appears to be centered on actual home? |
| 11:35:03 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | KU had conversations with Wade family about historic or archaeological interest on property? |
| 11:35:25 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | KU not conducted field study on farm? |
| 11:36:04 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Reviewed Wade testimony? |
| 11:36:11 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Familiar with concern deforesting northern end of farm destabilize bank of East Rhudes Creek? |
| 11:36:55 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Has KU made any plans to mitigate impact to creek? |
| 11:37:42 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Familiar with Wade testimony concerning pivot irrigation system? |
| 11:37:51 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Family considered installing second irrigation system? |
| 11:38:11 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Even if line moved 500 feet, still cause interference with second irrigation system? |
| 11:38:50 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Refer to Wade testimony Exhibit 2, last two pages of testimony, agree does indicate potential for second? |
| 11:39:56 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Agree does indicate potential location for second pivot irrigation system? |
| 11:40:05 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | 345 kV Route A proposal goes right smack dab through middle of circle? |
| 11:40:12 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Even if line were to move to east 500 feet, would prevent installation of system? |

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| 11:40:55 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | KU not had conversations with Elizabethtown about crossing southern portion of their parcel on left side Gaither Station Road? |
| 11:41:45 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Attachment to Staff Second, Question 10, one of map books, may be better map, page 46 of Team Spatial report, Figure 39, cluster of green dots west side of Gaither Station, believe is sanitation facility for City of Elizabethtown? |
| 11:43:45 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Municipal property of some sort, agree city owns significant sliver of land on west side of Gaither Station Road south of cluster of green dots? |
| 11:44:23 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Back to map on page 46, Route A, appears another purple corridor bisect corner of city property where west Route D, Route A southwest, then south, and then back to southeast? |
| 11:45:17 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Purple corridor that connects where western routes B, C, and D and where Route A is, see little bridge of purple? |
| 11:45:39 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Subject to check, purple bridge identified as possible corridor for western route? |
| 11:46:03 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Bridge of purple crossed at southern end Elizabethtown property undeveloped? |
| 11:46:15 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Would have avoided portion of forested land on proposed Route A? |
| 11:47:27 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | KU Response, Staff Second, Question 7, attachment to document, system impact study report? |
| 11:47:59 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | What is purpose? |
| 11:49:03 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Page 4 of 5, executive summary, see second paragraph? |
| 11:49:27 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Read that paragraph, as read this, part of LG&E and KU standard tariff for ad hoc study group to be convened? |
| 11:51:41 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | This study only covers construction power? |
| 11:51:48 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | No flow gate analysis performed? |
| 11:52:04 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Not off-peak system analysis performed? |
| 11:52:16 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Criteria for getting fast-track study done? |
| 11:52:46 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | A merchant electric transmission provider been able use same fast track process? |
| 11:53:06 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | KU tendered application for approved jurisdictional determination and nationwide permit to U S Army Corps of Engineers? |
| 11:53:26 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Could copy of application provided as post-hearing data request? |
| 11:53:43 AM | POST-HEARING DATA REQUEST | |
| | Note: Sacre, Candace | ATTY SAMFORD WADE FAMILY - WITNESS MCFARLAND |

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| | Note: Sacre, Candace | APPLICATION FILED WITH U S ARMY CORPS OF ENGINEERS FOR APPROVED JURISDICTIONAL DETERMINATION AND NATIONWIDE PERMIT |
| 11:53:52 AM | Atty Samford Wade Family - witness McFarland | |
| | Note: Sacre, Candace | Look at Wade Family Farm Response to Staff Request 1, Question 1, review response before prepared and submitted rebuttal? |
| 11:56:35 AM | Chairman Chandler | |
| | Note: Sacre, Candace | Questions? |
| 11:57:08 AM | Landowner Grover Berry - witness McFarland | |
| | Note: Sacre, Candace | Cross Examination. Came to my house, showed where lines going to go, later moved it over on some of best property, took answer that, asking why did that? |
| 11:59:29 AM | Landowner Grover Berry - witness McFarland | |
| | Note: Sacre, Candace | Guy doing it, communicating with keeps saying going to move it back, keeps telling me that? |
| 12:01:15 PM | Landowner Grover Berry - witness McFarland | |
| | Note: Sacre, Candace | Three towers on 12 acres my property, why go ahead and drill for towers, why did they do that? |
| 12:02:33 PM | Landowner Grover Berry - witness McFarland | |
| | Note: Sacre, Candace | Not bored on anybody but mine? |
| 12:02:57 PM | Landowner Grover Berry - witness McFarland | |
| | Note: Sacre, Candace | My neighbor Bill Buckles, haven't drilled on him, why drill on mine not know where it's going? |
| 12:03:31 PM | Landowner Grover Berry - witness McFarland | |
| | Note: Sacre, Candace | Back in 1979, KU came across my property, stole my property, still in business of stealing property? |
| 12:04:10 PM | Landowner Grover Berry - witness McFarland | |
| | Note: Sacre, Candace | Representative said do away with line where hooking on main line to E'town, do away with that line? |
| 12:04:37 PM | Landowner Grover Berry - witness McFarland | |
| | Note: Sacre, Candace | If they do do away with them, gonna get a little bit of my land back? |
| 12:04:54 PM | Landowner Grover Berry - witness McFarland | |
| | Note: Sacre, Candace | Going to do away with line going to E'town? |
| 12:05:04 PM | Landowner Grover Berry - witness McFarland | |
| | Note: Sacre, Candace | How long take when start this project to finish? |
| 12:05:51 PM | Landowner Grover Berry - witness McFarland | |
| | Note: Sacre, Candace | August '23? |
| 12:06:01 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Recess until 1:05. |
| 12:06:27 PM | Session Paused | |
| 1:07:08 PM | Session Resumed | |
| 1:07:17 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Back on the record in Case No. 2022-00066. |
| 1:07:33 PM | Staff Atty Tussey PSC | |
| | Note: Sacre, Candace | Procedural discussion. (Click on link for further comments.) |
| 1:08:25 PM | Staff Atty Tussey PSC - witness McFarland | |
| | Note: Sacre, Candace | Cross Examination. Can you see that all right? |
| 1:08:37 PM | Staff Atty Tussey PSC - witness McFarland | |
| | Note: Sacre, Candace | Berry asked about transmission line KU possibly taking out? |
| 1:08:46 PM | Staff Atty Tussey PSC - witness McFarland | |
| | Note: Sacre, Candace | Based on this map, starts proposed route on western side and then line that has little yellow Xs through it, removed KU line? |
| 1:09:10 PM | Staff Atty Tussey PSC - witness McFarland | |
| | Note: Sacre, Candace | Possible that could have been what he was referencing? |

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| 1:09:37 PM | Staff Atty Tussey PSC - witness McFarland | |
| | Note: Sacre, Candace | Clarification lines towards bottom, application page 3 stated owned Brown North Hardin 345 line? |
| 1:09:55 PM | Staff Atty Tussey PSC - witness McFarland | |
| | Note: Sacre, Candace | Also own Daviess County Hardin line? |
| 1:10:03 PM | Staff Atty Tussey PSC - witness McFarland | |
| | Note: Sacre, Candace | At bottom, see both routes come down and proposed Glendale Station down there, looks like EKPC has easements and existing lines there? |
| 1:10:23 PM | Staff Atty Tussey PSC - witness McFarland | |
| | Note: Sacre, Candace | Any overlap easements or existing lines? |
| 1:11:40 PM | Staff Atty Tussey PSC - witness McFarland | |
| | Note: Sacre, Candace | As part of co-location agreement, any discussion of cost allocation? |
| 1:12:39 PM | Staff Atty Tussey PSC - witness McFarland | |
| | Note: Sacre, Candace | Expected date when might be signed or when expect get completed? |
| 1:13:33 PM | Staff Atty Tussey PSC - witness McFarland | |
| | Note: Sacre, Candace | Lines at bottom, more in response to Item 5(a) and to Staff Second, mention talking about tapping into Daviess County Hardin County line creates three terminal with short terminal? |
| 1:14:35 PM | Staff Atty Tussey PSC - witness McFarland | |
| | Note: Sacre, Candace | Talk about susceptibility of misoperation? |
| 1:14:41 PM | Staff Atty Tussey PSC - witness McFarland | |
| | Note: Sacre, Candace | Expound on why chose configuration you did versus alternatives? |
| 1:17:33 PM | Staff Atty Tussey PSC - witness McFarland | |
| | Note: Sacre, Candace | Mentioned misoperation, just because distance would result in? |
| 1:19:27 PM | Staff Atty Tussey PSC - witness McFarland | |
| | Note: Sacre, Candace | Brought up next question, cost, take a look at Spatial study, western and eastern route as far as cost, page 53 of study, pages 69 and 70 for eastern route, general breakdown of cost in Team Spatial study, confirm costs still accurate today or material changes know of? |
| 1:21:07 PM | Staff Atty Tussey PSC - witness McFarland | |
| | Note: Sacre, Candace | These include costs for alternatives, only asked for cost estimates preferred route, able to provide more specific cost estimates for alternative routes as well? |
| 1:22:15 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Examination. Can give your perspective on weight in which Commission give to response, are you able to provide it? |
| 1:22:34 PM | Staff Atty Tussey PSC - witness McFarland | |
| | Note: Sacre, Candace | Cross Examination (cont'd). But as far as reviewing numbers from original report, alternative numbers appear to be similar to those in final estimate? |
| 1:22:53 PM | Staff Atty Tussey PSC - witness McFarland | |
| | Note: Sacre, Candace | More questions about Response, Staff Second, Item 2, list types of equipment financial responsibility of Ford, is that list still accurate? |
| 1:23:45 PM | Staff Atty Tussey PSC - witness McFarland | |
| | Note: Sacre, Candace | Further on, in same DR, Item 10, series of maps that show proposed routes, appears at least both substations and portion of 138 line be on or in Ford property boundary, see that? |
| 1:24:18 PM | Staff Atty Tussey PSC - witness McFarland | |
| | Note: Sacre, Candace | Item 10, series of maps? |
| 1:24:37 PM | Staff Atty Tussey PSC - witness McFarland | |
| | Note: Sacre, Candace | Would appear 138 line at least portion of it is going to be? |
| 1:25:13 PM | Staff Atty Tussey PSC - witness McFarland | |
| | Note: Sacre, Candace | Are portions of 138 line, any of that, Ford financial responsibility? |

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| 1:25:32 PM | Staff Atty Tussey PSC - witness McFarland | |
| | Note: Sacre, Candace | How delineate that? |
| 1:25:53 PM | Staff Atty Tussey PSC - witness McFarland | |
| | Note: Sacre, Candace | Questions about gas main be installed on Ford property? |
| 1:26:10 PM | Staff Atty Tussey PSC - witness McFarland | |
| | Note: Sacre, Candace | Touched on earlier, clarification, Berry mentioned geotechnical study, completed except for two property owners? |
| 1:26:35 PM | Staff Atty Tussey PSC - witness McFarland | |
| | Note: Sacre, Candace | Any other studies pending that you can think of, or completed all studies need to? |
| 1:27:36 PM | Staff Atty Tussey PSC - witness McFarland | |
| | Note: Sacre, Candace | Based on studies and surveys completed, appear line have proposed need to be moved for any reason so far? |
| 1:28:02 PM | Staff Atty Tussey PSC - witness McFarland | |
| | Note: Sacre, Candace | Based on that answer, explain why KU still seeking 1,000-foot corridor, reconcile those answers? |
| 1:29:24 PM | Staff Atty Tussey PSC - witness McFarland | |
| | Note: Sacre, Candace | Rebuttal pages 12 and 13, appears that company agrees consider alternative route proposed by Browns? |
| 1:30:33 PM | Staff Atty Tussey PSC - witness McFarland | |
| | Note: Sacre, Candace | Confirm no additional property owners affected by that decision? |
| 1:30:53 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Examination. Include right of way or just center line and facility? |
| 1:31:08 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | 345 line, right of way is 100 feet either side? |
| 1:31:15 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Include only area line will run or line plus right of way? |
| 1:31:57 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | 200-foot corridor? |
| 1:32:04 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Ordinary right of way for 345 be 200 feet? |
| 1:33:57 PM | Asst Gen Counsel Frederick PSC - witness McFarland | |
| | Note: Sacre, Candace | Cross Examination (cont'd). See where yellow line proposed route and blue line where two parallel one another, from engineering perspective, what problem be with connecting along that spot? |
| 1:34:31 PM | Asst Gen Counsel Frederick PSC - witness McFarland | |
| | Note: Sacre, Candace | Somewhere along line where line is parallel, to tap into existing line there, what would be the engineering problem? |
| 1:35:15 PM | Asst Gen Counsel Frederick PSC - witness McFarland | |
| | Note: Sacre, Candace | Where lines begin to run parallel? |
| 1:36:03 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Examination. See Route 3005, line runs parallel proposed line at beginning and then runs left where proposed runs south, see that? |
| 1:36:31 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Line runs parallel first third or first quarter and deviates to left, what voltage is the line? |
| 1:36:42 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Likely a monopole 69 kV line? |
| 1:36:52 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Could a 345 kV line single circuit or normal be co-located with that 69 kV line? |
| 1:37:59 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Line running in middle of screen is 69 kV and one running to west 69 kV as well? |

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| 1:38:10 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Blue lines on either side of proposed line? |
| 1:38:13 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | One running south is 69 kV line? |
| 1:38:16 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | One running west is what? |
| 1:38:24 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | One running west may been one counsel was asking about, taps into other line up above? |
| 1:38:37 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Proposed to tap in at 3005? |
| 1:38:41 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | What engineering concern with tapping line there where stop running parallel and deviate? |
| 1:39:23 PM | Atty Ingram KU | |
| | Note: Sacre, Candace | What was going to say, trying to understand Tussey question. (Click on link for further comments.) |
| 1:40:28 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Examination. Will be two lines running from Hardin County substation to five o'clock out of substation down, current line rerouted south instead of current location where be removed? |
| 1:40:53 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Separate parallel line will turn with it and run parallel and then run to eight or nine o'clock, current line not move at all, two 345 lines currently come south out of Hardin County substation? |
| 1:41:13 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Will continue be two lines out of Hardin County substation? |
| 1:41:23 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Proposing it run parallel to other 345 line until gets north of parkway and then directly south, that's proposal? |
| 1:41:44 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Not necessarily tapping into line, line begin or end at substation? |
| 1:42:11 PM | Staff Atty Tussey PSC - witness McFarland | |
| | Note: Sacre, Candace | Cross Examination (cont'd). Mentioned tripping of other line, causing fault, be possible install breaker prevent misoperation occurring? |
| 1:43:12 PM | Staff Atty Tussey PSC | |
| | Note: Sacre, Candace | Mark PSC Staff Exhibit 1. |
| 1:43:16 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Objection? |
| 1:43:22 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Mark this as PSC Staff Exhibit 1. |
| 1:43:34 PM | Staff Atty Tussey PSC | |
| | Note: Sacre, Candace | Move be admitted. |
| 1:43:35 PM | PSC STAFF EXHIBIT 1 | |
| | Note: Sacre, Candace | STAFF ATTY TUSSEY PSC - WITNESS MCFARLAND |
| | Note: Sacre, Candace | MAP OF GLENDALE MEGASITE MADE BY PUBLIC SERVICE COMMISSION MAY 30 2022 |
| 1:44:00 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Examination. Expert judgment model, Team Spatial study, 1s and 2s are values assigned to each criteria? |
| 1:45:12 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | 1s and 2s for community issues, schedule delay risk, reliability, natural environmental considerations, construction maintenance accessibility? |

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| 1:45:23 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Cost 1 for cheapest and 2 being amount relative to 1 of cost between two options? |
| 1:45:46 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Would seem, pursuant Team Spatial study, page 53 of 87, A ten percent more expensive than D which make sense for relative 1.1 or 1.1 relative to 1, accurate? |
| 1:46:12 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Some high level description of other criteria in Team Spatial study? |
| 1:46:29 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Says what schedule delay risks may be, construction/community issues might be? |
| 1:46:40 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Any of those quantitative? |
| 1:48:24 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Do we have criteria used to make expert judgment? |
| 1:48:59 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Post-hearing data request documentary support for quantitative side of expert judgment model, but is expert judgment model derived from every GTR Kentucky Transmission Line Siting Methodology? |
| 1:49:25 PM | POST-HEARING DATA REQUEST | |
| | Note: Sacre, Candace | CHAIRMAN CHANDLER - WITNESS MCFARLAND |
| | Note: Sacre, Candace | DOCUMENTARY SUPPORT FOR QUANTITATIVE SIDE OF EXPERT JUDGMENT MODEL |
| 1:50:20 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Do you have bigger version of Wade Family 2? |
| 1:50:29 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Workshop presentation that starts with Appendix F, slide reproduced on F-22, Expert Judgment, reproduction table that looks very similar included Team Spatial? |
| 1:51:35 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Provides different issues some of which in your study and some are not? |
| 1:51:50 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Issues are virtual issues, community issues, schedule delay risk, special permit issues, construction maintenance accessibilty, and environmental justice? |
| 1:52:02 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Ones used same as used in Big Rivers community issues, schedule delay risk reliability, natural environment considerations, construction maintenance accessibility, and cost? |
| 1:52:18 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Each provided weight, three routes on example? |
| 1:52:29 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | See provides narrative explanation of what expert judgment is? |
| 1:52:42 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | It says, "Evaluation metrics are normalized and assigned weights," reading (click on link for further comments), read right? |
| 1:52:59 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Take it 1 through 3, numbers used here, is ranking? |
| 1:53:15 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Either assigned 1, 2, or 3? |
| 1:53:19 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Take it, if two have 1, probably just equal? |

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| 1:53:25 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Then other one is left out, so is a third? |
| 1:53:32 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Rank these as 1, 2, 3, do you have Big Rivers, page 56, expert judgment model Big Rivers, rank these 1 and 1.5? |
| 1:54:03 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | But did go ahead with 1.1 and 1.0 for cost? |
| 1:54:13 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Based on experience and input into study, ranking them for everything other than costs and then scoring it relative each other for costs? |
| 1:54:57 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Almost identical to A&D here? |
| 1:55:10 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Given explanation of purpose of ranking that expert judgment model supposed to take into account, seem in line with explanation expert judgment model presentation describes, seem in line with ranking? |
| 1:56:04 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Not there because seem to me all qualitative considerations and not quantitative considerations, risks, agree? |
| 1:56:25 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Because you not need judgment when comes to quantitative items because relative each other, accountable? |
| 1:56:37 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | But qualitative issues require additional judgment? |
| 1:56:52 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Regards cost, proposed route 10 percent more expensive than Route D? |
| 1:57:04 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | When determined greater specificity cost, more or less than cost identified in Team Spatial study? |
| 1:57:19 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Western transmission line Route A chosen total identified as $19.5 million, provided greater detailed cost estimate for project, more or less than initial estimate? |
| 1:57:42 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Above or below the $19.469 million? |
| 1:57:54 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Know whether reasons below would impact other cost estimate for B, C, and D? |
| 1:58:29 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Go back and say conductoring happened, something would apply as cost reduction to all alternatives, anything would impact generally all four of them now that A is lower? |
| 1:59:17 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Project A specific how calculate but cost savings not necessarily exclusive to Project A? |
| 1:59:26 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Go to page 53 of 87, Team Spatial study, page 66 of application, below total cost projects individual parts inputs into total cost of project, see that? |
| 2:00:03 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | See at bottom cost of residence, $100k per resident? |
| 2:00:15 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Know what that supposed to represent? |

2:00:33 PM Chairman Chandler - witness McFarland
Note: Sacre, Candace Testimony earlier expectation is that D require purchase of two residences?
2:01:02 PM Chairman Chandler - witness McFarland
Note: Sacre, Candace That cost not taken into account in this determination?
2:01:39 PM Chairman Chandler - witness McFarland
Note: Sacre, Candace Not see line that shows actual cost of purchasing homes?
2:01:48 PM Chairman Chandler - witness McFarland
Note: Sacre, Candace Shows how many residences in right of way, in top row?
2:01:57 PM Chairman Chandler - witness McFarland
Note: Sacre, Candace Indicate any residences in any right of ways for proposed routes?
2:02:04 PM Chairman Chandler - witness McFarland
Note: Sacre, Candace How about projected residences within 300 feet of center line, any show residences within 300 feet of center line?
2:02:25 PM Chairman Chandler - witness McFarland
Note: Sacre, Candace Only one shows residences within 300 feet is Route C?
2:02:46 PM Chairman Chandler - witness McFarland
Note: Sacre, Candace Residences within 300 feet of center line and then projected residences within 300 feet of center line?
2:03:06 PM Chairman Chandler - witness McFarland
Note: Sacre, Candace Current residences today, homes built third row, and expected be built is fourth row?
2:03:28 PM Chairman Chandler - witness McFarland
Note: Sacre, Candace Within 300 feet of center line, is that150 feet on either side of center line or 300 feet of center line which would indicate a 600-foot corridor?
2:03:46 PM Chairman Chandler - witness McFarland
Note: Sacre, Candace Do you know what is distance from center line cannot have residence?
2:04:06 PM Chairman Chandler - witness McFarland
Note: Sacre, Candace Route A all seven residences between 100 and 300 feet?
2:04:17 PM Chairman Chandler - witness McFarland
Note: Sacre, Candace Only route has any building within 100 foot either side of center line is Route C?
2:04:41 PM Chairman Chandler - witness McFarland
Note: Sacre, Candace Second row, outbuildings within right of way?
2:04:48 PM Chairman Chandler - witness McFarland
Note: Sacre, Candace Talking about natural environment and construction maintenance, where things like natural, row natural, how tree clearings, stream and river crossings, right of ways within stream/river buffer, and wetlands taken into account?
2:05:45 PM Chairman Chandler - witness McFarland
Note: Sacre, Candace Goes to heart of post-hearing data request, quantitative determinations seems more difficult for A natural considerations and be in line with Figure 52 ranked 2 out of 2 Route A, page 61?
2:06:28 PM Chairman Chandler - witness McFarland
Note: Sacre, Candace Seems to be worse for environmental considerations why ranked 2 out of 2, Route A?
2:06:53 PM Chairman Chandler - witness McFarland
Note: Sacre, Candace Know whether those type of quantitative determinations - harder do right of way clearing moving forward for Route A than Route D?
2:07:23 PM Chairman Chandler - witness McFarland
Note: Sacre, Candace Number of acres, but seems be significant more right of way within stream and river buffers for A?

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| 2:07:37 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | More costly, more difficult clear right of way areas of streams and river buffers than in fields and even trees? |
| 2:07:53 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Not rank relative to each other, tied for first, individually first, or tied second? |
| 2:08:19 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | 345 kV east and west lines proposed be single or double circuit? |
| 2:08:29 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Any consideration given running only one of lines as double circuit? |
| 2:09:04 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Make internal reliability determination not want terminal substation at Glendale? |
| 2:09:22 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | If did single 345, only did Route A for western, would substation just be terminal substation with single, even if was double circuit just be down in that substation? |
| 2:09:43 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Made companywide determination not want radial feeds and substations out by selves, have that internal determination for engineering planning? |
| 2:11:19 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Have concern excessive run lines as double circuits have two of them? |
| 2:11:37 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | See it as being too much run double circuit 345s into and out of substation? |
| 2:12:28 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | If have 345 kV lines to single substation, how much load substation actually take, Ford 320 megawatts peak load, most amount of power can be taken from that 345 megawatts since 345 kV circuit providing service to substation? |
| 2:13:48 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | How much headroom exists on line today out of 1500? |
| 2:14:14 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Reason ask, Samford questions to you about additional load growth, right sizing building large enough where take extra 1,000 megawatts load and have headroom or right sizing to where few hundred megawatts serve remainder Glendale area? |
| 2:14:52 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Post-hearing data request how much headroom be left there to serve remainder of area without additional upgrade? |
| 2:14:53 PM | POST-HEARING DATA REQUEST | |
| | Note: Sacre, Candace | CHAIRMAN CHANDLER - WITNESS McFARLAND |
| | Note: Sacre, Candace | HOW MUCH HEADROOM REMAINING TO SERVE AREA WITHOUT ADDITIONAL UPGRADE |
| 2:14:56 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | At what voltage Ford be taking power? |
| 2:15:10 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Not own transformers step down to distribution? |
| 2:15:27 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Not have any stepdown at 21 or 12.5 kV for distribution? |
| 2:15:40 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Will they own that transformer or you own that transformer? |

| | | |
|---|---|---|
| 2:15:50 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Power to serve them coming from somewhere else or some sort of co-location or generation put back onto system in that area, planning with expectation? |
| 2:16:27 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Rooftop solar, at this point, behind the meter? |
| 2:16:36 PM | Chairman Chandler - witness McFarland | |
| | Note: Sacre, Candace | Not planning receive power at that point? |
| 2:17:03 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Redirect? |
| 2:17:11 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Step down, given breadth of testimony stick around for rest of hearing. |
| 2:17:23 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Recess until 2:30. |
| 2:17:48 PM | Session Paused | |
| 2:30:11 PM | Session Resumed | |
| 2:30:26 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Back on the record in Case No. 2022-00066. |
| 2:30:29 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Procedural discussions. (Click on link for further comments.) |
| 2:32:33 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Next witness? |
| 2:32:36 PM | Atty Ingram KU | |
| | Note: Sacre, Candace | Robert Conroy. |
| 2:32:46 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Witness is sworn. |
| 2:32:57 PM | Chairman Chandler - witness Conroy | |
| | Note: Sacre, Candace | Examination. Name and address? |
| 2:33:13 PM | Atty Ingram KU - witness Conroy | |
| | Note: Sacre, Candace | Direct Examination. Cause to be prepared and filed direct? |
| 2:33:23 PM | Atty Ingram KU - witness Conroy | |
| | Note: Sacre, Candace | Not have rebuttal? |
| 2:33:27 PM | Atty Ingram KU - witness Conroy | |
| | Note: Sacre, Candace | Also cause to be filed responses? |
| 2:33:38 PM | Atty Ingram KU - witness Conroy | |
| | Note: Sacre, Candace | Have changes or corrections? |
| 2:33:54 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Questions? |
| 2:34:16 PM | Landowner Grover Berry - witness Conroy | |
| | Note: Sacre, Candace | Cross Examination. When representative came and gave me quote what would give me from property, take into consideration going to take five acres or six acres of trees, cut those trees down? |
| 2:35:10 PM | Landowner Grover Berry - witness Conroy | |
| | Note: Sacre, Candace | They always cut them down? |
| 2:35:25 PM | Landowner Grover Berry - witness Conroy | |
| | Note: Sacre, Candace | No plan for erosion? |
| 2:36:20 PM | Landowner Grover Berry - witness Conroy | |
| | Note: Sacre, Candace | Just wonder why not tell me all that before came with offer, not know anything about that? |
| 2:36:41 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Questions? |

| | | |
|---|---|---|
| 2:36:43 PM | Staff Atty Tussey PSC - witness Conroy | |
| | Note: Sacre, Candace | Cross Examination. Post-hearing data request you responsible for cost of service, interested in drawing or diagram of substations and items be built on Ford property and who financially responsible? |
| 2:38:47 PM | Staff Atty Tussey PSC - witness Conroy | |
| | Note: Sacre, Candace | Metering point one thing not have picture of and also be what looking for, gas line that come through, on Ford property, too, include, too, in diagram, expense? |
| 2:39:29 PM | Chairman Chandler - witness Conroy | |
| | Note: Sacre, Candace | Examination. Had hearing yesterday, CPCN transmission line, no contract with their customer, had quite a few questions about responsibilities, expectation, be special contract? |
| 2:40:42 PM | Chairman Chandler - witness Conroy | |
| | Note: Sacre, Candace | Only customer of this size not take from RTS, take from own FLS? |
| 2:41:07 PM | Chairman Chandler - witness Conroy | |
| | Note: Sacre, Candace | Talking about hundreds, if not billion-plus, kilowatts a year? |
| 2:41:16 PM | Chairman Chandler - witness Conroy | |
| | Note: Sacre, Candace | When special contract completed? |
| 2:41:31 PM | Chairman Chandler - witness Conroy | |
| | Note: Sacre, Candace | Then file with Commission after four to six months? |
| 2:41:37 PM | Chairman Chandler - witness Conroy | |
| | Note: Sacre, Candace | Expected have terms recovery of costs, serve Ford? |
| 2:42:06 PM | Chairman Chandler - witness Conroy | |
| | Note: Sacre, Candace | How about in event not operate as long as anticipated? |
| 2:42:26 PM | Chairman Chandler - witness Conroy | |
| | Note: Sacre, Candace | Expect filed with Commission prior to end of 2022? |
| 2:42:33 PM | Chairman Chandler - witness Conroy | |
| | Note: Sacre, Candace | For service beginning when, Aug 2023? |
| 2:42:51 PM | Chairman Chandler - witness Conroy | |
| | Note: Sacre, Candace | Any power provided today tariff rate? |
| 2:43:05 PM | Chairman Chandler - witness Conroy | |
| | Note: Sacre, Candace | Secondary voltage? |
| 2:43:07 PM | Chairman Chandler - witness Conroy | |
| | Note: Sacre, Candace | No special contract other than MOU related to service to Ford? |
| 2:43:34 PM | Chairman Chandler - witness Conroy | |
| | Note: Sacre, Candace | Have to be under special contract for excess facilities charge or rider applied whatever tariff today? |
| 2:43:48 PM | Chairman Chandler - witness Conroy | |
| | Note: Sacre, Candace | Mobile transformers, already covered by rider in tariffs? |
| 2:44:20 PM | Chairman Chandler - witness Conroy | |
| | Note: Sacre, Candace | Concern about power, have enough power to serve in 2024? |
| 2:45:02 PM | Chairman Chandler - witness Conroy | |
| | Note: Sacre, Candace | Additional 320 MW specifically changed your retirement plans? |
| 2:45:18 PM | Chairman Chandler - witness Conroy | |
| | Note: Sacre, Candace | Changed any investments ELG/CCR compliance as relates to Mill Creek or Ghent? |
| 2:45:28 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Mr. Ingram? |
| 2:45:39 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Anything else? |
| 2:45:43 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Case for company? |
| 2:45:45 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Ms. Glass, first witness? |

2:45:48 PM Atty Glass Brown Family
Note: Sacre, Candace Gunes Demirbas.
2:46:01 PM Chairman Chandler
Note: Sacre, Candace Witness is sworn.
2:46:11 PM Chairman Chandler - witness Demirbas
Note: Sacre, Candace Examination. Name and address?
2:46:34 PM Atty Glass Brown Family - witness Demirbas
Note: Sacre, Candace Direct Examination. Cause to be filed direct?
2:46:41 PM Atty Glass Brown Family - witness Demirbas
Note: Sacre, Candace Changes or corrections?
2:46:48 PM Atty Glass Brown Family - witness Demirbas
Note: Sacre, Candace Ask same questions, would answers be same?
2:46:58 PM Atty Glass Brown Family - witness Demirbas
Note: Sacre, Candace What materials in front of you today?
2:47:58 PM Chairman Chandler
Note: Sacre, Candace Witness excused.
2:48:09 PM Chairman Chandler
Note: Sacre, Candace Next witness?
2:48:17 PM Atty Glass Brown Family
Note: Sacre, Candace Allen Summers.
2:48:36 PM Chairman Chandler
Note: Sacre, Candace Witness is sworn.
2:48:41 PM Chairman Chandler - witness Summers
Note: Sacre, Candace Examination. Name and address?
2:48:58 PM Atty Glass Brown Family - witness Summers
Note: Sacre, Candace Direct Examination. Relationship to Browns?
2:49:04 PM Atty Glass Brown Family - witness Summers
Note: Sacre, Candace Cause to be filed direct and responses?
2:49:12 PM Atty Glass Brown Family - witness Summers
Note: Sacre, Candace Changes or corrections?
2:49:16 PM Atty Glass Brown Family - witness Summers
Note: Sacre, Candace Asked same questions, answers be same?
2:49:22 PM Atty Glass Brown Family - witness Summers
Note: Sacre, Candace Materials in front of you?
2:49:28 PM Chairman Chandler
Note: Sacre, Candace Questions?
2:50:12 PM Chairman Chandler
Note: Sacre, Candace Witness excused.
2:50:17 PM Chairman Chandler
Note: Sacre, Candace Additional witness?
2:50:23 PM Atty Glass Brown Family
Note: Sacre, Candace Michael Billings.
2:50:40 PM Chairman Chandler
Note: Sacre, Candace Witness is sworn.
2:50:48 PM Chairman Chandler - witness Billings
Note: Sacre, Candace Examination. Name and address?
2:51:02 PM Atty Ward Brown Family - witness Billings
Note: Sacre, Candace Direct Examination. Who is employer?
2:51:08 PM Atty Ward Brown Family - witness Billings
Note: Sacre, Candace Position?
2:51:21 PM Atty Ward Brown Family - witness Billings
Note: Sacre, Candace Cause to be filed testimony?
2:51:28 PM Atty Ward Brown Family - witness Billings
Note: Sacre, Candace Changes or corrections?

| | | |
|---|---|---|
| 2:51:32 PM | Atty Ward Brown Family - witness Billings | |
| | Note: Sacre, Candace | Asked same questions, answers be same? |
| 2:51:44 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Questions? |
| 2:51:52 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Witness excused. |
| 2:51:59 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Is that it from The Browns? |
| 2:52:20 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Mr. Samford? |
| 2:52:22 PM | Atty Samford Wade Family | |
| | Note: Sacre, Candace | Thomas Wade. |
| 2:52:53 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Witness is sworn. |
| 2:53:01 PM | Chairman Chandler - witness Wade | |
| | Note: Sacre, Candace | Examination. Name and address? |
| 2:53:15 PM | Atty Samford Wade Family - witness Wade | |
| | Note: Sacre, Candace | Direct Examination. Cause certain testimony and responses be filed? |
| 2:53:24 PM | Atty Samford Wade Family - witness Wade | |
| | Note: Sacre, Candace | Changes edits or additions? |
| 2:53:36 PM | Atty Samford Wade Family - witness Wade | |
| | Note: Sacre, Candace | What is that you have with you? |
| 2:54:45 PM | Atty Samford Wade Family - witness Wade | |
| | Note: Sacre, Candace | Why not included in original testimony? |
| 2:56:12 PM | Atty Ingram KU | |
| | Note: Sacre, Candace | New direct testimony. (Click on link for further comments.) |
| 2:56:41 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Anything else? |
| 2:56:44 PM | Atty Samford Wade Family - witness Wade | |
| | Note: Sacre, Candace | Ask same questions, answers be same? |
| 2:56:56 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Questions? |
| 2:57:10 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Have one more? |
| 2:57:12 PM | Atty Samford Wade Family | |
| | Note: Sacre, Candace | Marty Marchaterre. |
| 2:57:28 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Witness is sworn. |
| 2:57:35 PM | Chairman Chandler - witness Marchaterre | |
| | Note: Sacre, Candace | Examination. Name and address? |
| 2:57:53 PM | Atty Samford Wade Family - witness Marchaterre | |
| | Note: Sacre, Candace | Direct Examination. Cause certain testimony and responses be filed? |
| 2:58:01 PM | Atty Samford Wade Family - witness Marchaterre | |
| | Note: Sacre, Candace | Additions, corrections, or changes? |
| 2:58:29 PM | Atty Samford Wade Family | |
| | Note: Sacre, Candace | Going to ask Mr. Marchaterre about Native American artifacts just provided. |
| 2:58:30 PM | Atty Samford Wade Family - witness Marchaterre | |
| | Note: Sacre, Candace | Asked same questions, answers be same? |
| 2:58:33 PM | Atty Samford Wade Family - witness Marchaterre | |
| | Note: Sacre, Candace | Have you had opportunity to review those? |

| | | |
|---|---|---|
| 2:58:38 PM | Atty Ingram KU | |
| | Note: Sacre, Candace | Same objection, new direct testimony. (Click on link for further comments.) |
| 2:59:30 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Sustain the objection, no reason provided why information been provided in direct. (Click on link for further comments.) |
| 3:00:24 PM | Atty Samford Wade Family - witness Marchaterre | |
| | Note: Sacre, Candace | What was evidence or what was findings of evaluation that you had? |
| 3:00:53 PM | Atty Samford Wade Family - witness Marchaterre | |
| | Note: Sacre, Candace | These were on field where proposed transmission lines? |
| 3:01:12 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Questions? |
| 3:01:14 PM | Atty Ingram KU - witness Marchaterre | |
| | Note: Sacre, Candace | Cross Examination. Familiar with Team Spatial Siting Study filed in case? |
| 3:01:21 PM | Atty Ingram KU - witness Marchaterre | |
| | Note: Sacre, Candace | Have reviewed? |
| 3:01:25 PM | Atty Ingram KU - witness Marchaterre | |
| | Note: Sacre, Candace | Familiar with fact two methodologies are referred to as 2006 EPRI GTC Overhead Electric Transmission Line Siting Methodology for the first one, and the second one 2007 Kentucky Transmission Line Siting Methodology? |
| 3:01:47 PM | Atty Ingram KU - witness Marchaterre | |
| | Note: Sacre, Candace | Read two methodologies? |
| 3:01:53 PM | Atty Ingram KU - witness Marchaterre | |
| | Note: Sacre, Candace | Recall seeing name Jesse Glasgow in either? |
| 3:02:02 PM | Atty Ingram KU - witness Marchaterre | |
| | Note: Sacre, Candace | Familiar with who is? |
| 3:02:06 PM | Atty Ingram KU - witness Marchaterre | |
| | Note: Sacre, Candace | Have copy of study with you? |
| 3:02:20 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Team Spatial Siting is exhibit this case or your Team Spatial Siting included in application? (Click on link for further comments.) |
| 3:02:48 PM | Atty Ingram KU - witness Marchaterre | |
| | Note: Sacre, Candace | Have read document? |
| 3:02:54 PM | Atty Ingram KU - witness Marchaterre | |
| | Note: Sacre, Candace | First page, please, and see who report prepared by? |
| 3:03:19 PM | Atty Ingram KU - witness Marchaterre | |
| | Note: Sacre, Candace | See specifically prepared by Jesse Glasgow? |
| 3:03:25 PM | Atty Ingram KU - witness Marchaterre | |
| | Note: Sacre, Candace | Said had read two transmission line siting methodologies upon which Team Spatial Report relies? |
| 3:03:37 PM | Atty Ingram KU - witness Marchaterre | |
| | Note: Sacre, Candace | Aware Mr. Glasgow part of team studied and produced 2006 EPRI GTC Overhead Electric Transmission Line Siting Methodology? |
| 3:03:50 PM | Atty Ingram KU - witness Marchaterre | |
| | Note: Sacre, Candace | Also aware project manager and principal investigator for 2007 Kentucky Transmission Line Siting Methodology? |
| 3:04:04 PM | Atty Ingram KU - witness Marchaterre | |
| | Note: Sacre, Candace | On either of those teams? |
| 3:04:10 PM | Atty Ingram KU - witness Marchaterre | |
| | Note: Sacre, Candace | Attached to testimony resume 19 single-spaced pages, correct? |
| 3:04:23 PM | Atty Ingram KU - witness Marchaterre | |
| | Note: Sacre, Candace | Have resume in front of you? |

| | | |
|---|---|---|
| 3:04:31 PM | Atty Ingram KU - witness Marchaterre | |
| | Note: Sacre, Candace | Page 2, list number of project experiences? |
| 3:04:51 PM | Atty Ingram KU - witness Marchaterre | |
| | Note: Sacre, Candace | Page 2, close to top, says solar, and list number of projects, those are projects worked on in past related to solar? |
| 3:05:03 PM | Atty Ingram KU - witness Marchaterre | |
| | Note: Sacre, Candace | Projects span all the way to page 19? |
| 3:05:17 PM | Atty Ingram KU - witness Marchaterre | |
| | Note: Sacre, Candace | 128 project experiences, believe to be accurate? |
| 3:05:32 PM | Atty Ingram KU - witness Marchaterre | |
| | Note: Sacre, Candace | Page 15, resume? |
| 3:05:47 PM | Atty Ingram KU - witness Marchaterre | |
| | Note: Sacre, Candace | See caption transmission lines? |
| 3:05:53 PM | Atty Ingram KU - witness Marchaterre | |
| | Note: Sacre, Candace | Seem to be related to one line in Illinois and Missouri? |
| 3:06:07 PM | Atty Ingram KU - witness Marchaterre | |
| | Note: Sacre, Candace | Three projects relate to different segments of that line? |
| 3:06:12 PM | Atty Ingram KU - witness Marchaterre | |
| | Note: Sacre, Candace | In total, 330-mile line according to resume? |
| 3:06:17 PM | Atty Ingram KU - witness Marchaterre | |
| | Note: Sacre, Candace | For those projects, performed environmental planning support? |
| 3:06:23 PM | Atty Ingram KU - witness Marchaterre | |
| | Note: Sacre, Candace | Accurate say of 128 items listed in resume, only three relate to electric transmission lines? |
| 3:06:32 PM | Atty Ingram KU - witness Marchaterre | |
| | Note: Sacre, Candace | Of three, all related to single line in Illinois and Missouri? |
| 3:06:42 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Questions? |
| 3:06:50 PM | Chairman Chandler - witness Marchaterre | |
| | Note: Sacre, Candace | Examination. Not know about providing testimony to public service commissions, have provided testimony used to support applications in front of siting board? |
| 3:07:02 PM | Chairman Chandler - witness Marchaterre | |
| | Note: Sacre, Candace | Done merchant transmission siting for siting board, any studies related? |
| 3:07:11 PM | Chairman Chandler - witness Marchaterre | |
| | Note: Sacre, Candace | Mentioned this is representative review of experience, done transmission work not included? |
| 3:07:20 PM | Chairman Chandler - witness Marchaterre | |
| | Note: Sacre, Candace | Conducted one of these methodologies pursuant to Kentucky Transmission Line Siting Methodology or any of other states' methodologies based off EPRI GTC methodology? |
| 3:07:47 PM | Chairman Chandler - witness Marchaterre | |
| | Note: Sacre, Candace | Taken issue with judgments of folks who prepared study, specifically what would have done differently? |
| 3:09:22 PM | Chairman Chandler - witness Marchaterre | |
| | Note: Sacre, Candace | Asking questions of study done? |
| 3:09:27 PM | Chairman Chandler - witness Marchaterre | |
| | Note: Sacre, Candace | What would you have done differently? |
| 3:10:00 PM | Chairman Chandler - witness Marchaterre | |
| | Note: Sacre, Candace | Specificity is helpful, say would have taken into account cemeteries? |
| 3:10:09 PM | Chairman Chandler - witness Marchaterre | |
| | Note: Sacre, Candace | Just not identify as cemeteries in sense of cemeteries, noted them as part of churches and noticed them as churches, necessarily incorrect? |

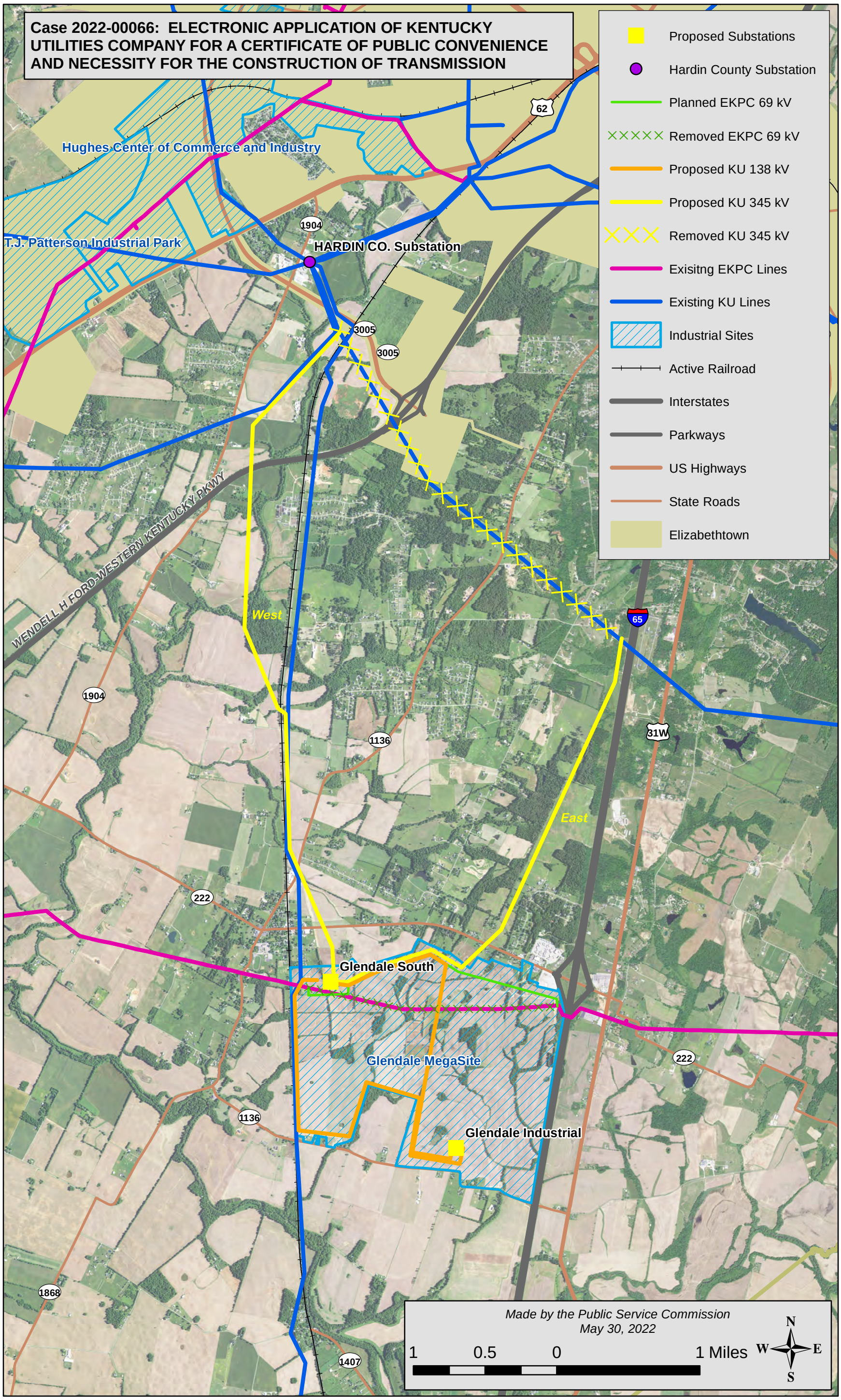
| | | |
|---|---|---|
| 3:11:13 PM | Chairman Chandler - witness Marchaterre | |
| | Note: Sacre, Candace | Think inclusion of filters specific to buffer zones would have changed outcome of expert judgment or alternate corridors study? |
| 3:12:12 PM | Chairman Chandler - witness Marchaterre | |
| | Note: Sacre, Candace | Along lines of testimony, any information helps, in addition to testimony not have burden of proof, trying to understand what would have done differently supported position or changed routes, anything else you can think of done differently? |
| 3:13:26 PM | Chairman Chandler - witness Marchaterre | |
| | Note: Sacre, Candace | When say types of streams, saying distinction between streams water all year verse ephemeral streams, type of vegetation, more specific differences? |
| 3:14:35 PM | Chairman Chandler - witness Marchaterre | |
| | Note: Sacre, Candace | Done before, Illinois-Missouri case, siting board cases, what is understanding of standard and case in front of Commission in terms of what company has to prove verse different permits required after utility gets CPCN? |
| 3:15:21 PM | Chairman Chandler - witness Marchaterre | |
| | Note: Sacre, Candace | Is that normal? |
| 3:15:41 PM | Chairman Chandler - witness Marchaterre | |
| | Note: Sacre, Candace | Understanding TVA under different legal obligation? |
| 3:15:57 PM | Chairman Chandler - witness Marchaterre | |
| | Note: Sacre, Candace | For all of them, regardless of timing or pressing? |
| 3:16:06 PM | Chairman Chandler - witness Marchaterre | |
| | Note: Sacre, Candace | For each transmission line? |
| 3:16:11 PM | Chairman Chandler - witness Marchaterre | |
| | Note: Sacre, Candace | You say we, your firm or you, yourself, personal knowledge or firm's experience? |
| 3:16:35 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Mr. Samford, redirect? |
| 3:16:39 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Witness excused. |
| 3:16:48 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Anything else? |
| 3:17:00 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Post-hearing data requests. (Click on link for further comments.) |
| 3:18:09 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Briefs. (Click on link for further comments.) |
| 3:20:18 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Procedural discussions. (Click on link for further comments.) |
| 3:22:42 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Any additional concerns? |
| 3:23:10 PM | Chairman Chandler | |
| | Note: Sacre, Candace | Hearing adjourned. |
| 3:23:22 PM | Session Ended | |

# Exhibit List Report

**2022-00066 01Jun2022**

**Kentucky Utilities Company (KU)**

| Name: | Description: |
|---|---|
| PSC STAFF EXHIBIT 1 | MAP OF GLENDALE MEGASITE MADE BY PUBLIC SERVICE COMMISSION MAY 30 2022 |
| WADE FAMILY FARM EXHIBIT 1 | TEAM SPATIAL SITING REPORT |
| WADE FAMILY FARM EXHIBIT 2 | KENTUCKY STATE SITING MODEL |




**PSC STAFF EXHIBIT 1**

TEAM SPATIAL

Big Rivers
ELECTRIC CORPORATION

# 345 & 161 kV Transmission Lines
# Brandenburg Steel Mill
# Routing Study

## Project Report

Prepared by: Jesse Glasgow and Nicholas Arjona, Team Spatial
Date: November 7, 2019



**WADE FAMILY FARM EXHIBIT 1**

TEAM SPATIAL

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## Project Overview

Big Rivers Electric Corporation plans to construct three transmission lines that connect the proposed Brandenburg Steel Mill Substation, proposed Otter Creek Substation, proposed Redmon Road Substation, and Meade County Substation.

The project involves constructing one 2.58 mile 345 kV transmission line northwestward out of the proposed Redmon Road Substation. The northwestern end point for this proposed transmission line will terminate at the proposed Otter Creek Substation.

From the proposed Otter Creek Substation, a second 345 kV line will extend to the north approximately 8.79 miles to the proposed steel mill.

A 161 kV transmission line will extend 8.52 miles eastward from the existing Meade County Substation at the intersection of KY-79 and Guston Road. The eastern terminal will be the proposed Otter Creek Substation.

In support of this project, Team Spatial performed a siting study to help the Big Rivers team identify the preferred routes to construct the new lines. The siting study considered the natural environment and people as well as cost and engineering concerns. The route selection process is described in this report.

## Study Area Description

The Brandenburg Steel Mill project is in Meade County, Kentucky. Meade County is home to about 28,000 residents and has a population density of about 85 people per square mile.

The study area is mainly agricultural with some forested land in the northwest and an urban portion in the center. The terrain is relatively flat with the Ohio River serving as a northern border to the county. There is a park in the southern center of the study area with special areas such as schools and churches near the urban portion.

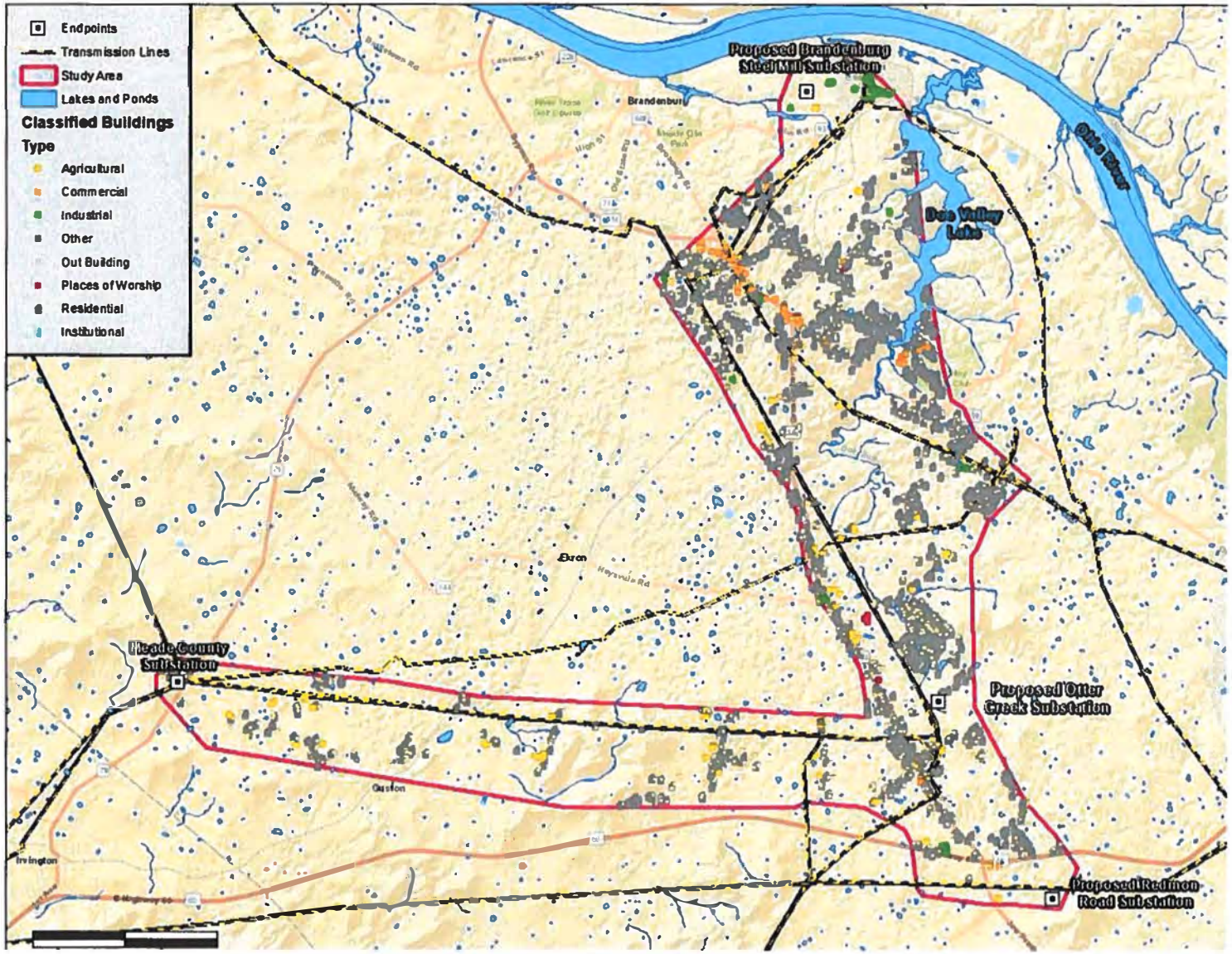



*Figure 1 Study Area Map*

## Siting Methodology Overview

The EPRI (Electric Power Research Institute) - GTC (Georgia Transmission Corporation) Siting Methodology[1] and the Kentucky Siting Model[2] was used on this project. The methodology uses a data driven objective process that leverages external stakeholder input from representative organizations to help calibrate the Alternative Corridor model using the Analytical Hierarchy and the Modified Delphi processes. It relies on routing experts to identify alternate routes using the Alternative Corridors as a guide. The method leverages internal experts to calibrate the Alternative Route Evaluation Model and uses the Alternative Route Evaluation Model to help identify the top routes. Finally, the Expert Judgment Model is used to select the preferred route.

The Methodology is analogous to a funnel used to process information. Into the funnel goes geographic information which is calibrated with community concerns, natural concerns, and engineering considerations. Each phase of the process is like a filter in the funnel which is used to reduce the area of consideration. As the area of focus is reduced, users are able to invest more effort into studying the area at a greater level of detail. More detailed information are collected as one proceeds through the funnel. The bottom of the funnel results a preferred route for the transmission line.

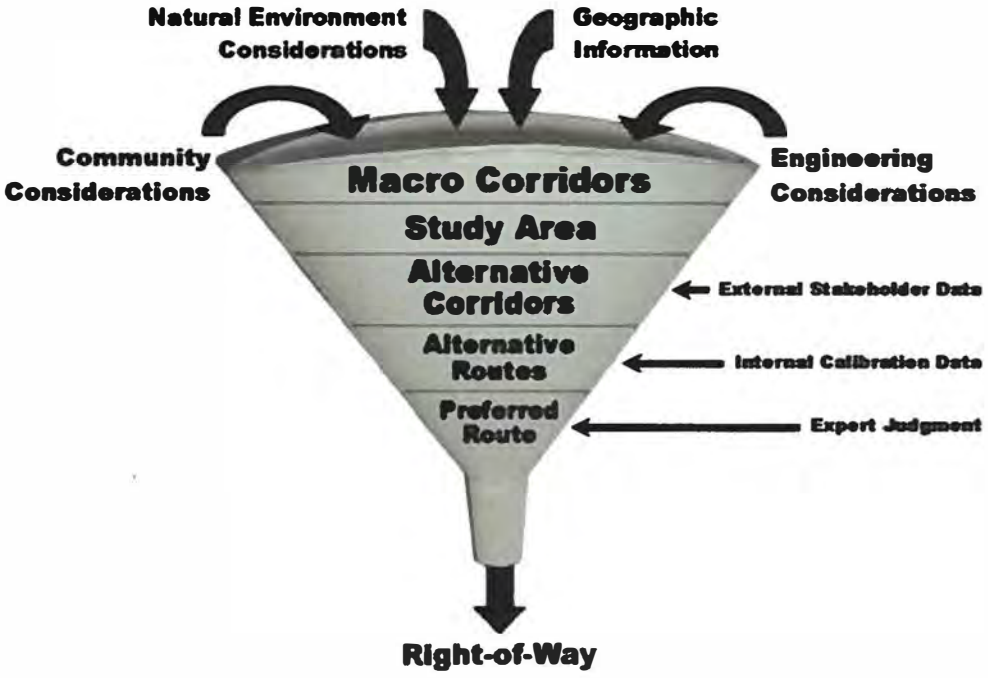



*Figure 2 Funnel Analogy*

[1] https://www.epri.com/#/pages/product/1013080/?lang=en-US
[2] https://www.epri.com/#/pages/product/1016198/?lang=en-US

TEAM SPATIAL

# Alternative Corridors

| Engineering Environment | | Natural Environment | | Built Environment | | | |
|---|---|---|---|---|---|---|---|
| Linear Infrastructure | 80.3% | Floodplain | 5.6% | Proximity to Buildings | 17.5% | Land Use | 37.3% |
| Parallel Existing Transmission Lines | 1.0 | Background | 1.0 | Background | 1.0 | Commercial/Industrial | 1.0 |
| Rebuild Existing Transmission Lines (good) | 2.3 | 100 Year Floodplain | 9.0 | 900-1200 | 3.4 | Agriculture (crops) | 3.5 |
| Background | 4.6 | Streams/Wetlands | 35.4% | 600-900 | 5.7 | Agriculture (other livestock) | 4.6 |
| Parallel Interstates ROW | - | Background | 1.0 | 300-600 | 8.0 | Silviculture | - |
| Parallel Roads ROW | 5.6 | Streams < 5cf+Regulatory Buffer | 6.2 | 0-300 | 9.0 | Other (forest) | 6.7 |
| Parallel Pipelines | 5.8 | Streams > 5cf+Regulatory Buffer | - | Building Density | 8.7% | Equine Agri-Tourism | - |
| Future DOT Plans | - | Wetlands + 30'Buffer | 8.7 | 0 - 0.05 Buildings/Acre | 1.0 | Residential | 9.0 |
| Parallel Railway ROW | 6.4 | Outstanding State Resource Waters | 9.0 | 0.05 - 0.2 Buildings/Acre | 3.1 | Proximity to Eligible Historic and Archaeological Sites | 32.3% |
| Road ROW | 7.5 | Public Lands | - | 0.2 - 1 Buildings/Acre | 5.9 | Background | 1.0 |
| Rebuild Existing Transmission Lines (bad) | 9.0 | Background | - | 1 - 4 Buildings/Acre | 9.0 | 900-1200 | 4.6 |
| Scenic Highways ROW | - | WMA + Not State Owned | - | >4 Buildings/Acre | - | 600-900 | 7.9 |
| Slope | 13.8% | USFS (proclamation area) | - | Proposed Development | - | 0-300 | 8.6 |
| Slope 0-15% | 1.0 | Other Conservation Land | - | Background | - | 300-600 | 9.0 |
| Slope 15-30% | 4.0 | USFS (actually owned) | - | Proposed Development | - | Areas of Least Preference | |
| Slope 30-40% | 6.7 | State Owned Conservation Land | - | Spannable Lakes and Ponds | 4.2% | Listed Archaeology Sites and Districts | |
| Slope >40% | 9.0 | Land Cover | 24.1% | Background | 1.0 | Listed NRHP Districts and Buildings | |
| Areas of Least Preference | | Developed Land | 1.0 | Spannable Lakes and Ponds | 9.0 | Day Care Parcels | |
| Non-Spannable Waterbodies | | Agriculture | 4.6 | | | City and County Parcels | |
| Mines and Quarries (Active) | | Forests | 9.0 | | | Cemetery Parcels | |
| Buildings | | Wildlife Habitat | 34.9% | | | School Parcels (K-12) | |
| Airports | | Background | 1.0 | | | Church Parcels | |
| Military Facilities | | Species of Concern Habitat | 9.0 | | | | |
| Center Pivot Irrigation | | 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 | | | | | |

*Figure 3 Alternate Corridor Model*

The above model is the Kentucky Siting Model that was developed with input from subject-matter experts and stakeholders. Each perspective (Built, Engineering, and Natural) represent the three groupings of considerations in the model. Within the perspectives, there are layers like Linear Infrastructure that further specify the groups. Finally, there are features that lie in the layers that tie to specific features such as Road ROW.

Each feature is given a value 1-9 depending on the relative suitably for a potential transmission line to intersect with said feature. 1 being the most suitable and 9 being the least. At the layer level, all of the layers within a perspective are given a weight and all of the weights have to equal 100%. The features and layers that are not present in this project are grayed out in the table above.

## Areas of Least Preference

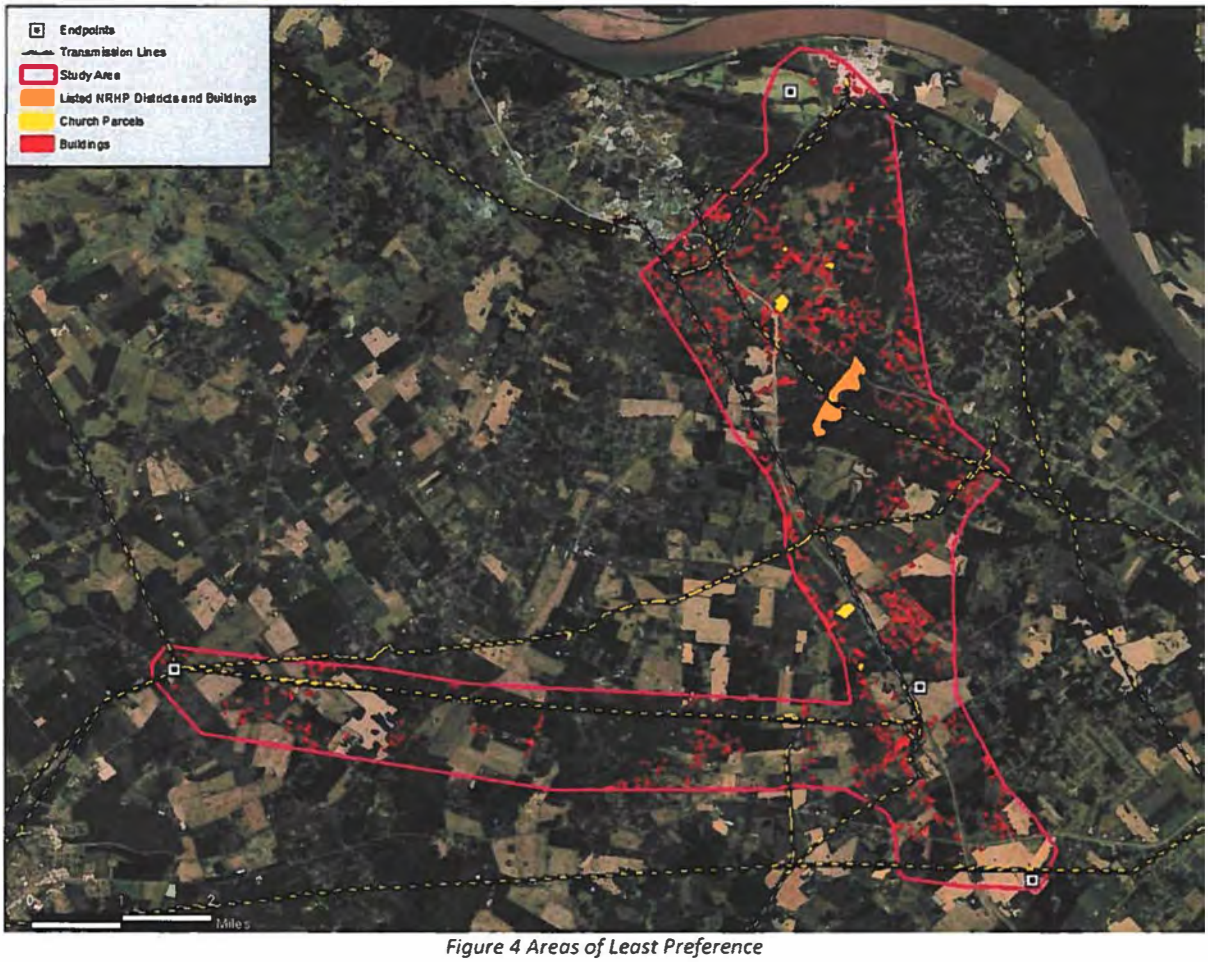



*Figure 4 Areas of Least Preference*

## Built Criteria

**The Built portion of the Alternate Corridor Model considers places where people live, work, and play. The Built Environment contains six layers: Building Density, Building Proximity, Proposed Development, Spannable Lakes and Ponds, Land Use, and Proximity to Eligible Historic and Archaeological Sites.**

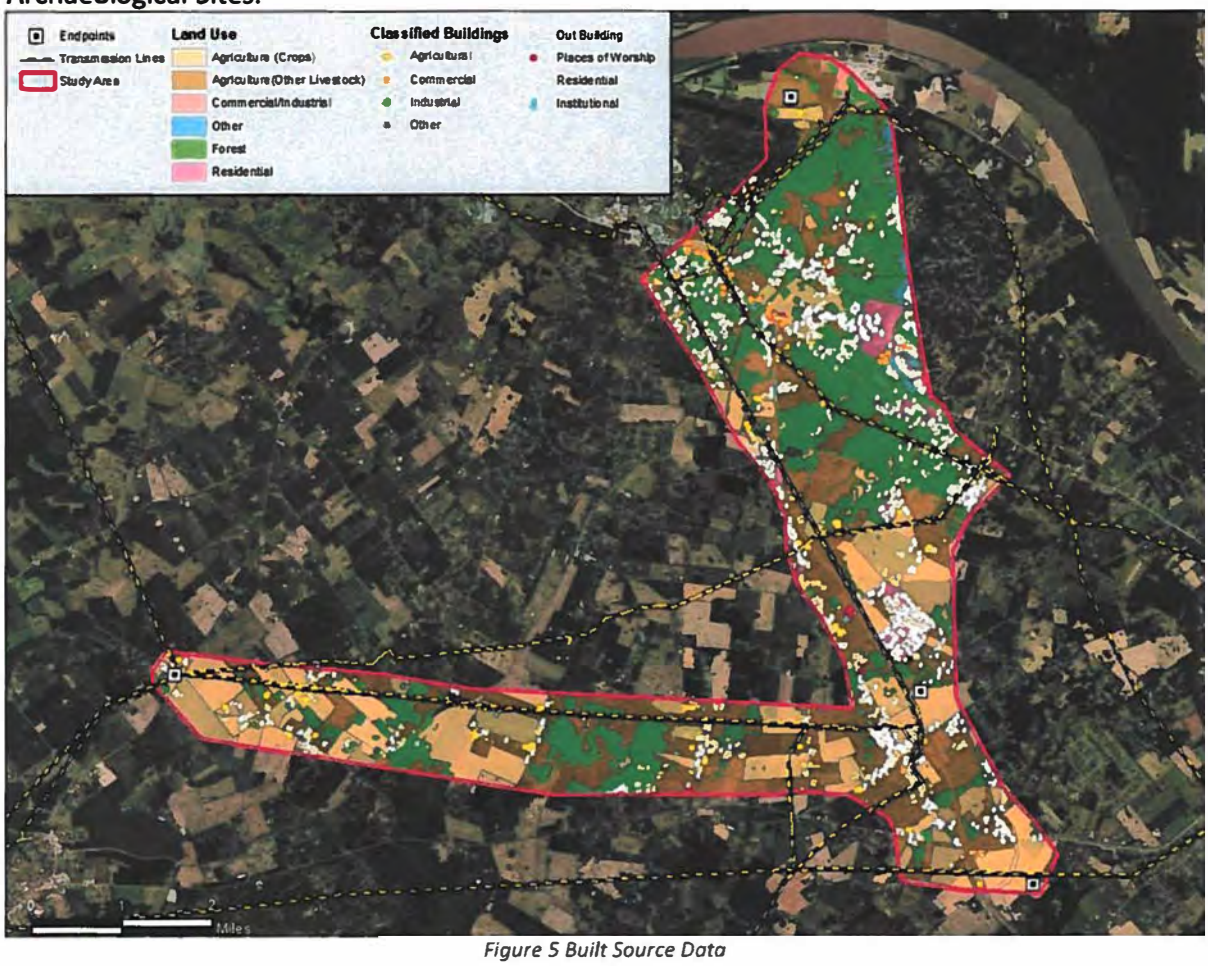



*Figure 5 Built Source Data*

**The above map shows the source data in the Built Environment. We aren't aware of proposed developments within the study area.**

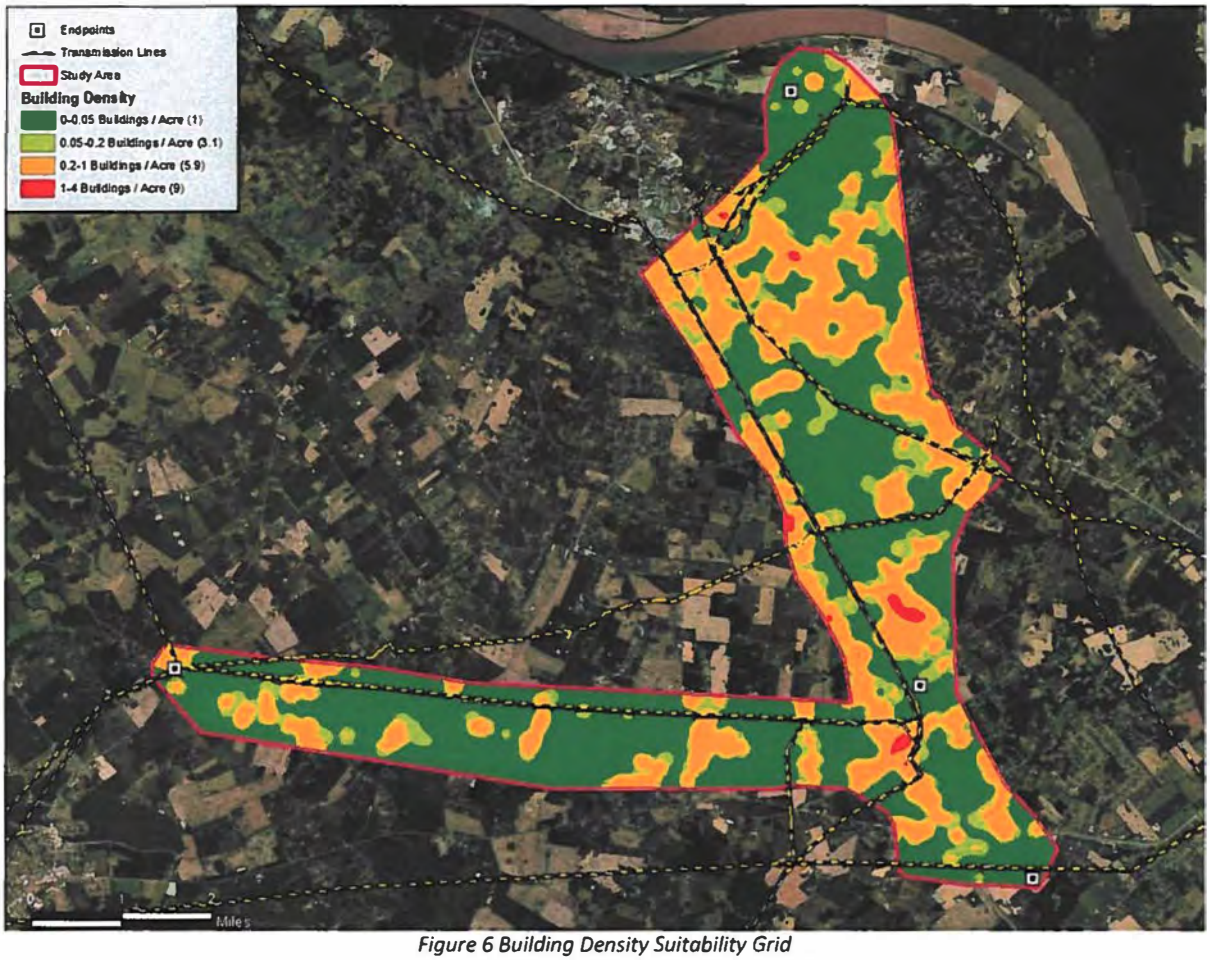



*Figure 6 Building Density Suitability Grid*

The Building Density layer is classified by the number of buildings per acre. The higher the density, the less suitable that location is for a potential transmission line. ***Note: The legend of the following maps illustrates the categories from the Kentucky model, and the relative suitability values. Within each layer the number 1 represents the most suitable place for a transmission line (in that layer) and the number 9 represents the least suitable place.***

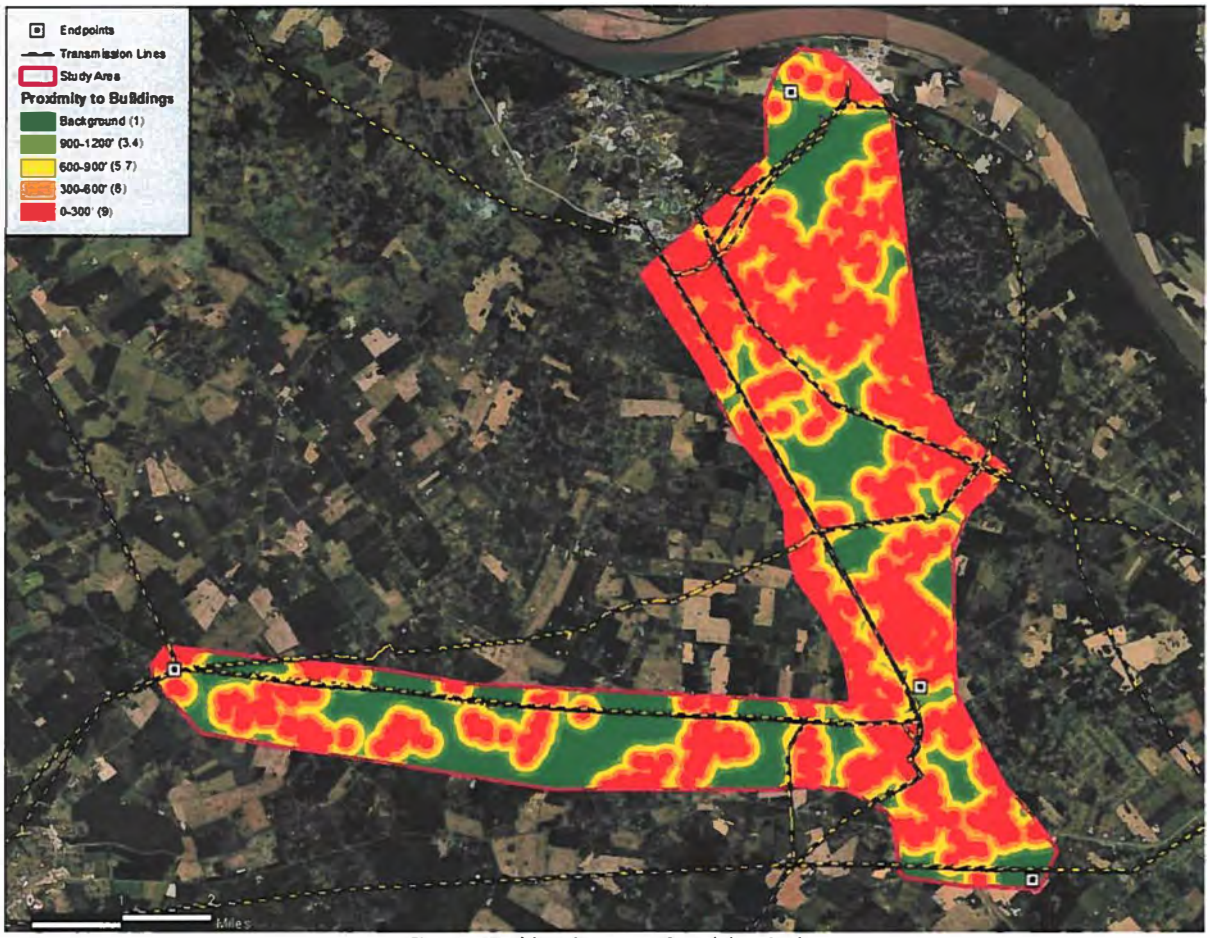



*Figure 7 Building Proximity Suitability Grid*

**For the Building Proximity layer, the most suitable location for a potential transmission line is beyond 1,200 feet from a building. These areas are shown in dark green in the map above. The least suitable areas are within 300 feet of a building.**

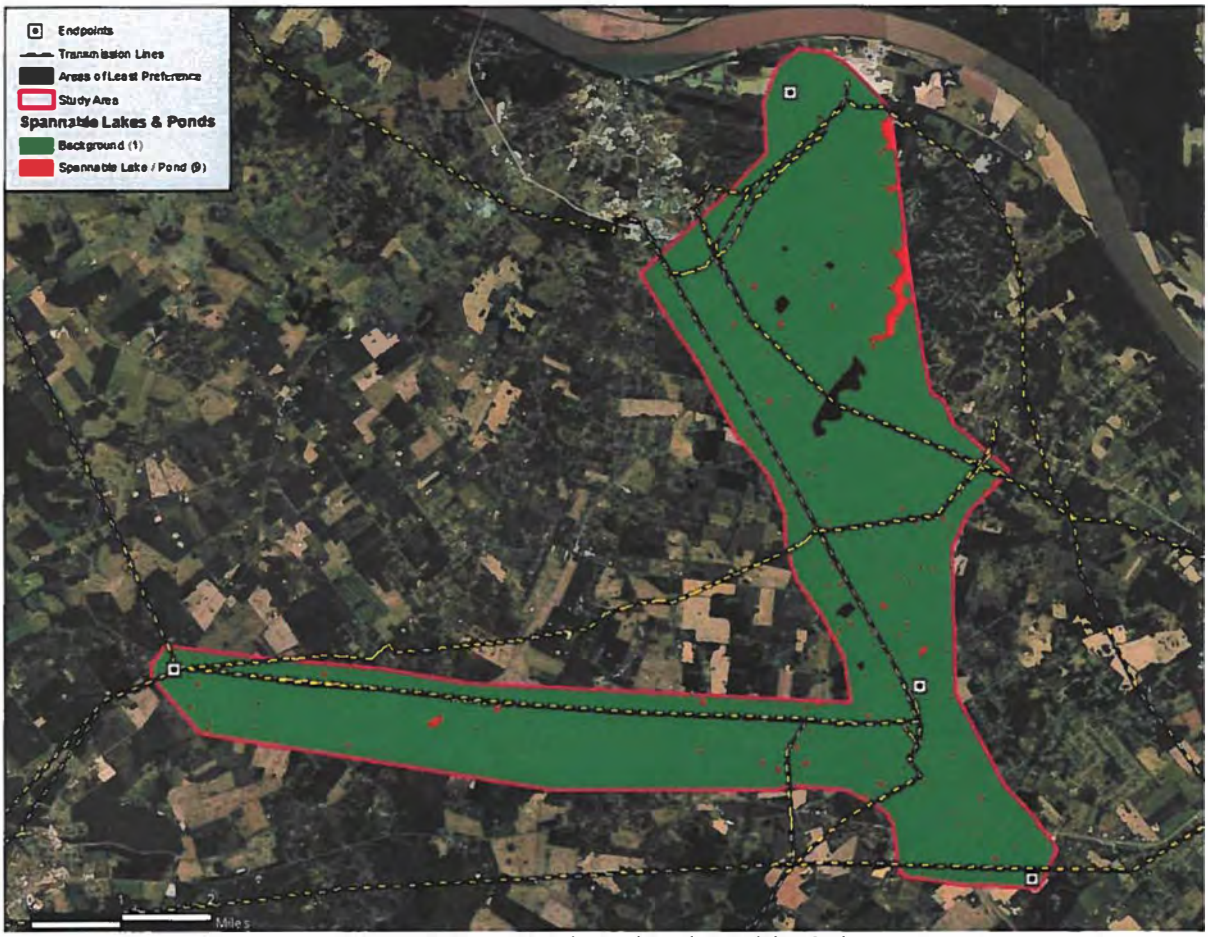



*Figure 8 Spannable Lakes and Ponds Suitability Grid*

**The Spannable Lakes and Ponds suitability grid is characterized by two options, either the location is within a spannable lake and pond or the location is not. The areas that are not in a spannable lake or pond are more suitable for a potential transmission line. A maximum span distance of 800' was used for this analysis**

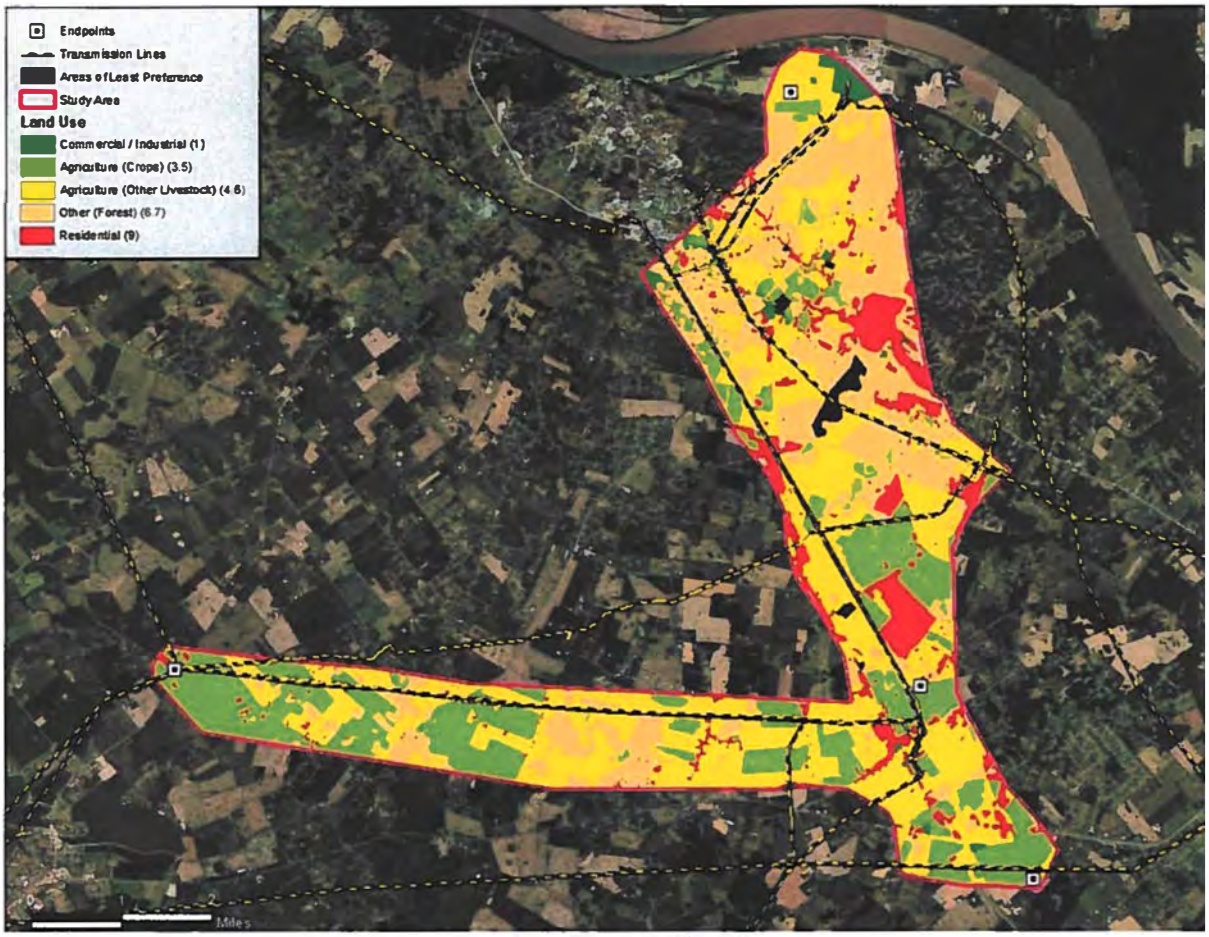



*Figure 9 Land Use Suitability Grid*

According to the Kentucky Model, from a Built Perspective the most suitable land use classification for a potential transmission line is an area with a commercial or industrial land use. While the least suitable classification is residential areas. An area with an Agricultural land use classification is the second most suitable, while any other land use classification would be the third most suitable area. In this case "other" consist of areas with trees.

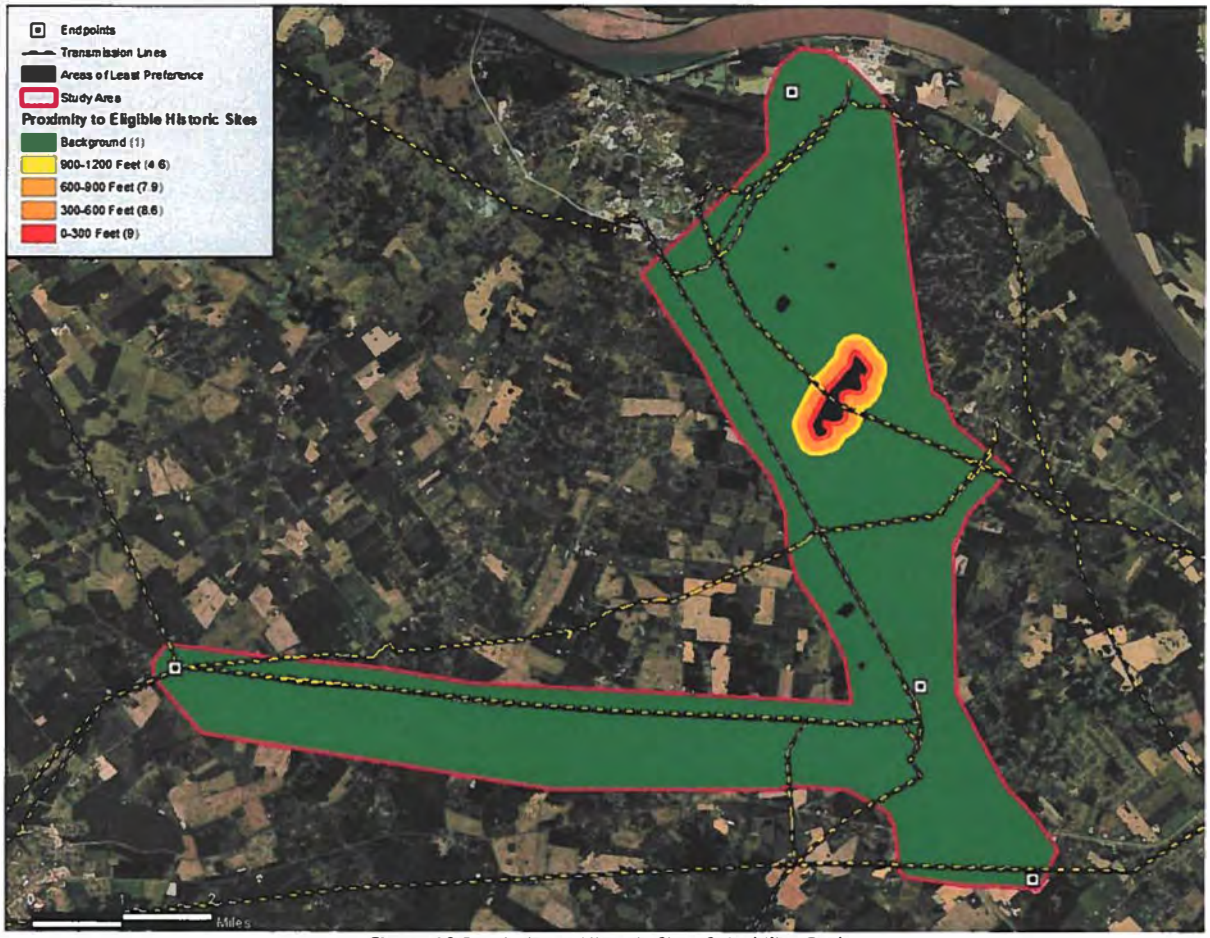



*Figure 10 Proximity to Historic Sites Suitability Grid*

**The Proximity to Historic Sites and Archaeological layer is meant to protect the Historic and Archaeological sites in or near the study area. This is done by making the areas near the sites to be the least suitable, while the farthest away from the sites is the most suitable location for a potential transmission line. There was no Archaeological sites within the study area that were classified as "eligible" in their status.**

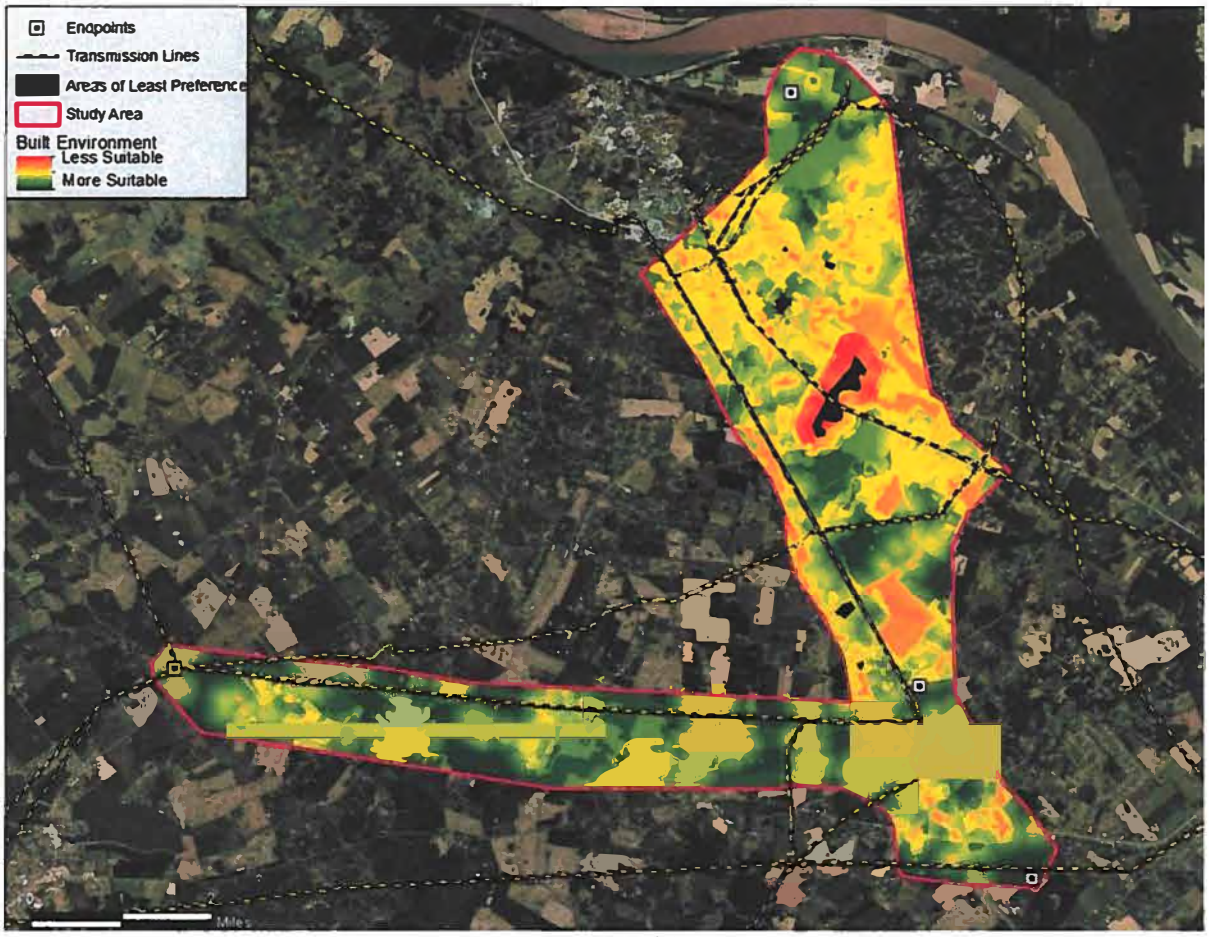



*Figure 11 Built Suitability Grid*

**The suitability grids for each perspective are created by multiplying the values of the individual layer grids by the weights in the model and combining to create a weighted average suitability grid.**

## Natural Criteria

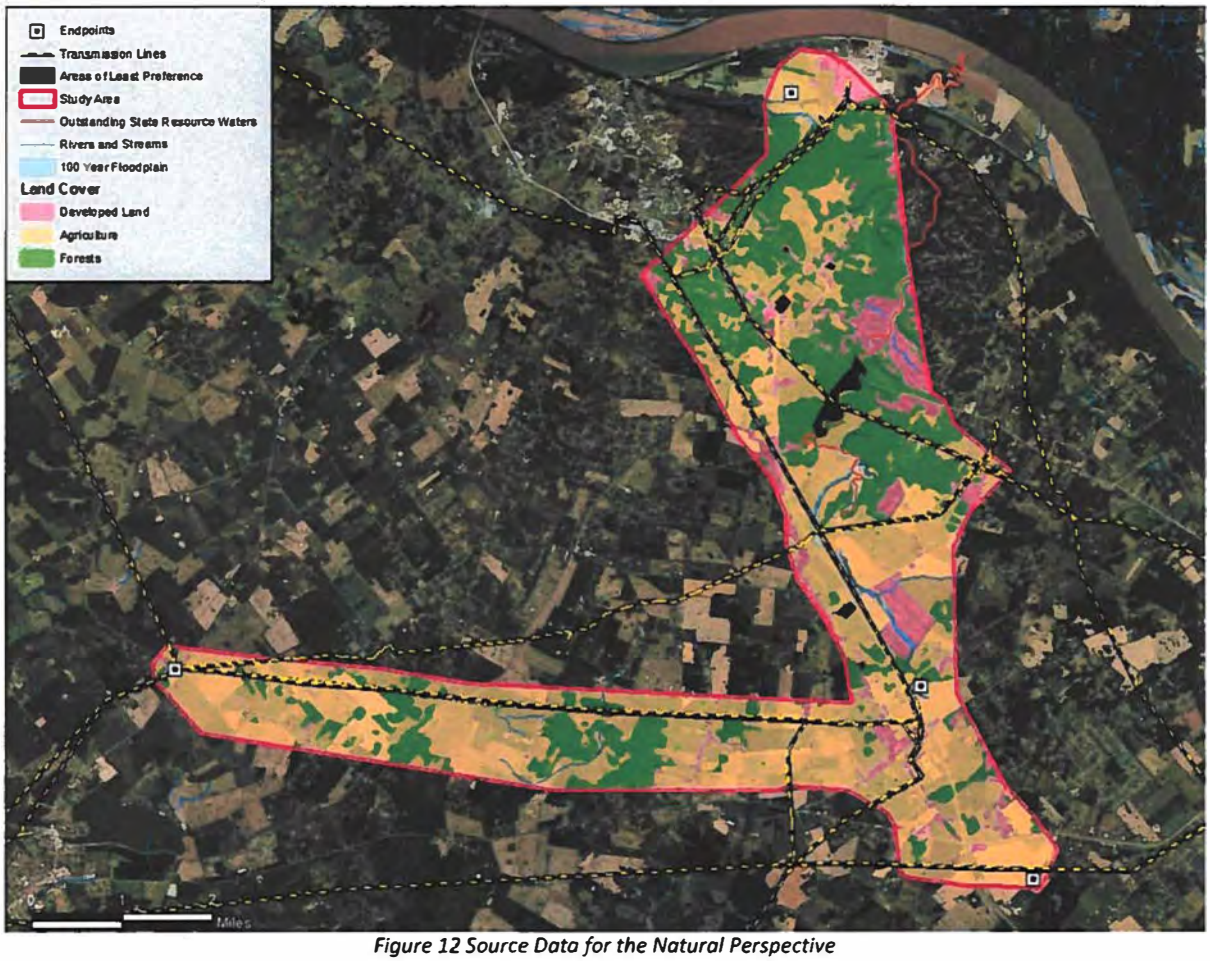



*Figure 12 Source Data for the Natural Perspective*

**The Natural Perspective considers rivers and streams throughout the study area with a 100-year floodplain near an Outstanding State Resource Water in the eastern portion of the study area. The land cover is also considered when assessing the natural suitability of a potential transmission line in the area. The Wildlife Habitat was modeled utilizing a combination of forested lands and rivers. Public Lands were also considered with the Natural Perspective, however, none are present in the study area.**

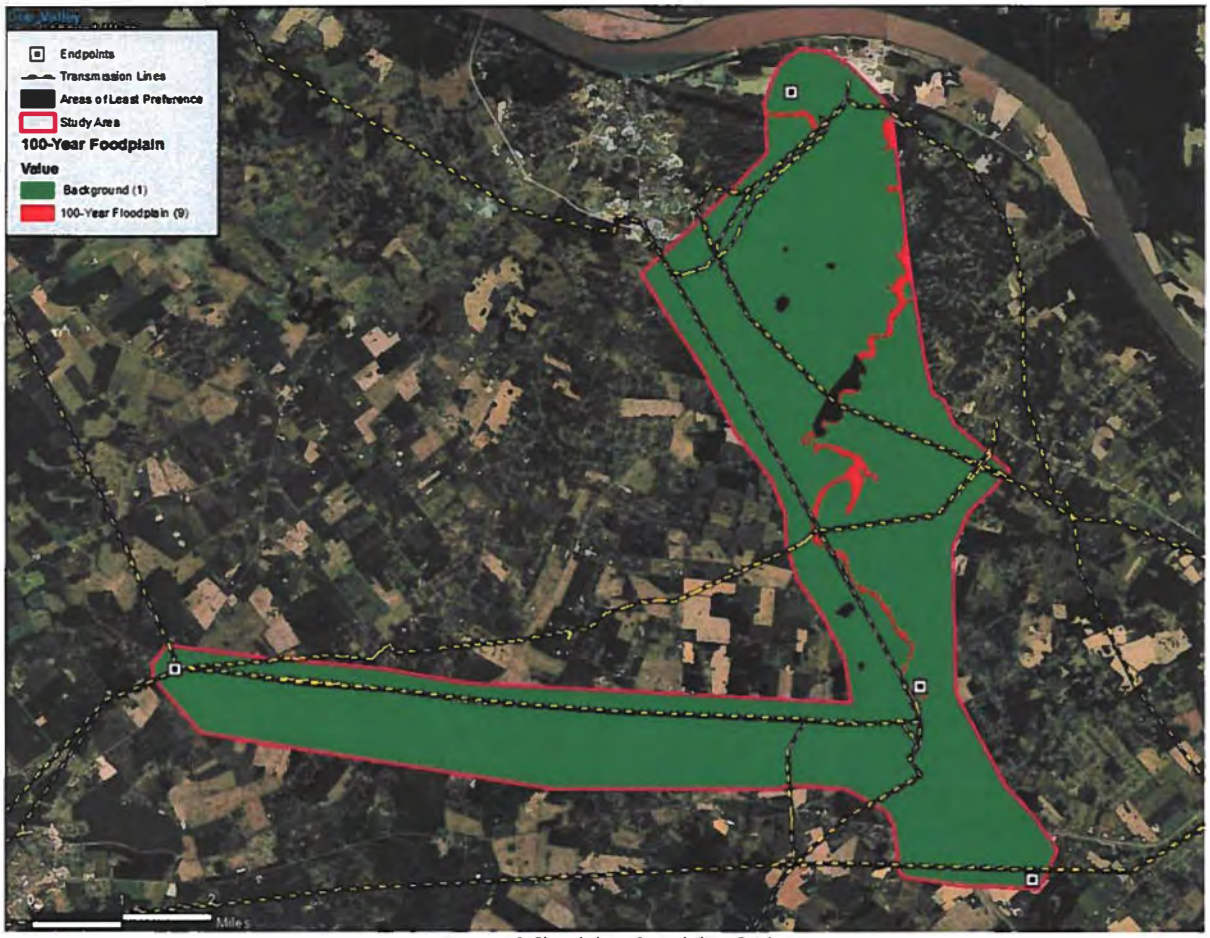



*Figure 13 Floodplain Suitability Grid*

**The most suitable areas are not within a 100-year floodplain.**

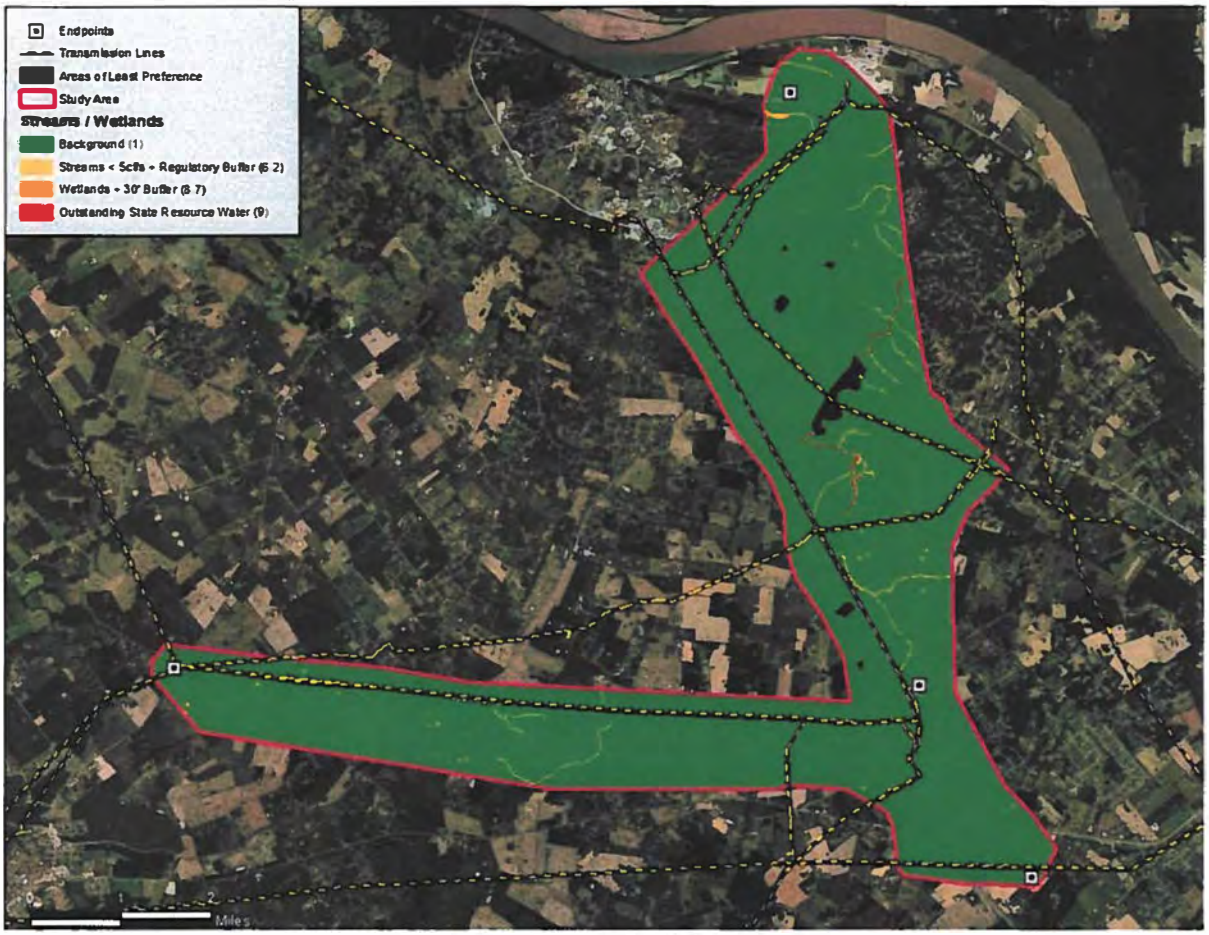



*Figure 14 Streams and Wetlands Suitability Grid*

**Outstanding State Resource Waters, plus a 30-foot buffer, are the least suitable area within the Streams and Wetlands layer. Wetlands are the next least suitable location for a potential transmission line. The most suitable areas do not contain wetlands or streams/rivers.**

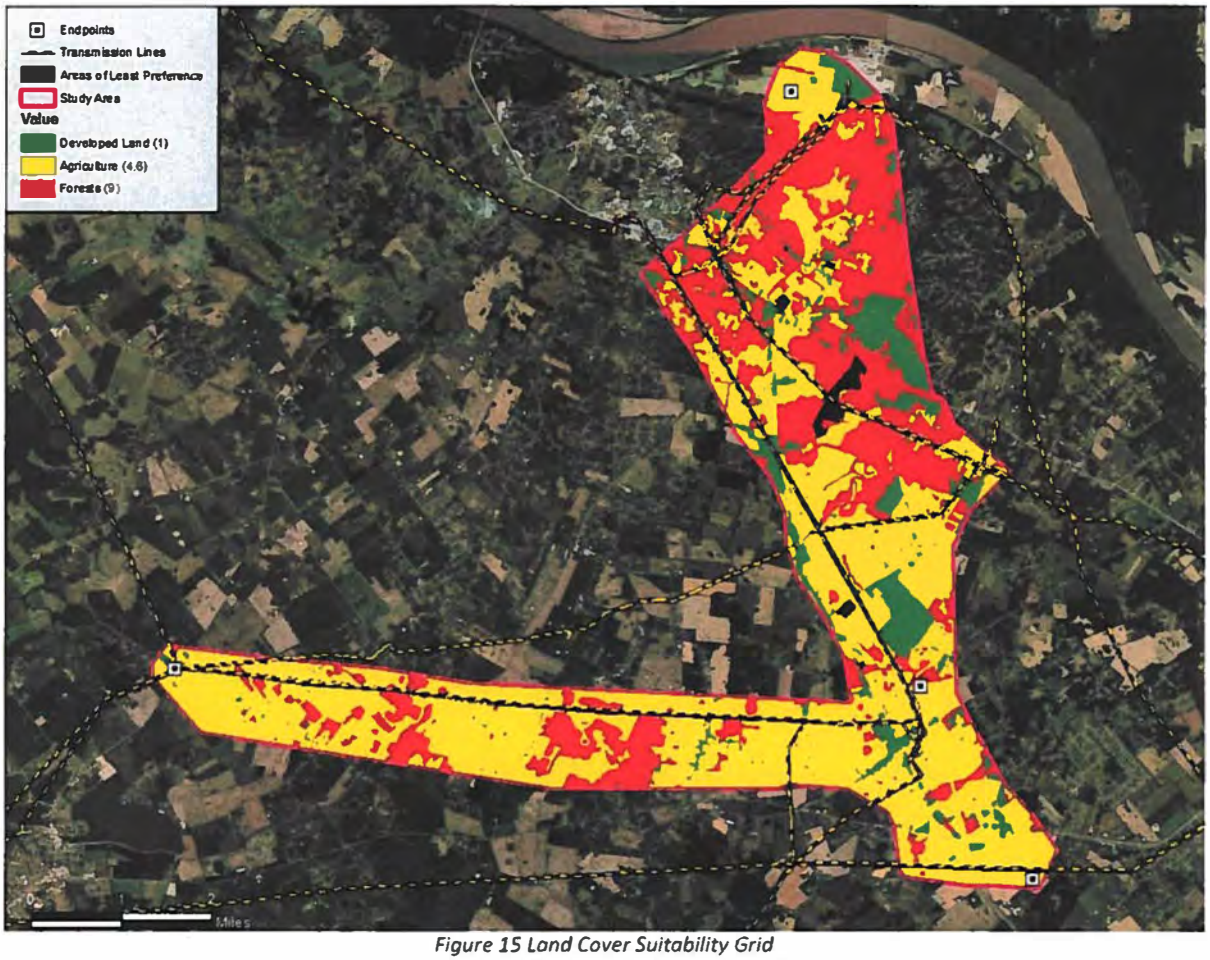



*Figure 15 Land Cover Suitability Grid*

**The land cover is classified by developed land, agriculture, and forest. From a Natural Perspective, forested land is the least suitable area for a potential transmission line. Developed land is the most suitable area and agriculture land is rated near the middle.**

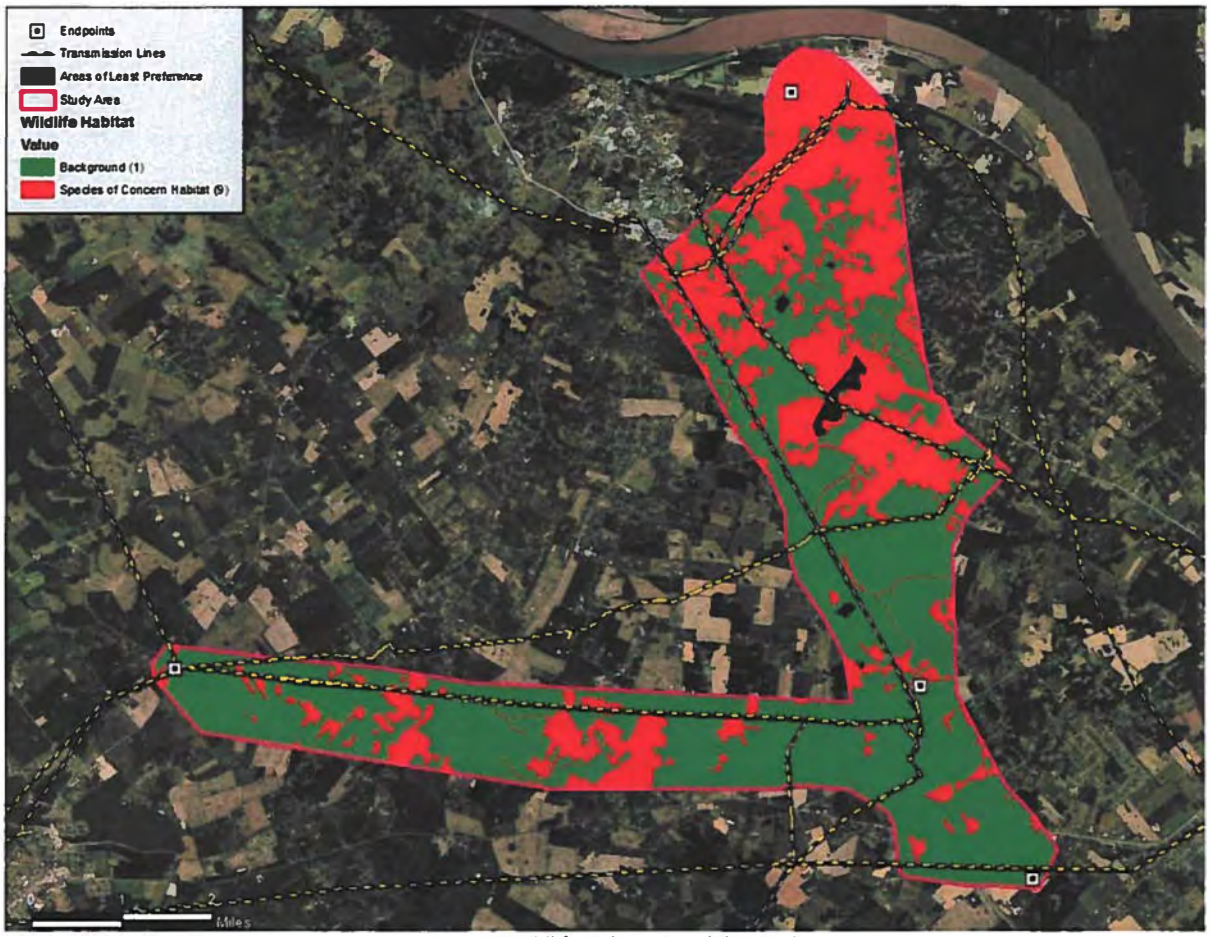



*Figure 16 Wildlife Habitat Suitability Grid*

The wildlife habitat within the study area considered the following species: Northern Long-Eared Bat, Clubshell, Gray Bat, Indiana Bat, Ring Pink, and Rough Pigtoe. The habitats for these species are modeled based off the U.S Forest and Wildlife descriptions of their habitats. The Northern Long-Eared Bats and Indiana Bats are found in forested areas. The Clubshell and Rough Pigtoe species are found in rivers and streams. The Gray Bat is found near the Ohio River, so the Ohio River was buffered by one mile to model the potential habitat. The Ring Pink species are found in open waterbody coastlines, therefore the boundaries of the Doe Valley Lake were buffered by 30 feet and other waterbodies modeled as the habitat. Forested land, open water, and surrounding areas, were used to model potential wildlife habitat of the threatened and endangered species.

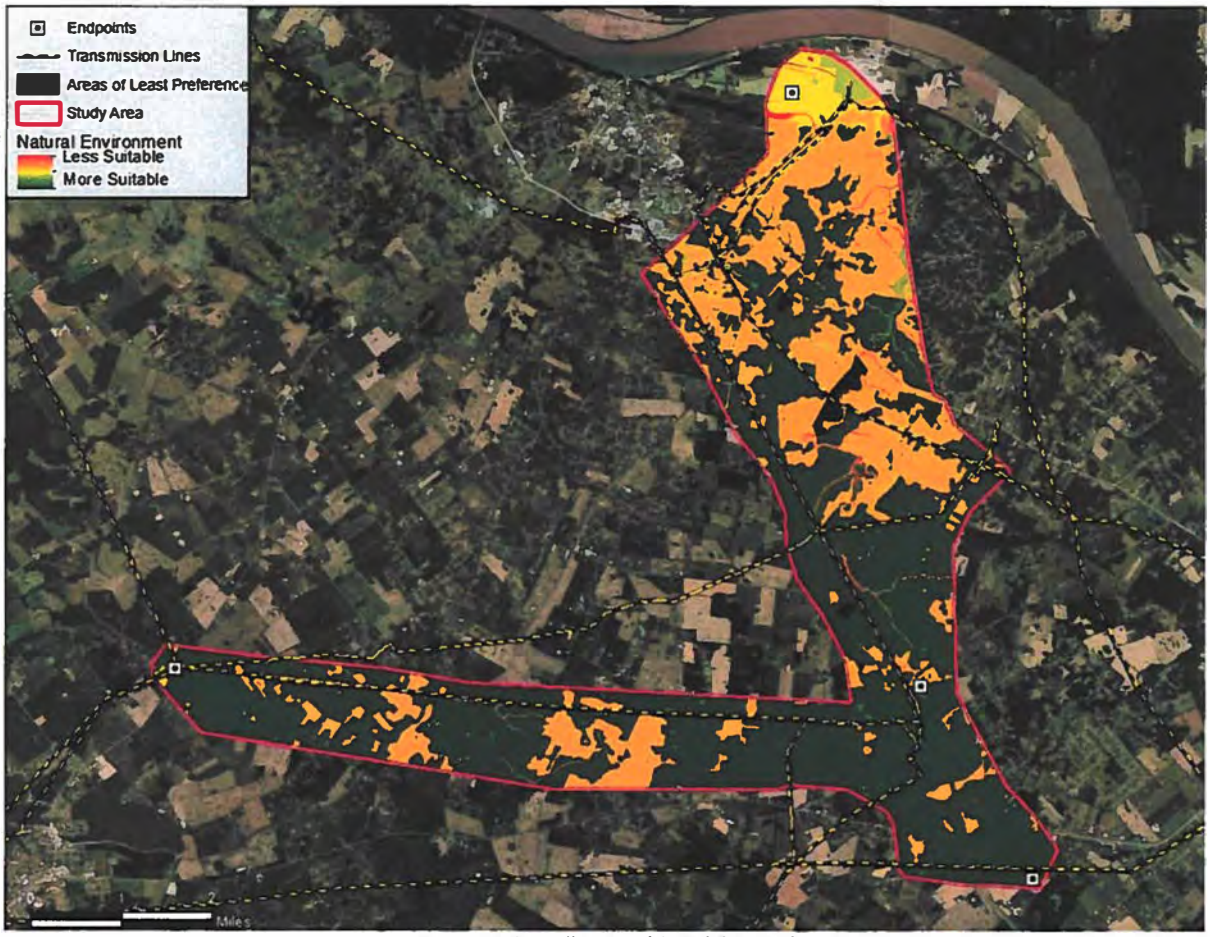



*Figure 17 Overall Natural Suitability Grid*

## Engineering Criteria

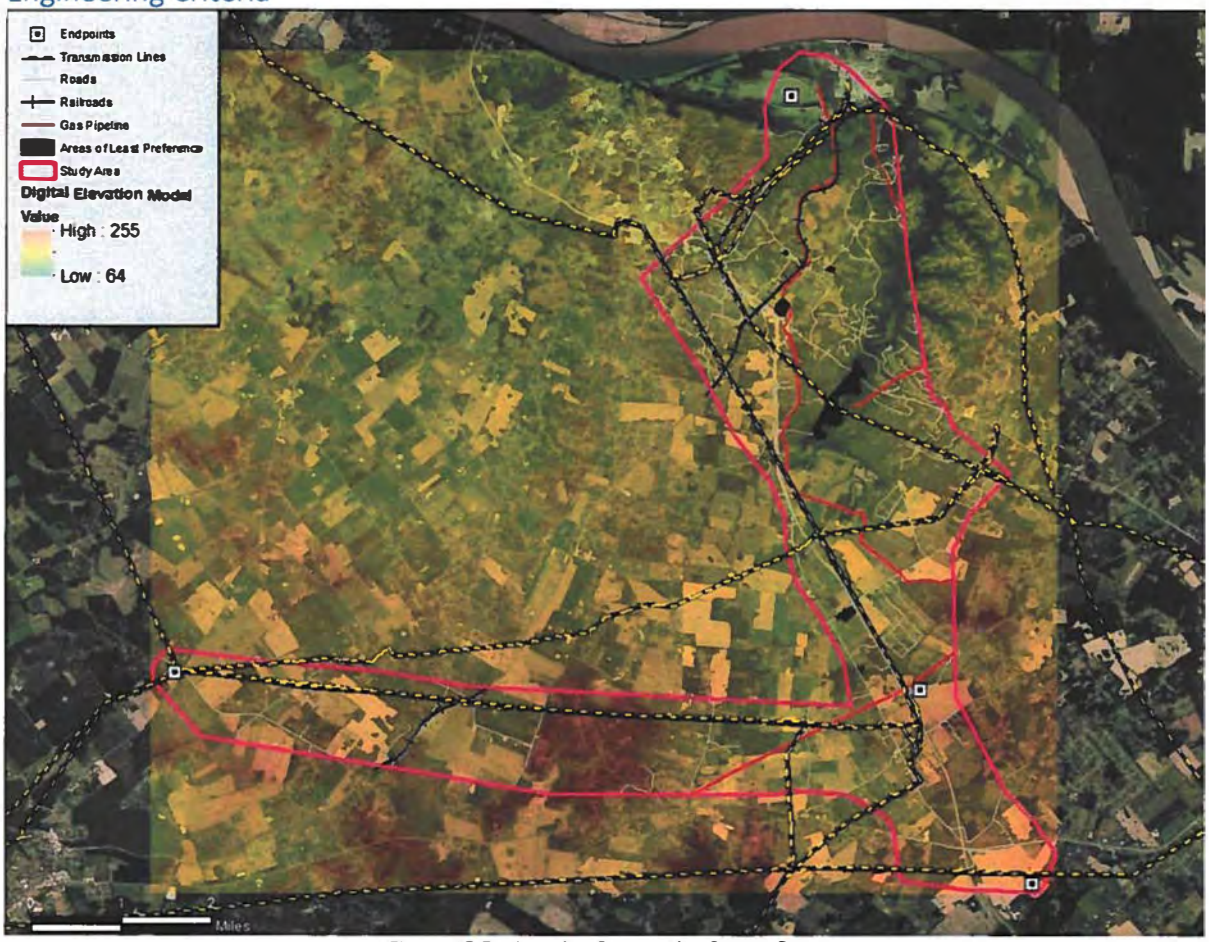



*Figure 18 Engineering Perspective Source Data*

**The Engineering Perspective of the Alternate Corridor Model considers existing linear infrastructure and slope.**

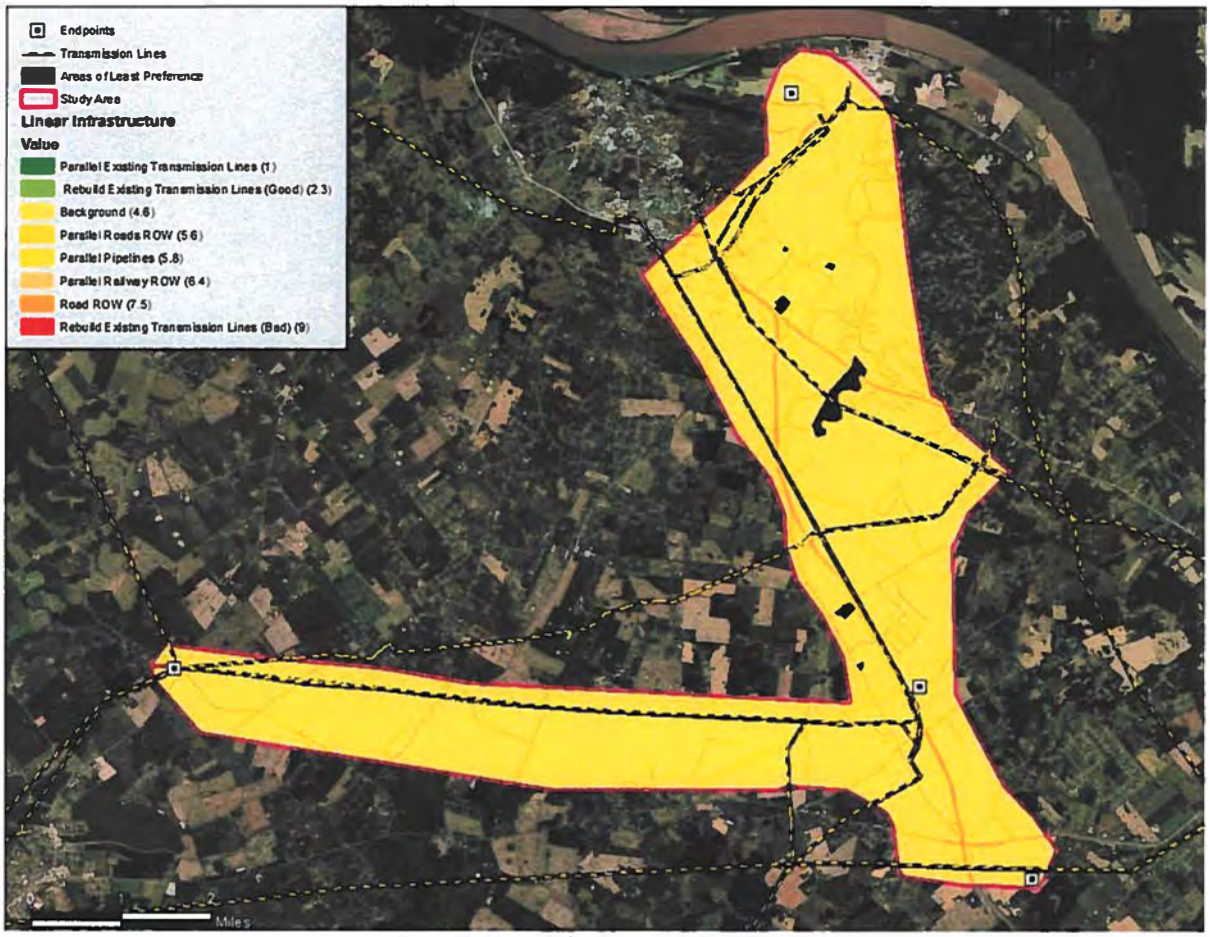



*Figure 19 Linear Infrastructure Suitability Grid*

The Linear Infrastructure layer considers co locating with roads, railroads, and transmission lines. The least suitable is an existing transmission line ROW which can not be leveraged for this new line construction (AKA rebuild existing transmission line bad). Parallel or rebuilding existing transmission lines are considered the most suitable areas within this layer. The existing 69kV line owned by Big Rivers and running from Brandenburg Substation to Garrett Substation was considered as an opportunity for rebuilding with a new double circuit line. Also, the existing 2.7-mile 69 kV transmission line running radially into Buttermilk Falls Substation was considered as an opportunity for rebuilding with a new double circuit line, as well as, the existing 69kV line owned by Big Rivers and running from Meade County Substation to Garrett Substation was considered an opportunity for rebuilding with a double circuit line.

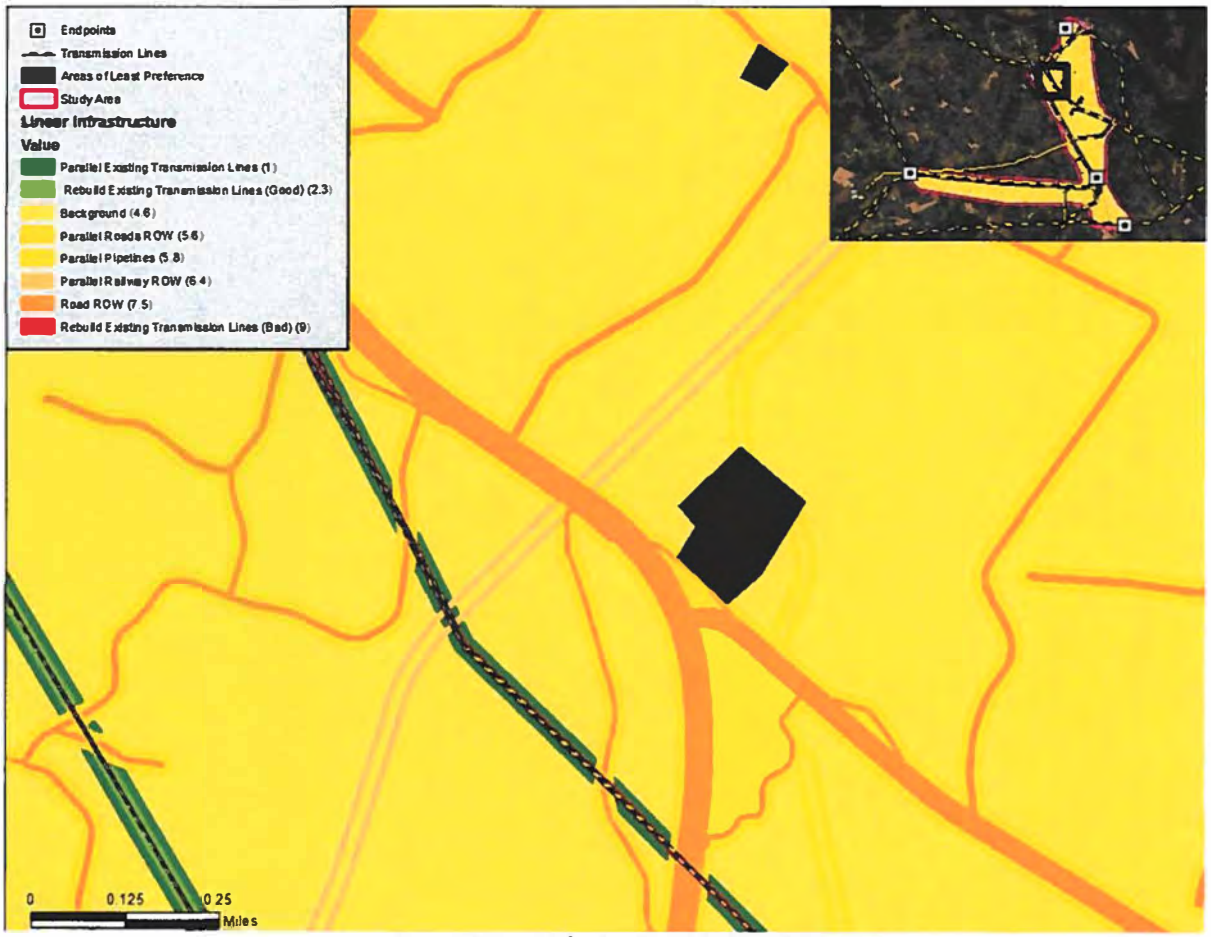



*Figure 20 Linear Infrastructure Suitability Grid*

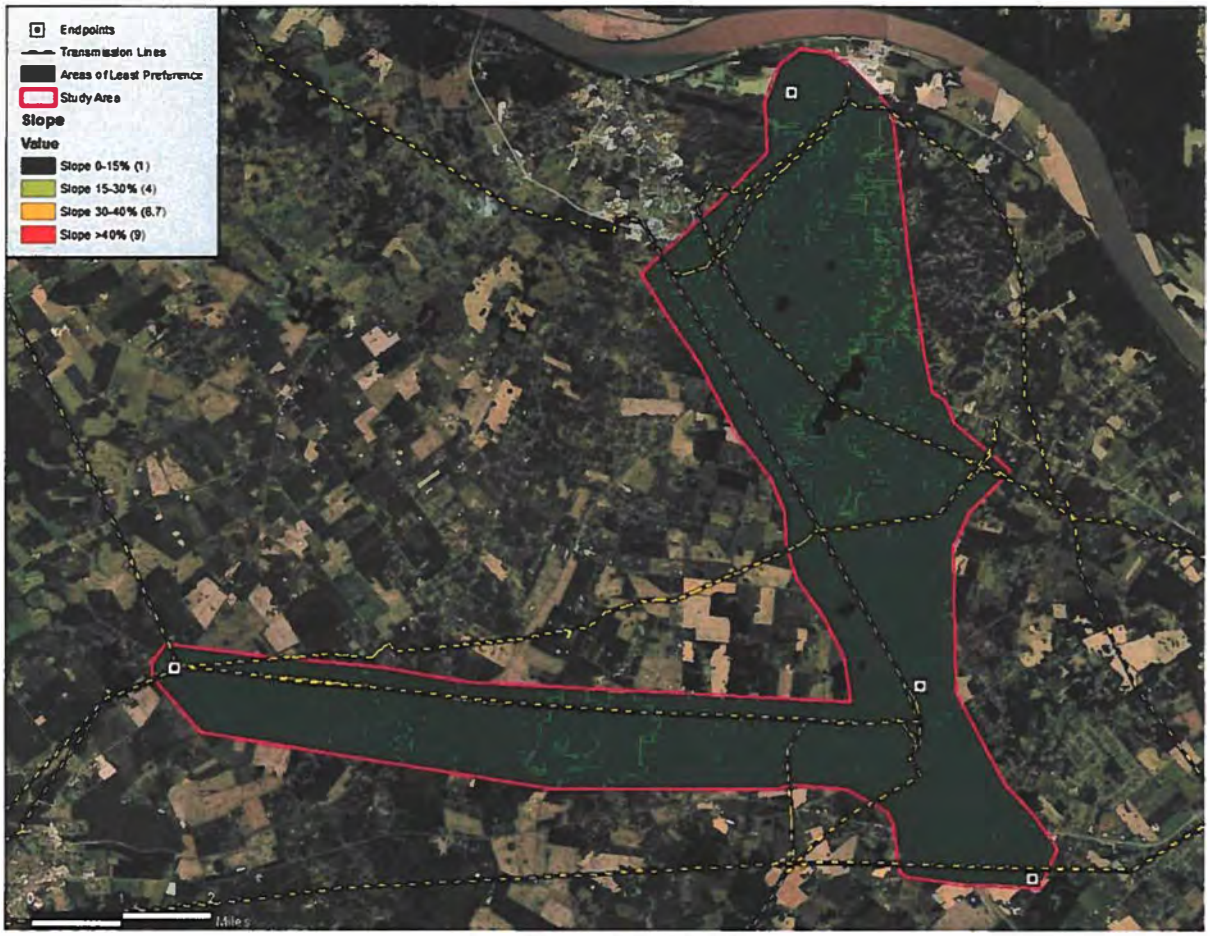



*Figure 21 Slope Suitability Grid*

**The slope layer assesses the suitability in regards to the degree slope of the land with the higher the slope being the least suitable location. Most of the study area has a slope less than 15%, which is the most suitable location for a transmission line.**

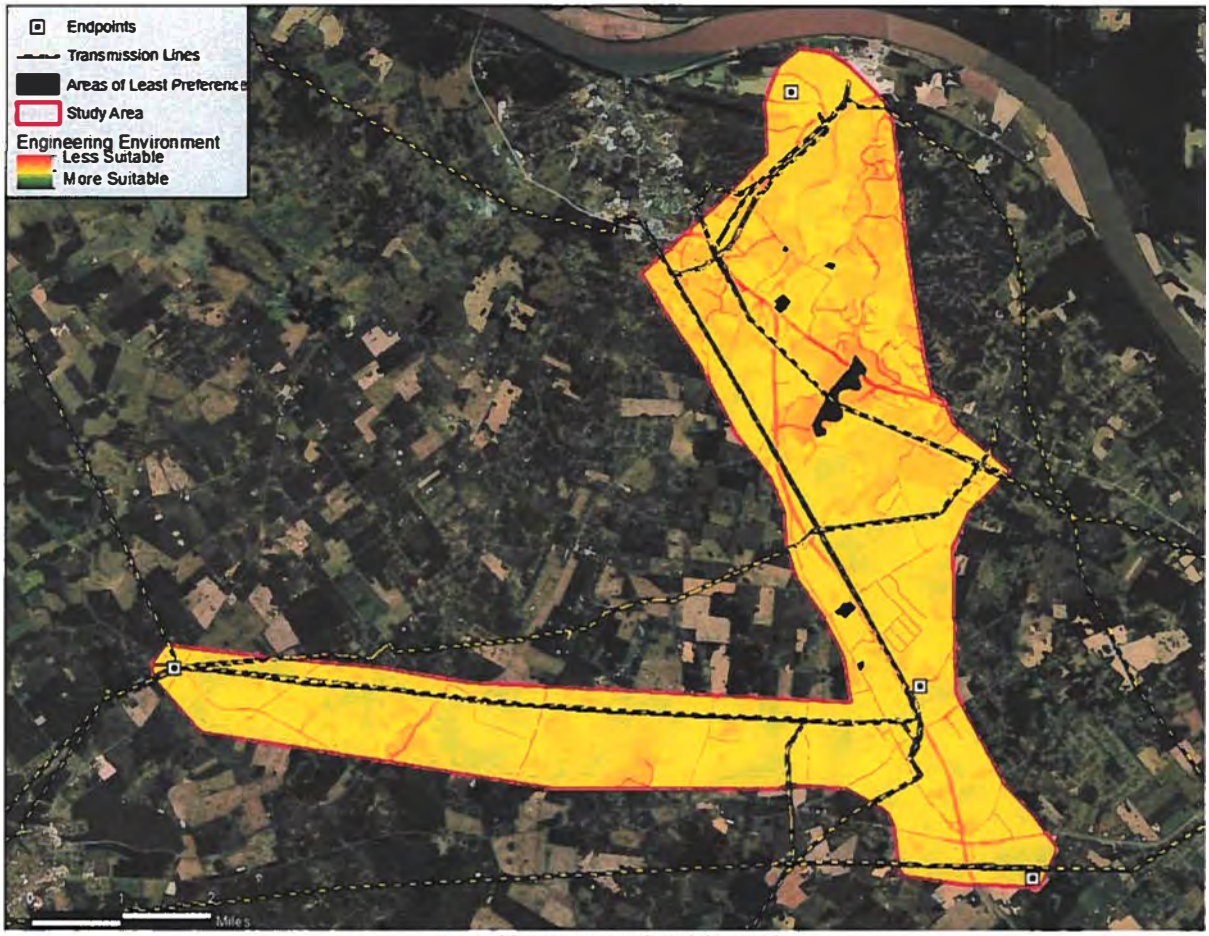



*Figure 22 Engineering Suitability Grid*

## Built Emphasis Corridor

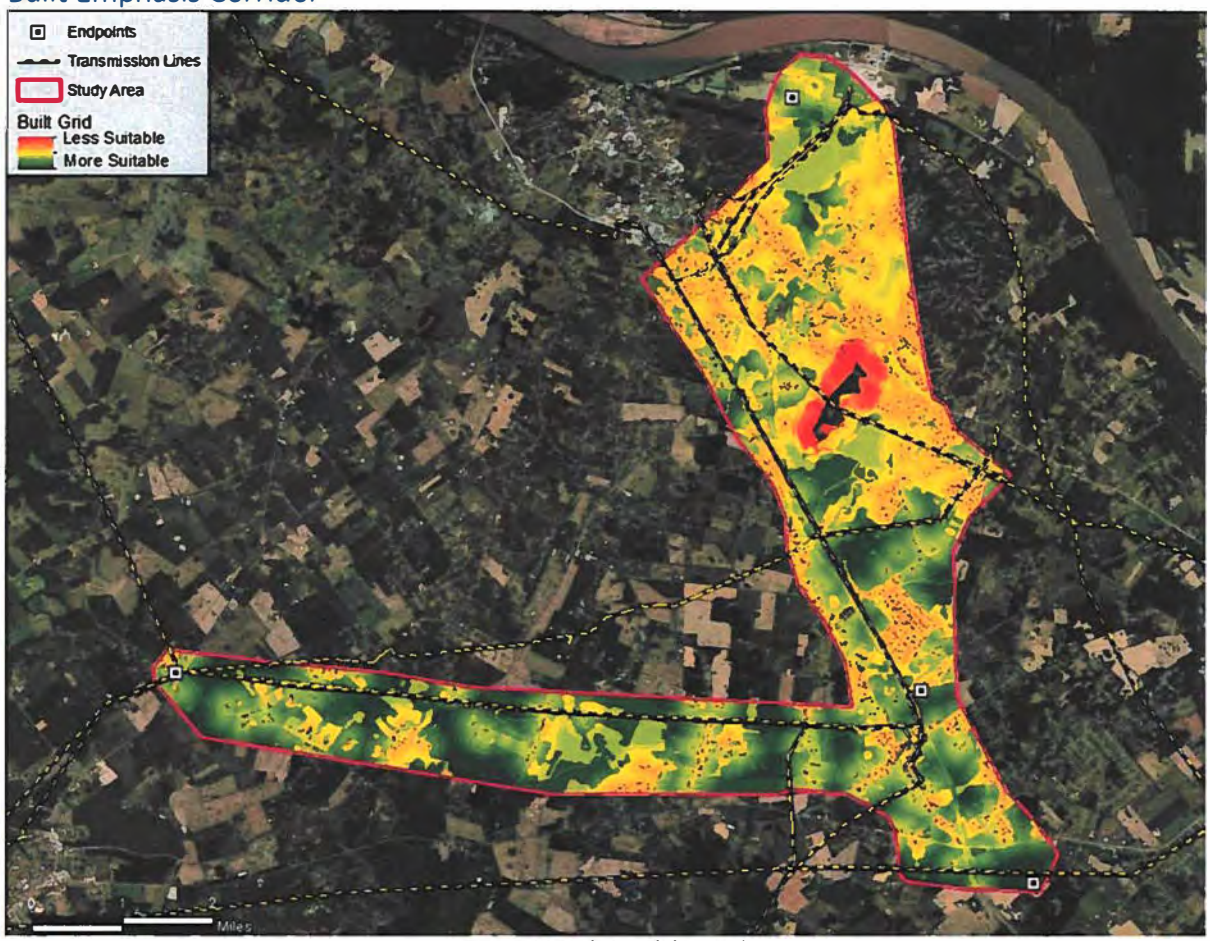



*Figure 23 Built Suitability Grid*

**The Built suitability grid is created by putting emphasis (5x) on the built perspective while taking into consideration the other two perspectives (1x).**

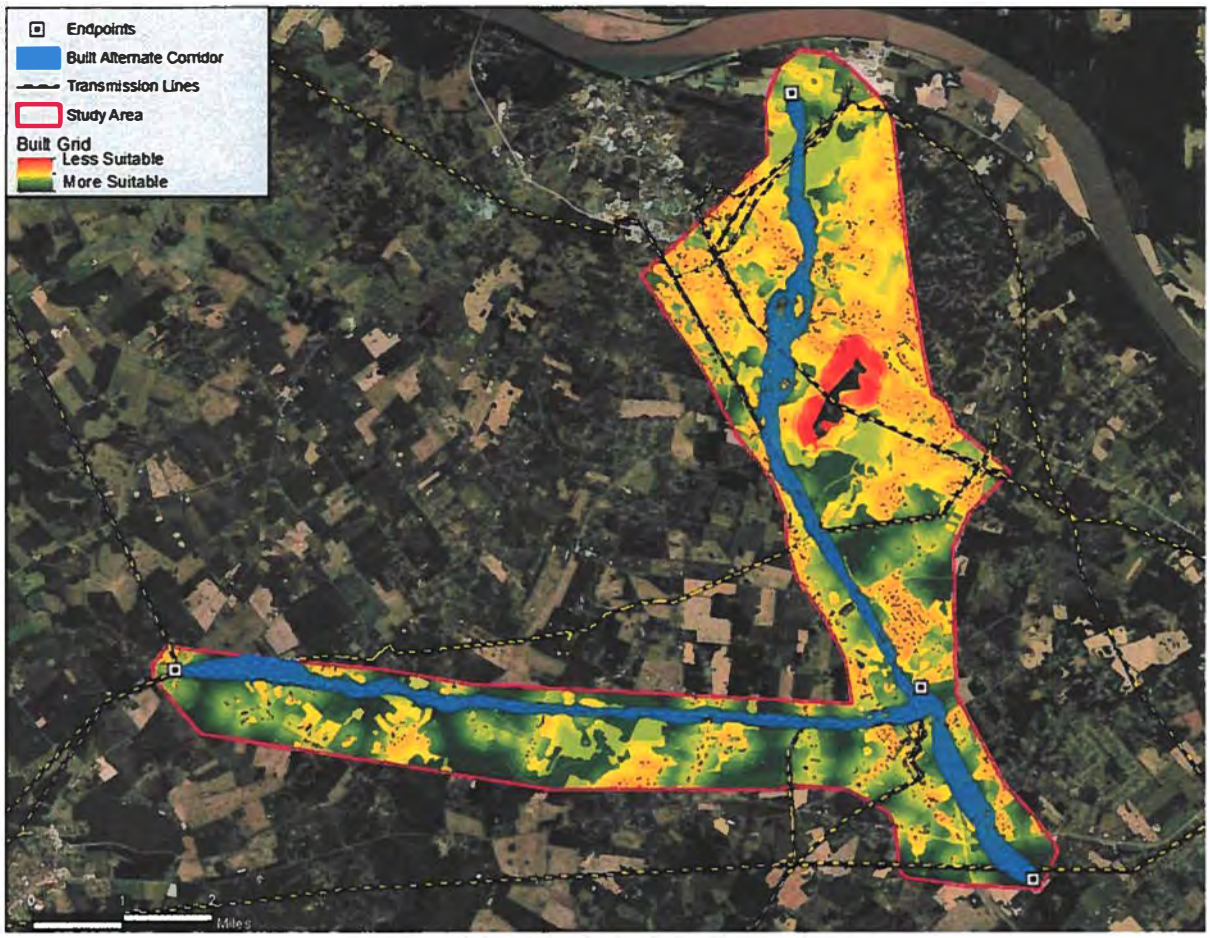



*Figure 24 Built Suitability Grid with the Alternate Corridor*

**The Built Alternate Corridor was created by calculating the top 3% of routes between the Meade County Substation, Proposed Otter Creek Substation, Brandenburg Steel Mill Substation, and Proposed Redmon Road Substation.**

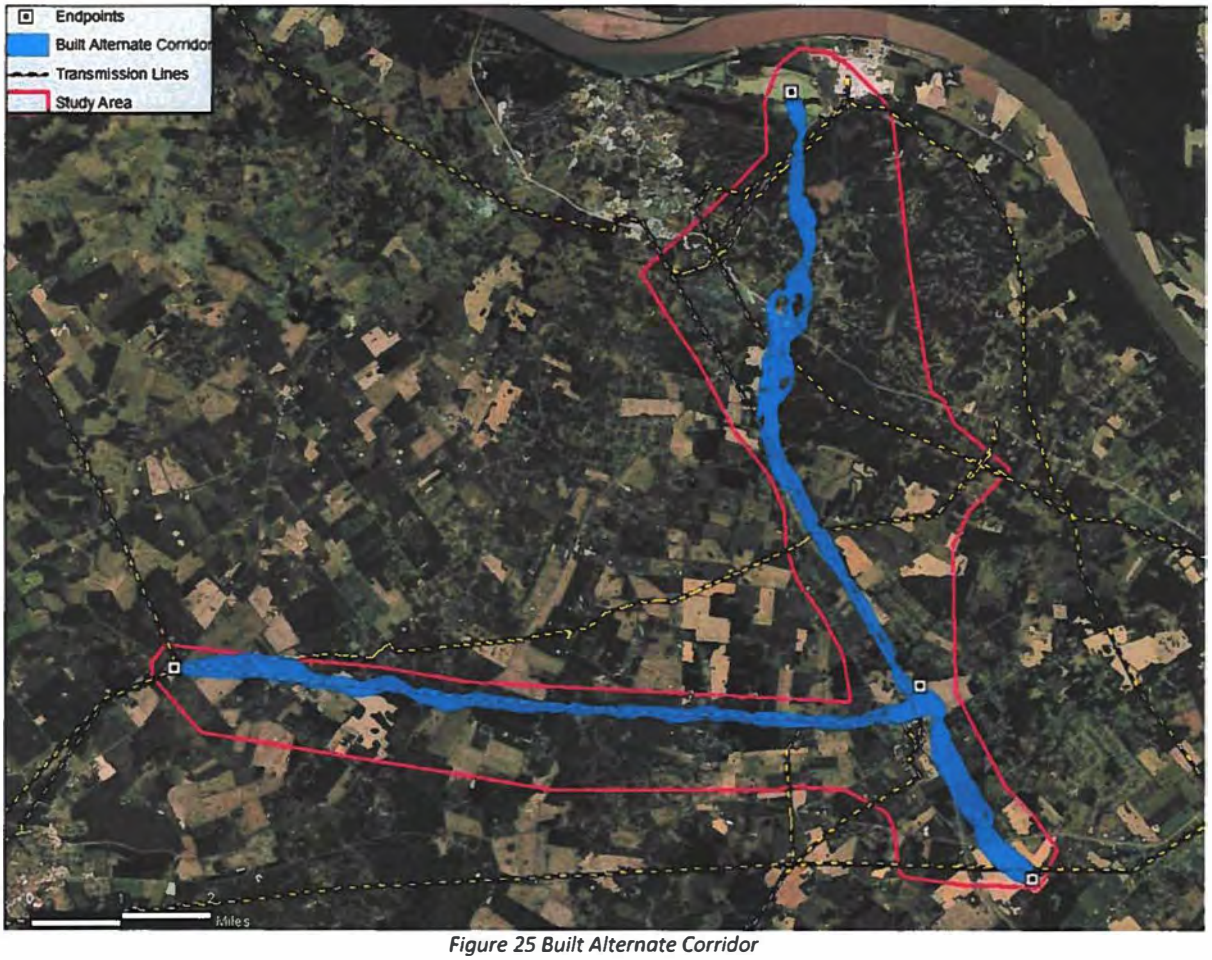



*Figure 25 Built Alternate Corridor*

## Natural Emphasis Corridor

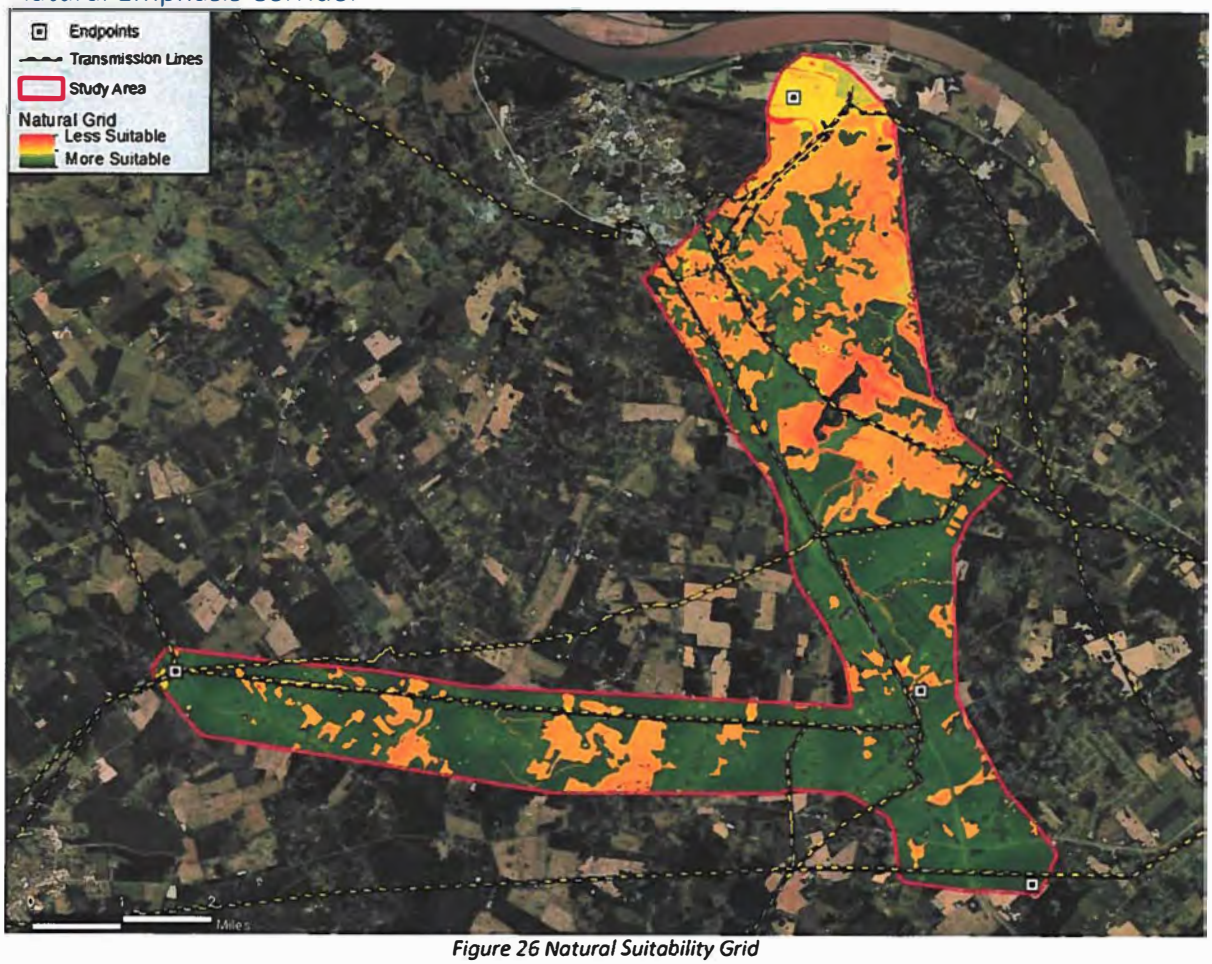



*Figure 26 Natural Suitability Grid*

**The Natural suitability grid is created by putting emphasis (5x) on the natural perspective while taking into consideration the other two perspectives (1x).**

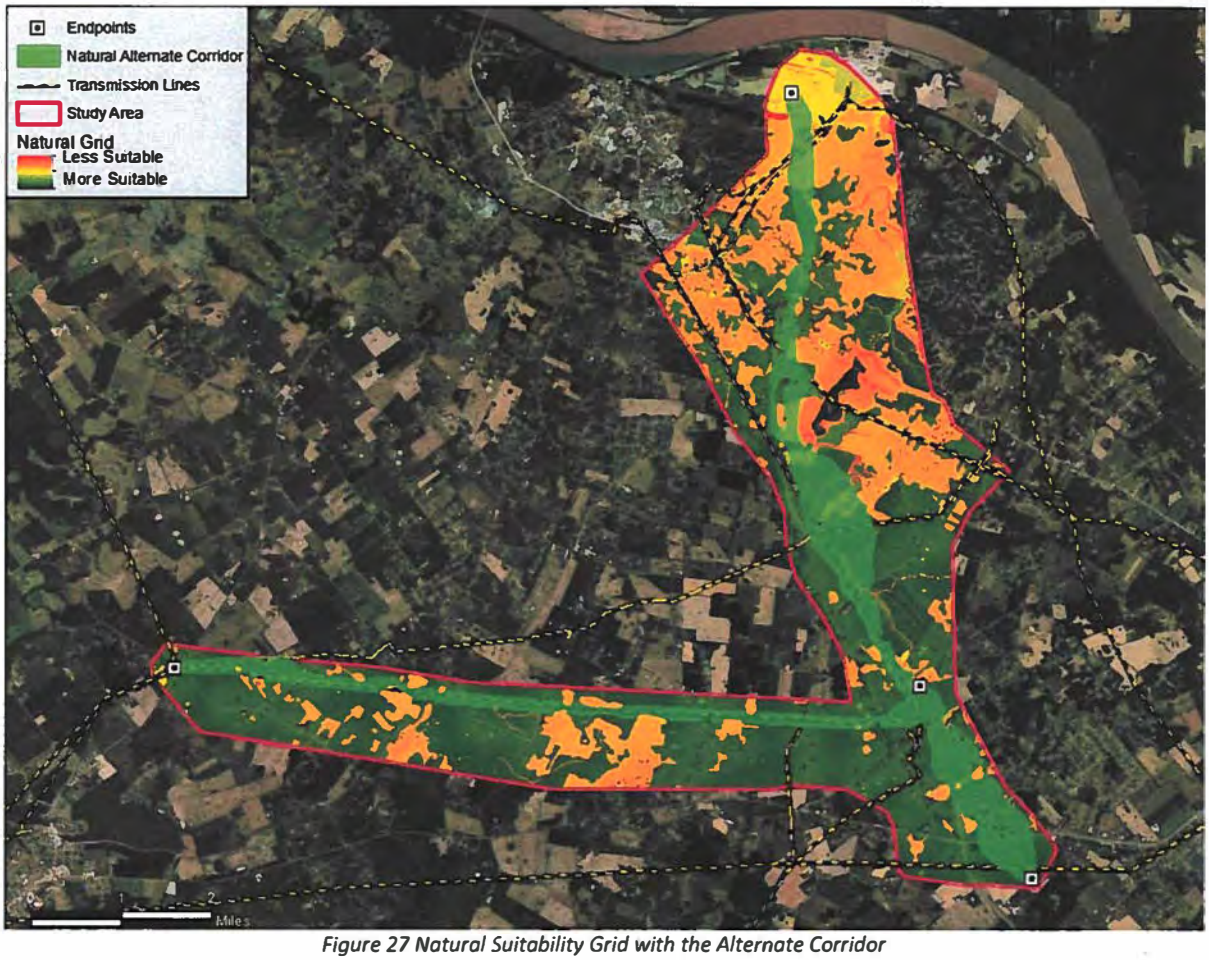



*Figure 27 Natural Suitability Grid with the Alternate Corridor*

**The Natural Alternate Corridor was created by calculating the top 3% of routes between the Meade County Substation, Proposed Otter Creek Substation, Brandenburg Steel Mill Substation, and Proposed Redmon Road Substation.**

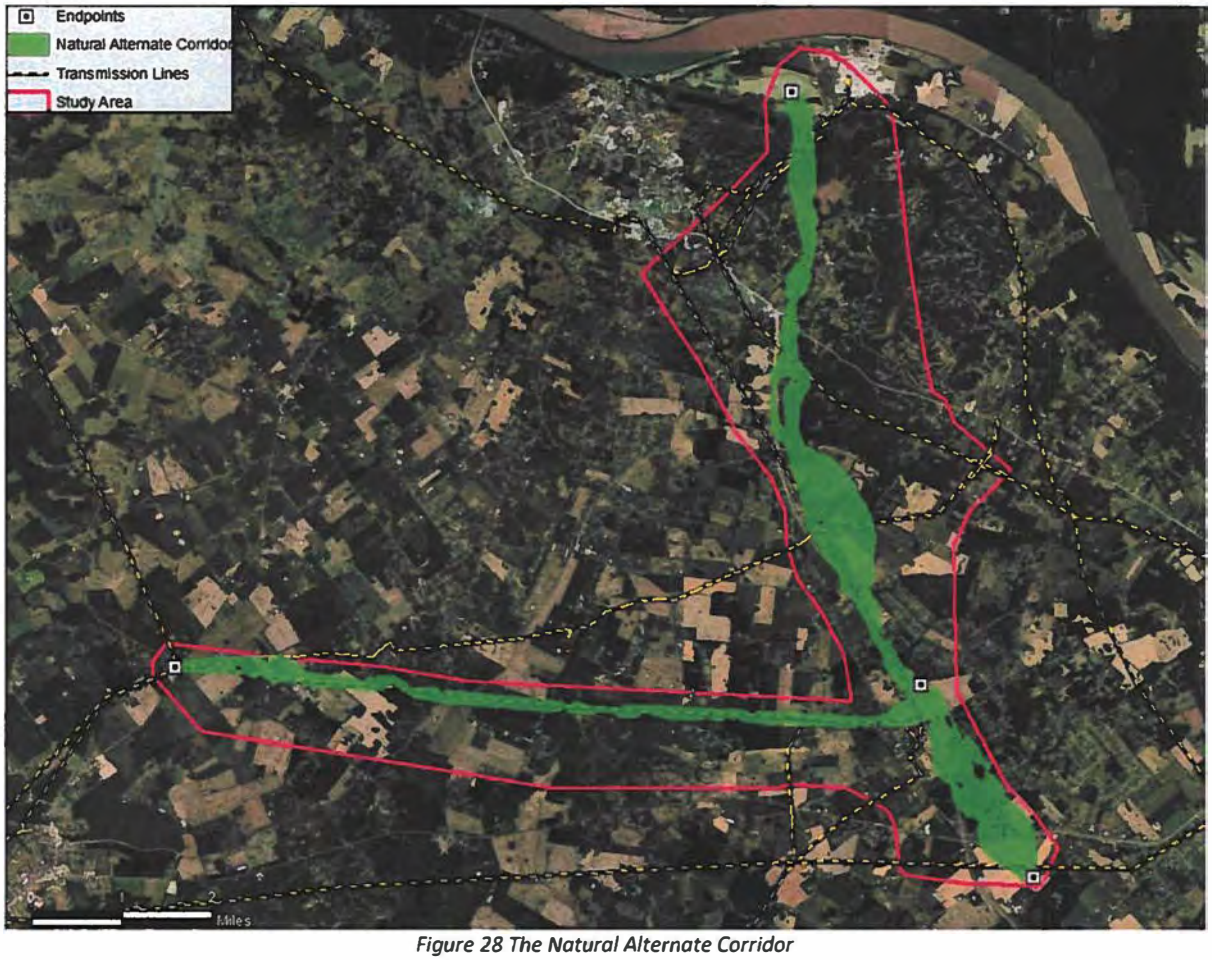



*Figure 28 The Natural Alternate Corridor*

## Engineering Emphasis Corridor

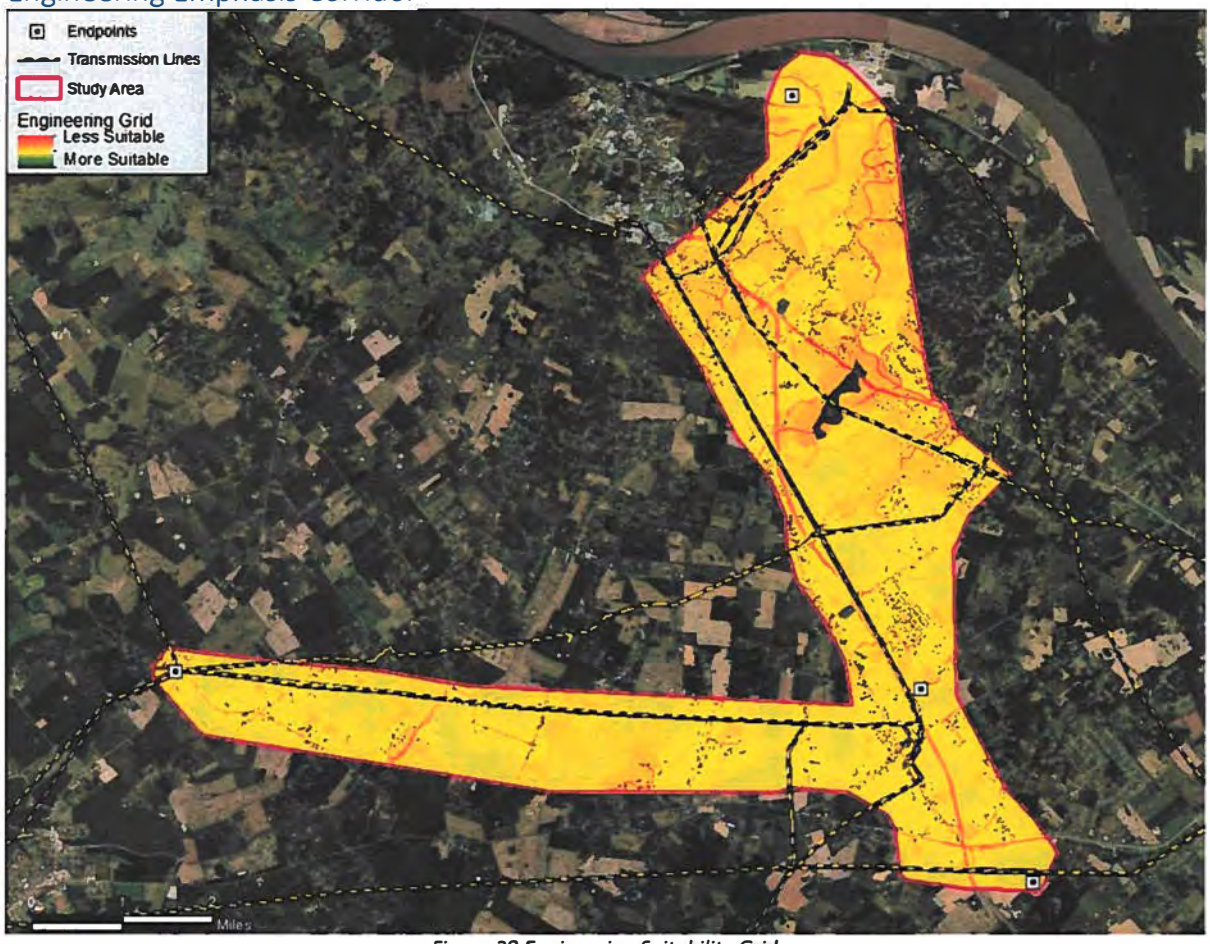



*Figure 29 Engineering Suitability Grid*

**The Engineering suitability grid is created by putting emphasis (5x) on the engineering perspective while taking into consideration the other two perspectives (1x).**

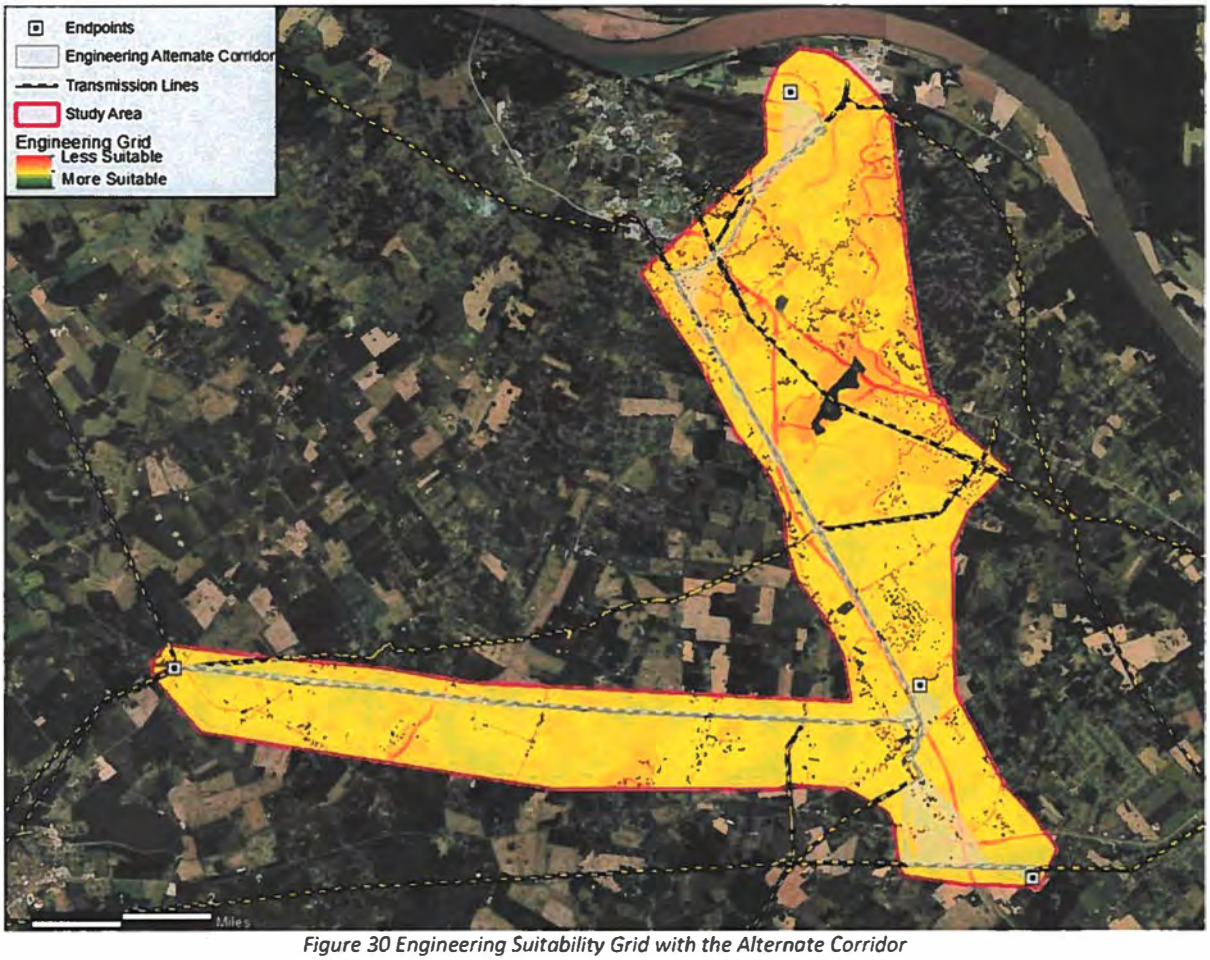



*Figure 30 Engineering Suitability Grid with the Alternate Corridor*

**The Engineering Alternate Corridor was then created by calculating the top 3% of routes between the Meade County Substation, Proposed Otter Creek Substation, Brandenburg Steel Mill Substation, and Proposed Redmon Road Substation.**

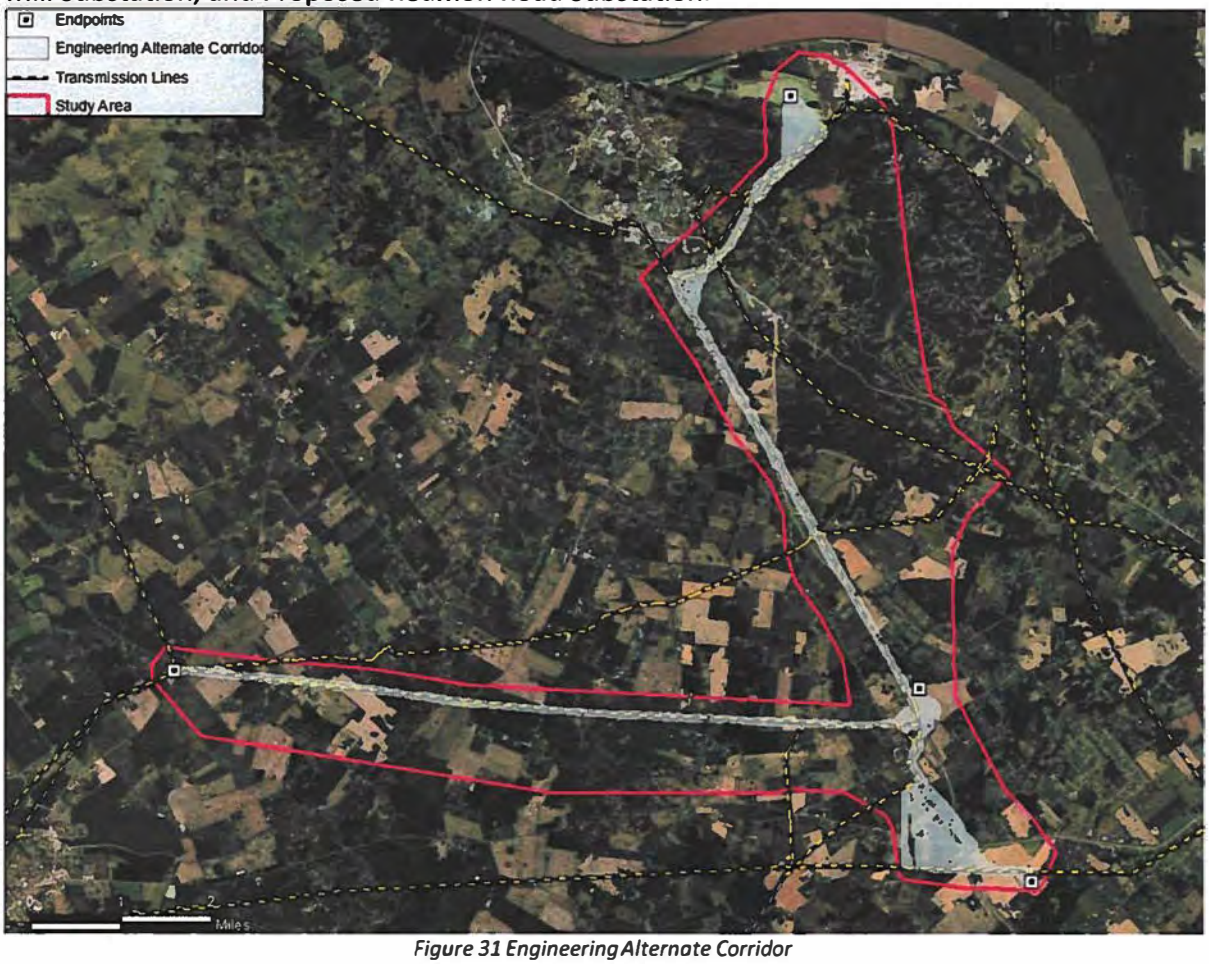



*Figure 31 Engineering Alternate Corridor*

## Simple Emphasis Corridor

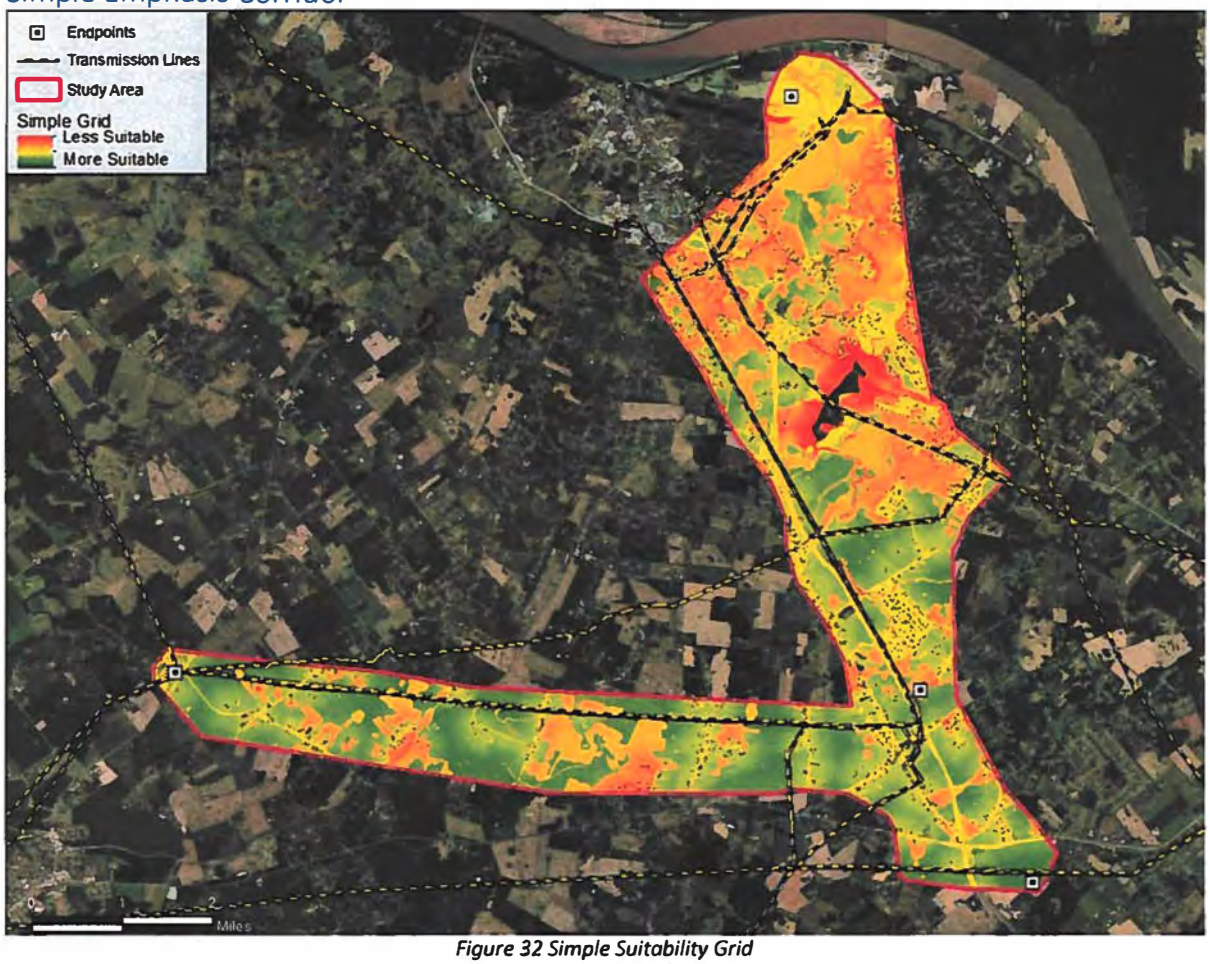



*Figure 32 Simple Suitability Grid*

**The Simple suitability grid is created by putting equal emphasis on the Built, Natural, and Engineering perspectives.**

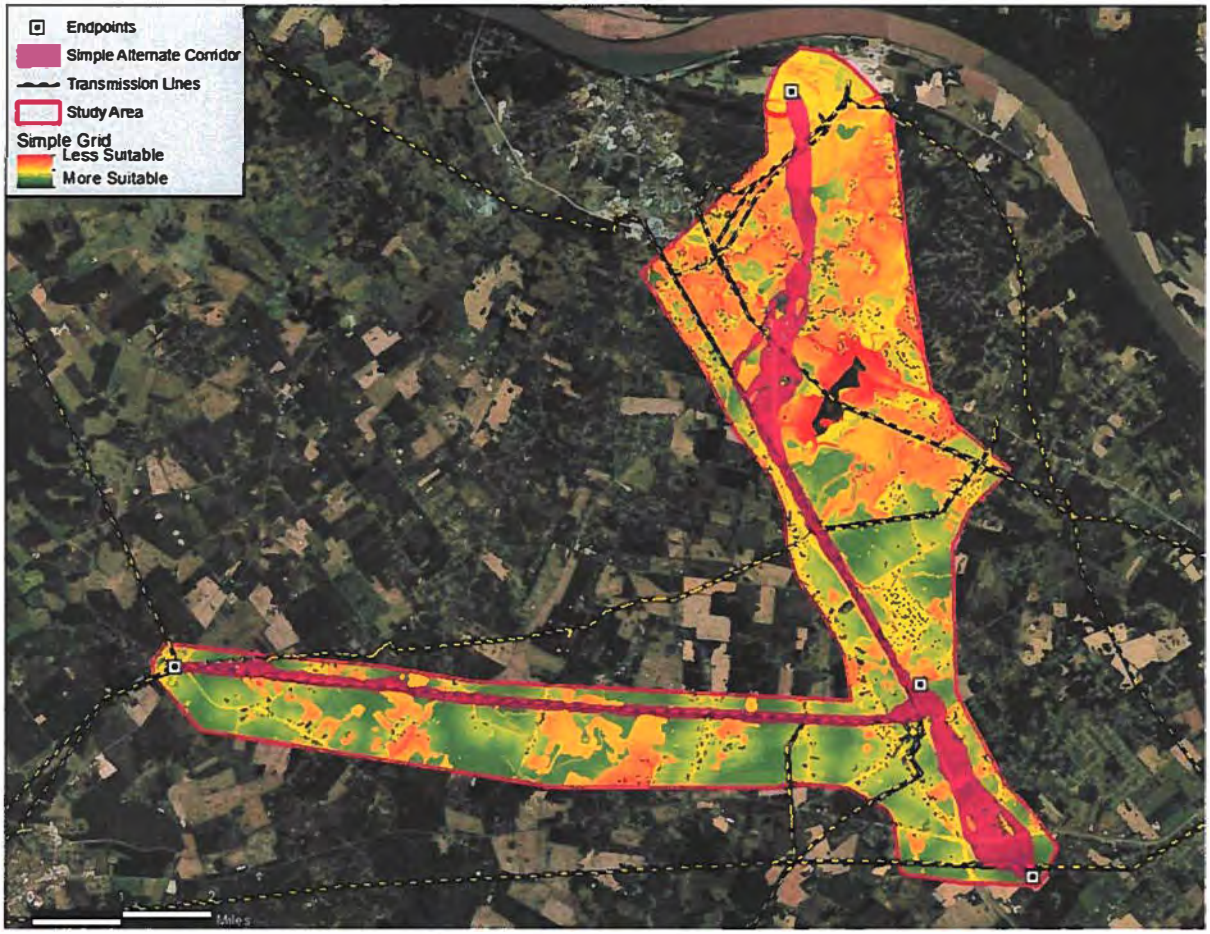



*Figure 33 Simple Suitability Grid with the Alternate Corridor*

**The Simple Alternate Corridor is then created by taking the least cost path between the Big Meade County Substation, Proposed Otter Creek Substation, Brandenburg Steel Mill Substation, and Proposed Redmon Road Substation.**

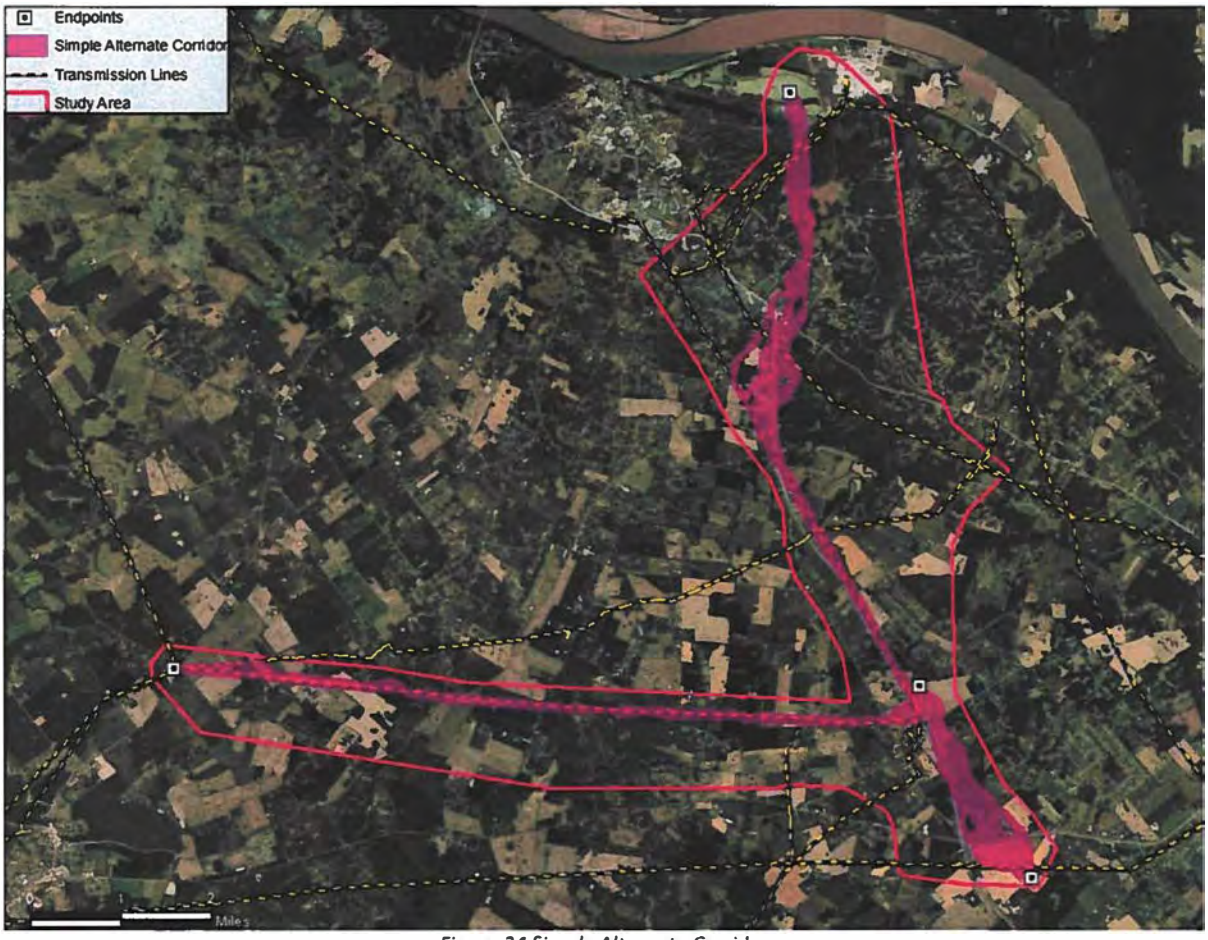



*Figure 34 Simple Alternate Corridor*

## Composite Alternative Corridors

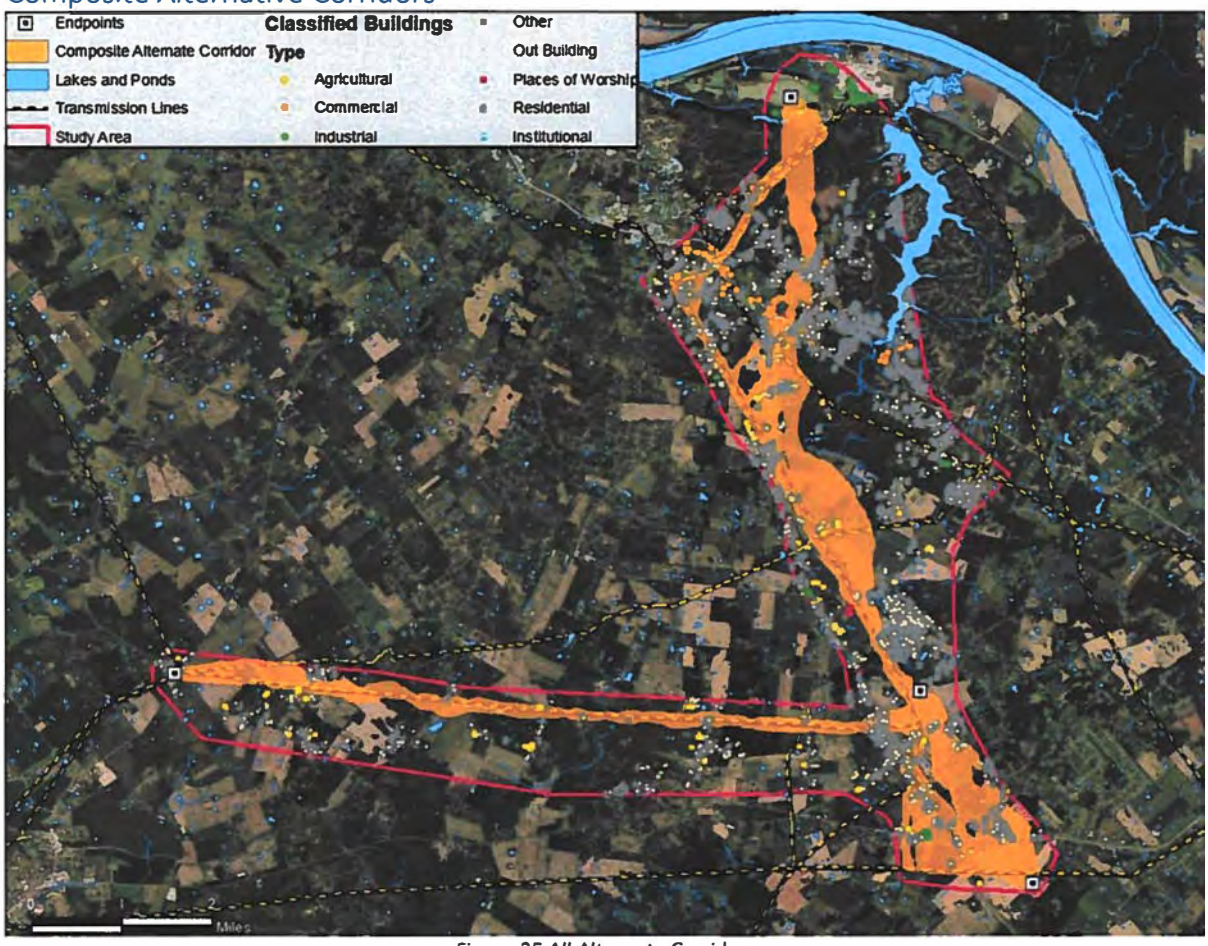



*Figure 35 All Alternate Corridors*

## Preferred Routes

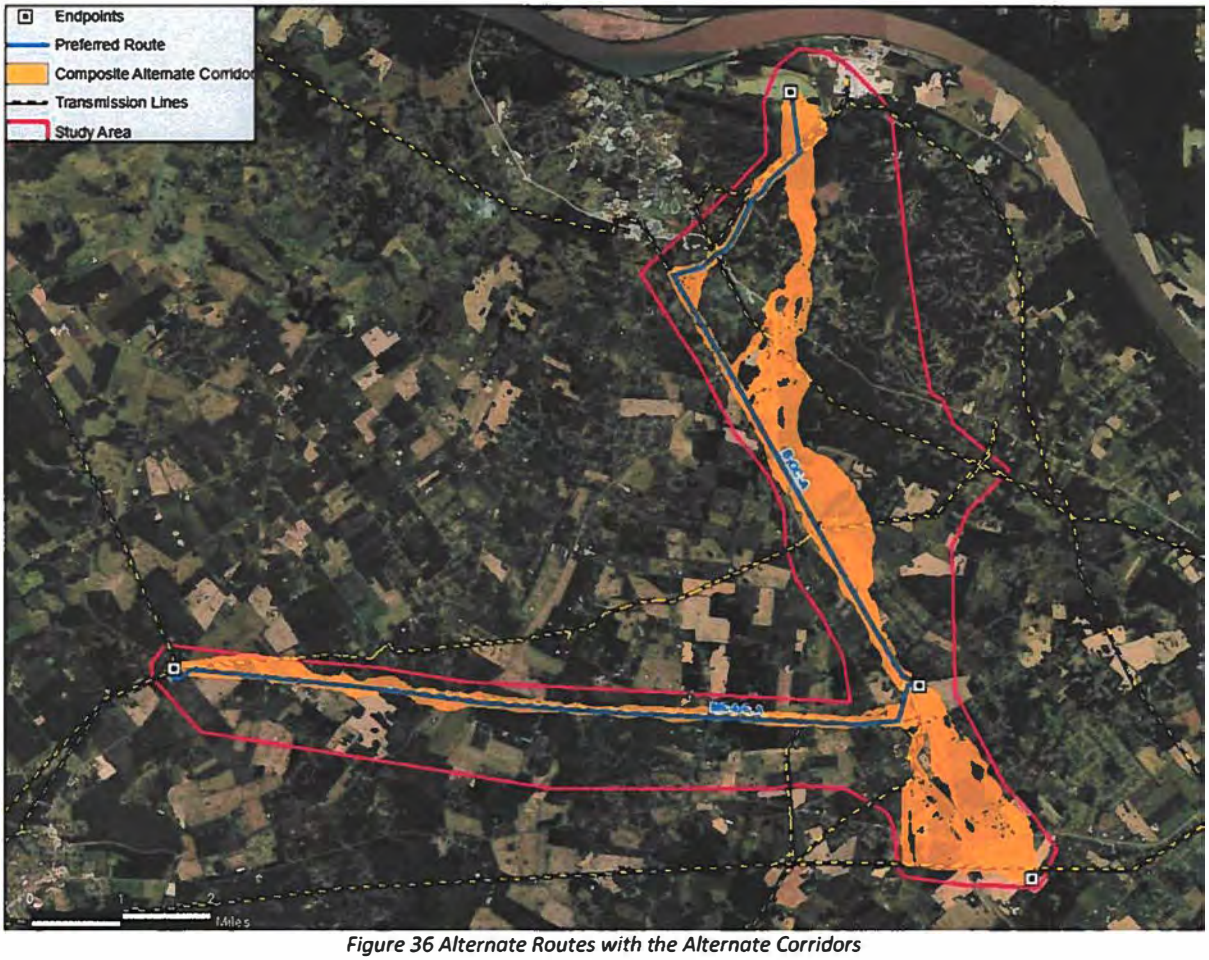



*Figure 36 Alternate Routes with the Alternate Corridors*

**The Preferred Routes were created using the alternate corridors as guidelines to go from the Meade County Substation to Proposed Otter Creek Substation. The preferred route will rebuild the existing 69kV in the existing ROW.**

**The preferred route from Brandenburg Steel Mill Substation to Proposed Otter Creek Substation will rebuild the existing 69kV and expand the existing ROW by 12.5 feet on both sides.**

**The alternative routes developed from the proposed Otter Creek Substation to the Proposed Redmon Road Substation are described in the next section.**

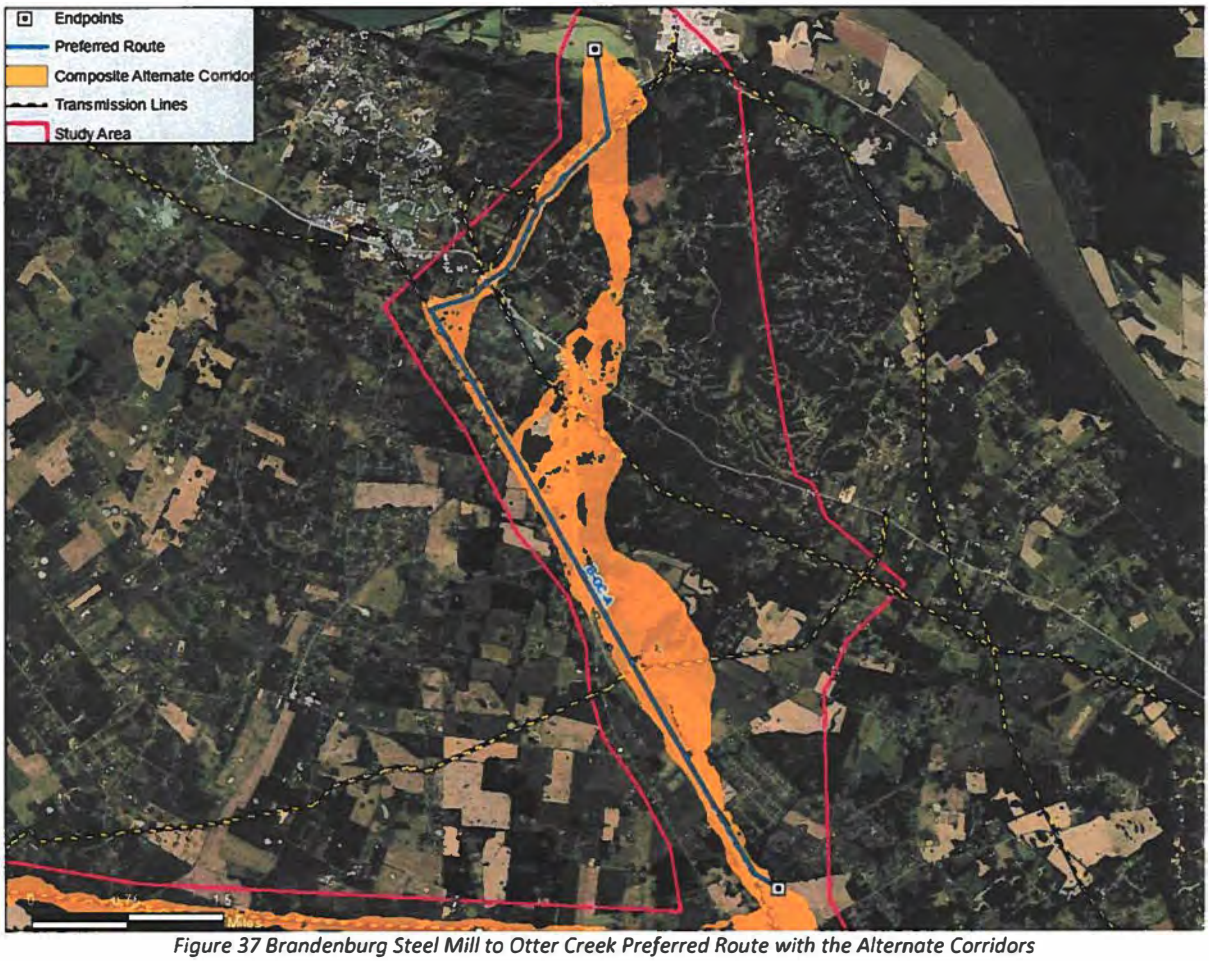



*Figure 37 Brandenburg Steel Mill to Otter Creek Preferred Route with the Alternate Corridors*

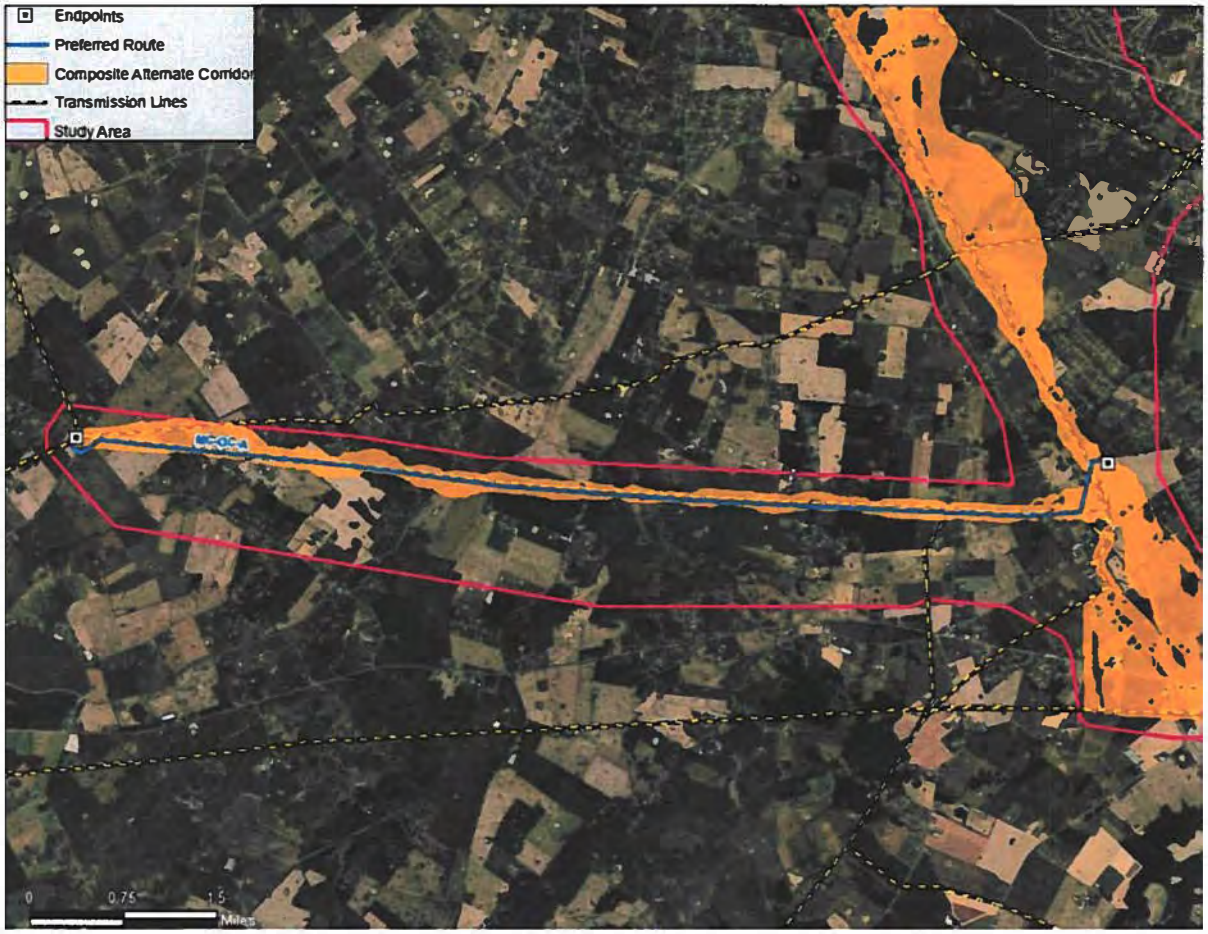



*Figure 38 Meade County to Otter Creek Preferred Route with the Alternate Corridors*

| | Route A |
|---|---|
| **Built** | |
| Residences Within the ROW | 3 |
| Residences Within 300' of the Centerline | 31 |
| Commercial Buildings within 300' of the Centerline | 5 |
| Industrial Buildings within 300' of the Centerline | 0 |
| Agricultural Buildings within 100' of the Centerline | 0 |
| School, Daycare, Church, Cemetery, & Park within 50' of the ROW | 0 |
| Historic structures within 600' of the Centerline | 0 |
| **Natural** | |
| Tree Clearing (Acres) | 7.78 |
| Stream / River Crossings | 3 |
| Wetlands (Acres) | 0 |
| **Engineering** | |
| % Rebuild of Existing Transmission Lines | 91% |
| % Parallel with Existing Transmission Lines | 0% |
| % Parallel Roads | 38% |
| Total Project Costs | $17,184,205 |
| Construction Cost ($1.7M/mile) | $14,943,000 |
| Land Acquisition Cost ($6,271/acre ) | $226,195 |
| Major Angle | $1,980,000 |
| 0-45° Angle ($90K) | 8 |
| 45-90° Angle ($240K) | 4 |
| >90° Angle ($300K) | 1 |
| Clearing Cost ($4.5K/Acre) | $35,010 |
| Length (Miles) | 8.79 |
| Approximate new ROW required (Acres) | 36 |

*Figure 39 Route Data Brandenburg Steel Mill Substation to Otter Creek Substation*

TEAM SPATIAL

| | Route A |
|---|---|
| **Built** | |
| Residences Within the ROW | 1 |
| Residences Within 300' of the Centerline | 14 |
| Commercial Buildings within 300' of the Centerline | 0 |
| Industrial Buildings within 300' of the Centerline | 0 |
| Agricultural Buildings within 100' of the Centerline | 1 |
| School, Daycare, Church, Cemetery, & Park within 50' of the ROW | 0 |
| Historic structures within 600' of the Centerline | 0 |
| **Natural** | |
| Tree Clearing (Acres) | 0 |
| Stream / River Crossings | 0 |
| Wetlands (Acres) | 0.04 |
| **Engineering** | |
| % Rebuild of Existing Transmission Lines | 95% |
| % Parallel with Existing Transmission Lines | 1% |
| % Parallel Roads | 0% |
| Total Project Costs | $7,808,353 |
| Construction Cost ($820K/mile) | $6,986,400 |
| Land Acquisition Cost ($6,271/acre ) | $41,953 |
| Major Angle | $780,000 |
| 0-45° Angle ($90K) | 6 |
| 45-90° Angle ($240K) | 1 |
| >90° Angle ($300K) | 0 |
| Clearing Cost ($4.5K/Acre) | $0 |
| Length (Miles) | 8.52 |
| Approximate new ROW required (Acres) | 7 |

*Figure 40 Route Data Meade County Substation to Otter Creek Substation*

## Alternate Routes

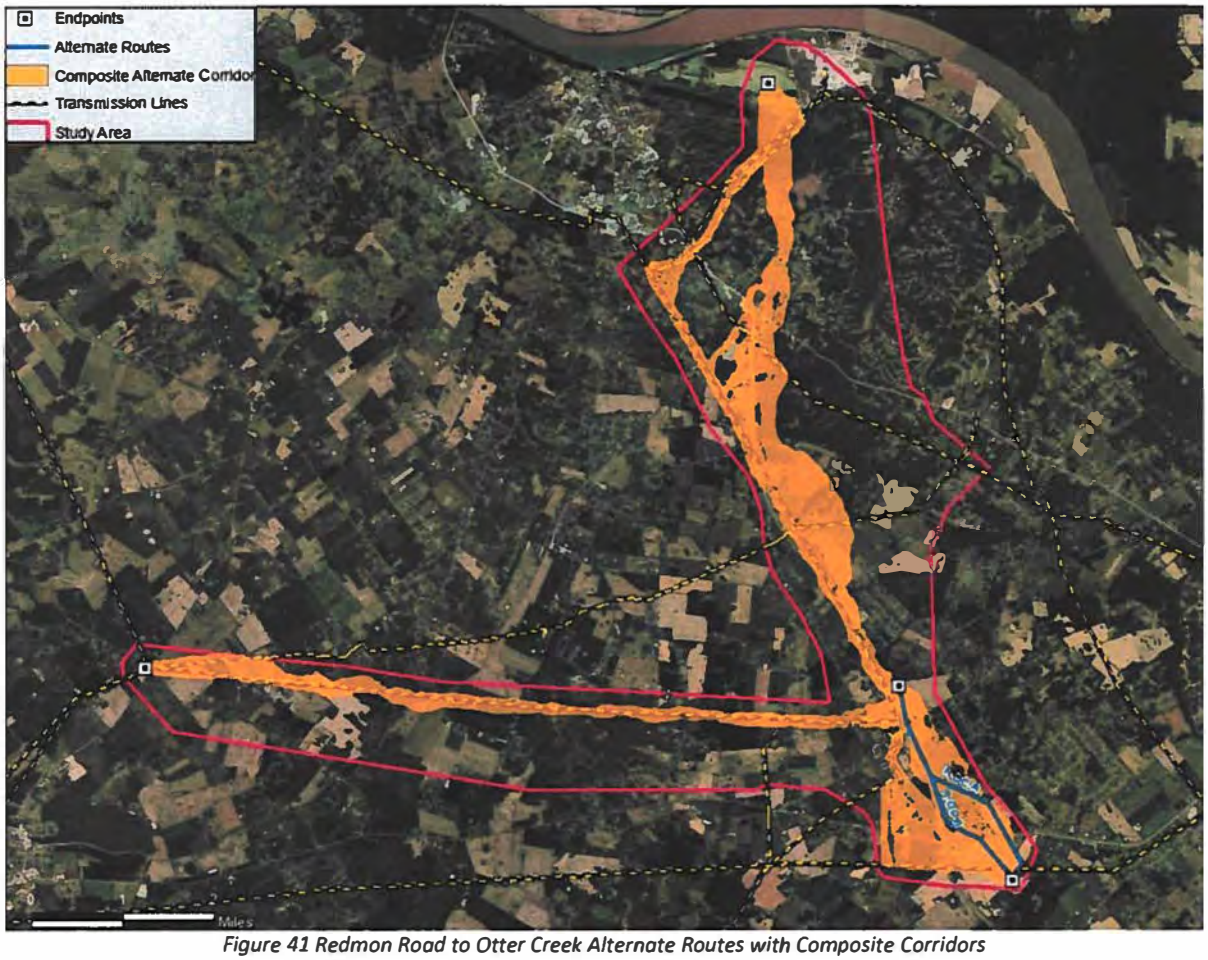



*Figure 41 Redmon Road to Otter Creek Alternate Routes with Composite Corridors*

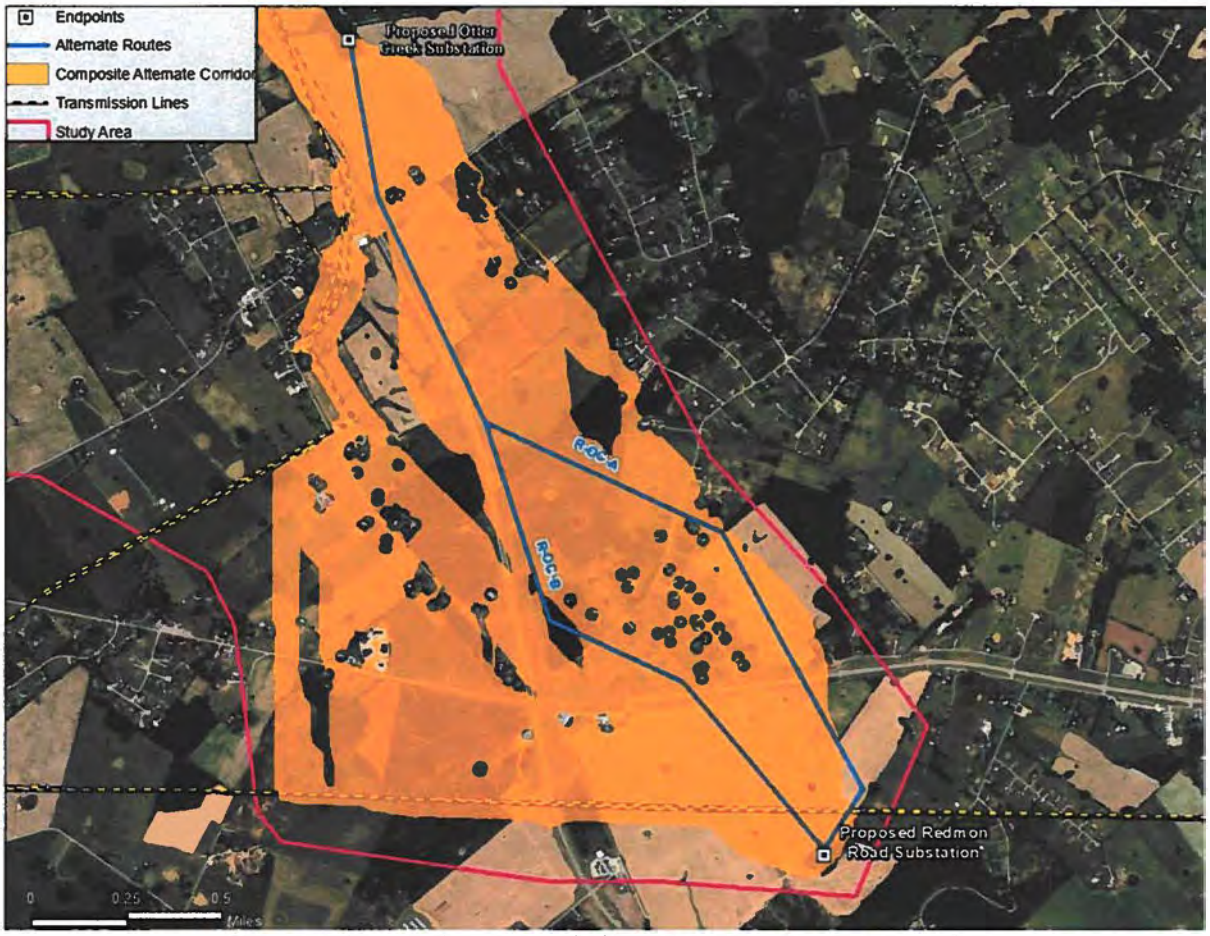



*Figure 42 Redmon Road to Otter Creek Alternate Routes with Composite Corridors*

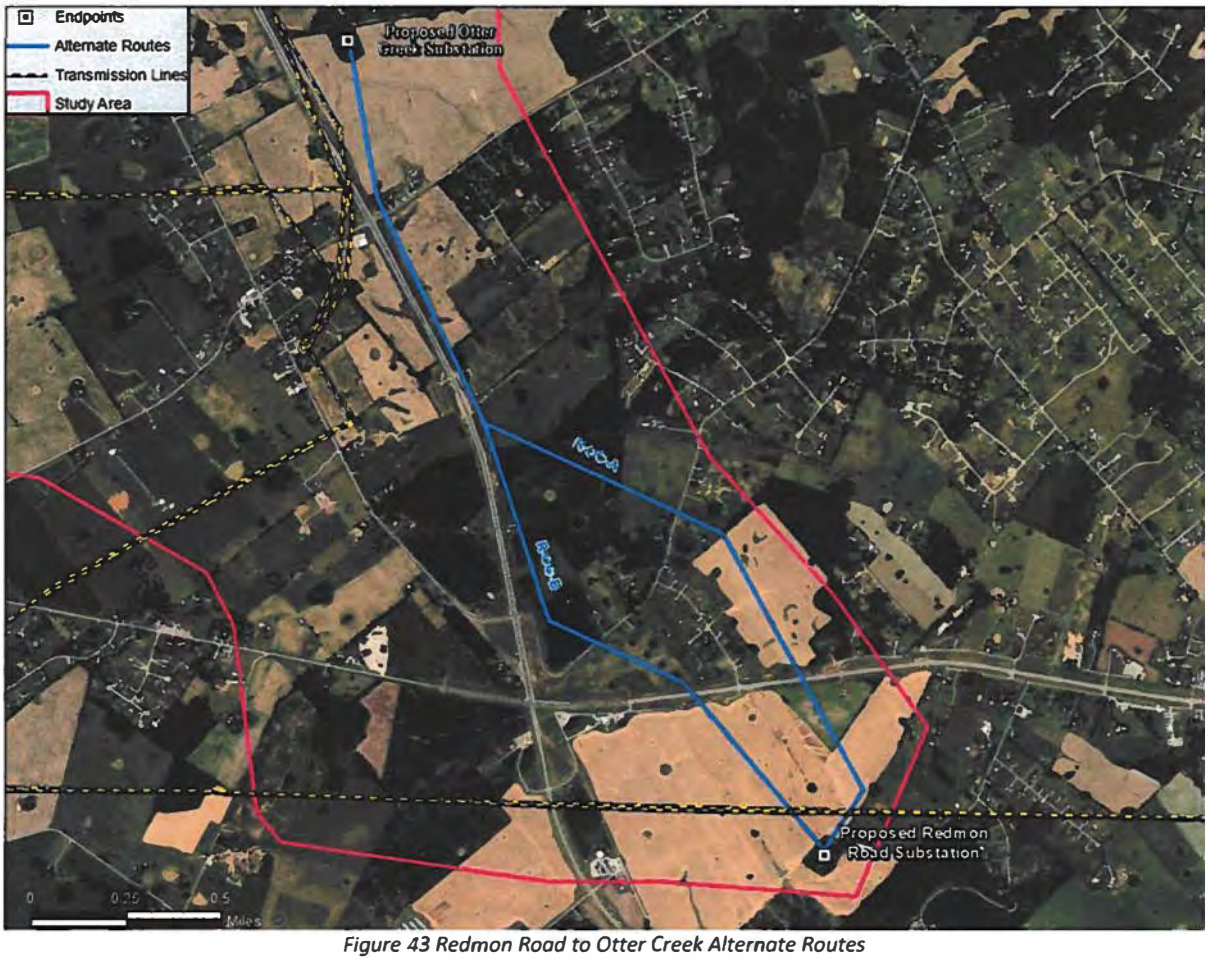



*Figure 43 Redmon Road to Otter Creek Alternate Routes*

**The Alternate Route Evaluation Model leverages weighted metrics to compare the Alternate Routes. The first step of the process is to compile data for each route. The metrics are grouped into three categories: Built, Natural, and Engineering.**

**The route data (Figure 32) are normalized on a scale from 0 to 1 with 0 being the best and 1 being the worst in each category. This allows comparisons of metrics in different units such as counts, acreage and dollars. The percent colocation with roads and existing distribution lines are inverted since the higher the number, the better it is for an alternate route.**

**The criteria are assigned weights based on their relative importance to the siting process. The weight for each criterion is represented by percentages such as 50% residences and 20% special areas. The weights within a perspective (built, natural, engineering) must total 100%.**

**The Alternate Route Evaluation Model places 5 times emphasis on each perspective to produce Built, Natural, and Engineering Emphasis Models. In addition, a Simple Average Model is implemented which places equal emphasis on the three perspectives.**

| | Route A East | Route B West |
|---|---|---|
| **Built** | | |
| Residences Within the ROW | 0 | 0 |
| Residences Within 300' of the Centerline | 4 | 2 |
| Commercial Buildings within 300' of the Centerline | 0 | 0 |
| Industrial Buildings within 300' of the Centerline | 0 | 0 |
| Agricultural Buildings within 300' of the Centerline | 1 | 0 |
| School, Daycare, Church, Cemetery, & Park within 50' of the ROW | 0 | 0 |
| Historic structures within 600' of the Centerline | 0 | 0 |
| **Natural** | | |
| Tree Clearing (Acres) | 1.03 | 4.9 |
| Stream / River Crossings | 0 | 0 |
| Wetlands (Acres) | 0 | 0 |
| **Engineering** | | |
| % Rebuild of Existing Transmission Lines | 0% | 0% |
| % Parallel with Existing Transmission Lines | 0% | 0% |
| % Parallel Roads | 8% | 34% |
| Total Project Costs | $5,627,023 | $5,315,721 |
| Construction Cost ($1.7M/mile) | $4,386,000 | $4,216,000 |
| Land Acquisition Cost ($6,271/acre ) | $246,388 | $237,671 |
| Major Angle | $990,000 | $840,000 |
| 0-45° Angle ($90K) | 3 | 4 |
| 45-90° Angle ($240K) | 3 | 2 |
| >90° Angle ($300K) | 0 | 0 |
| Clearing Cost ($4.5K/Acre) | $4,635 | $22,050 |
| Length (Miles) | 2.58 | 2.48 |
| Approximate new ROW required (Acres) | 39.29 | 37.9 |

*Figure 44 Route Data Redmon Road Substation to Otter Creek Substation*

TEAM SPATIAL

| Built | Route A East | Route B West |
|---|---|---|
| Residences Within the ROW | 0.0 | 0.0 |
| *Normalized* | - | - |
| Residences Within 300' of the Centerline | 4.0 | 2.0 |
| *Normalized* | 1.0 | 0.0 |
| Commercial Buildings within 300' of the Centerline | 0.0 | 0.0 |
| *Normalized* | - | - |
| Industrial Buildings within 300' of the Centerline | 0.0 | 0.0 |
| *Normalized* | - | - |
| Agricultural Buildings within 300' of the Centerline | 1.0 | 0.0 |
| *Normalized* | 1.0 | 0.0 |
| School, Daycare, Church, Cemetery, & Park within 50' of the ROW | 0.0 | 0.0 |
| *Normalized* | - | - |
| Historic structures within 600' of the Centerline | 0.0 | 0.0 |
| *Normalized* | - | - |
| **Natural** | | |
| Tree Clearing (Acres) | 1.0 | 4.9 |
| *Normalized* | 0.0 | 1.0 |
| Stream / River Crossings | 0.0 | 0.0 |
| *Normalized* | - | - |
| Wetlands (Acres) | 0.0 | 0.0 |
| *Normalized* | - | - |
| **Engineering** | | |
| % Rebuild of Existing Transmission Lines | 0.00 | 0.00 |
| *Normalized* | - | - |
| *Inverted* | - | - |
| % Parallel with Existing Transmission Lines | 0 | 0 |
| *Normalized* | - | - |
| *Inverted* | - | - |
| % Parallel Roads | 0.08 | 0.34 |
| *Normalized* | 0.0 | 1.0 |
| *Inverted* | 1.0 | 0.0 |
| Total Project Costs | $ 5,627,023 | $ 5,315,721 |
| *Normalized* | 1.0 | 0.0 |

*Figure 45 Normalized Data Redmon Road Substation to Otter Creek Substation*

TEAM SPATIAL

| Built | 72% | Route A East | Route B West |
|---|---|---|---|
| Feature | | Unit | Unit |
| Residences Within the ROW | 0.0% | - | - |
| *Weighted* | | - | - |
| Residences Within 300' of the Centerline | 95.0% | 1.00 | 0.00 |
| *Weighted* | | 0.95 | 0.00 |
| Commercial Buildings within 300' of the Centerline | 0.0% | - | - |
| *Weighted* | | - | - |
| Industrial Buildings within 300' of the Centerline | 0.0% | - | - |
| *Weighted* | | - | - |
| Agricultural Buildings within 300' of the Centerline | 5.0% | 1.00 | 0.00 |
| *Weighted* | | 0.05 | 0.00 |
| School, Daycare, Church, Cemetery, & Park within 50' of the ROW | 0.0% | - | - |
| *Weighted* | | - | - |
| Historic structures within 600' of the Centerline | 0.0% | - | - |
| *Weighted* | | - | - |
| TOTAL | 100.0% | 1.00 | 0.00 |
| WEIGHTED TOTAL | | 0.72 | 0.00 |
| **Natural** | 14% | | |
| Tree Clearing (Acres) | 100.0% | 0.00 | 1.00 |
| *Weighted* | | 0.00 | 1.00 |
| Stream / River Crossings | 0.0% | - | - |
| *Weighted* | | - | - |
| Wetlands (Acres) | 0.0% | - | - |
| *Weighted* | | - | - |
| TOTAL | 100.0% | 0.00 | 1.00 |
| WEIGHTED TOTAL | | 0.00 | 0.14 |
| **Engineering** | 14% | | |
| % Rebuild of Existing Transmission Lines | 0.0% | - | - |
| *Weighted* | | - | - |
| % Parallel with Existing Transmission Lines | 0.0% | - | - |
| *Weighted* | | - | - |
| % Parallel Roads | 20.0% | 1.00 | 0.00 |
| *Weighted* | | 0.20 | 0.00 |
| Total Project Costs | 80.0% | 1.00 | 0.00 |
| *Weighted* | | 0.80 | 0.00 |
| TOTAL | 100.0% | 1.00 | 0.00 |
| WEIGHTED TOTAL | | 0.14 | 0.00 |
| **SUM OF WEIGHTED TOTALS** | | 0.86 | 0.14 |

*Figure 45 Built Emphasis Redmon Road Substation to Otter Creek Substation*

TEAM SPATIAL

| Built | 14% | Route A East | Route B West |
|---|---|---|---|
| Feature | | Unit | Unit |
| Residences Within the ROW | 0.0% | - | - |
| *Weighted* | | - | - |
| Residences Within 300' of the Centerline | 95.0% | 1.00 | 0.00 |
| *Weighted* | | 0.95 | 0.00 |
| Commercial Buildings within 300' of the Centerline | 0.0% | - | - |
| *Weighted* | | - | - |
| Industrial Buildings within 300' of the Centerline | 0.0% | - | - |
| *Weighted* | | - | - |
| Agricultural Buildings within 300' of the Centerline | 5.0% | 1.00 | 0.00 |
| *Weighted* | | 0.05 | 0.00 |
| School, Daycare, Church, Cemetery, & Park within 50' of the ROW | 0.0% | - | - |
| *Weighted* | | - | - |
| Historic structures within 600' of the Centerline | 0.0% | - | - |
| *Weighted* | | - | - |
| TOTAL | 100.0% | 1.00 | 0.00 |
| WEIGHTED TOTAL | | 0.14 | 0.00 |
| **Natural** | 72% | | |
| Tree Clearing (Acres) | 100.0% | 0.00 | 1.00 |
| *Weighted* | | 0.00 | 1.00 |
| Stream / River Crossings | 0.0% | - | - |
| *Weighted* | | - | - |
| Wetlands (Acres) | 0.0% | - | - |
| *Weighted* | | - | - |
| TOTAL | 100.0% | 0.00 | 1.00 |
| WEIGHTED TOTAL | | 0.00 | 0.72 |
| **Engineering** | 14% | | |
| % Rebuild of Existing Transmission Lines | 0.0% | - | - |
| *Weighted* | | - | - |
| % Parallel with Existing Transmission Lines | 0.0% | - | - |
| *Weighted* | | - | - |
| % Parallel Roads | 20.0% | 1.00 | 0.00 |
| *Weighted* | | 0.20 | 0.00 |
| Total Project Costs | 80.0% | 1.00 | 0.00 |
| *Weighted* | | 0.80 | 0.00 |
| TOTAL | 100.0% | 1.00 | 0.00 |
| WEIGHTED TOTAL | | 0.14 | 0.00 |
| **SUM OF WEIGHTED TOTALS** | | 0.28 | 0.72 |

*Figure 46 Natural Emphasis Redmon Road Substation to Otter Creek Substation*

| Built | 14% | Route A East | Route B West |
|---|---|---|---|
| Feature | | Unit | Unit |
| Residences Within the ROW | 0.0% | - | - |
| *Weighted* | | - | - |
| Residences Within 300' of the Centerline | 95.0% | 1.00 | 0.00 |
| *Weighted* | | 0.95 | 0.00 |
| Commercial Buildings within 300' of the Centerline | 0.0% | - | - |
| *Weighted* | | - | - |
| Industrial Buildings within 300' of the Centerline | 0.0% | - | - |
| *Weighted* | | - | - |
| Agricultural Buildings within 300' of the Centerline | 5.0% | 1.00 | 0.00 |
| *Weighted* | | 0.05 | 0.00 |
| School, Daycare, Church, Cemetery, & Park within 50' of the ROW | 0.0% | - | - |
| *Weighted* | | - | - |
| Historic structures within 600' of the Centerline | 0.0% | - | - |
| *Weighted* | | - | - |
| TOTAL | 100.0% | 1.00 | 0.00 |
| WEIGHTED TOTAL | | 0.14 | 0.00 |
| **Natural** | 14% | | |
| Tree Clearing (Acres) | 100.0% | 0.00 | 1.00 |
| *Weighted* | | 0.00 | 1.00 |
| Stream / River Crossings | 0.0% | - | - |
| *Weighted* | | - | - |
| Wetlands (Acres) | 0.0% | - | - |
| *Weighted* | | - | - |
| TOTAL | 100.0% | 0.00 | 1.00 |
| WEIGHTED TOTAL | | 0.00 | 0.14 |
| **Engineering** | 72% | | |
| % Rebuild of Existing Transmission Lines | 0.0% | - | - |
| *Weighted* | | - | - |
| % Parallel with Existing Transmission Lines | 0.0% | - | - |
| *Weighted* | | - | - |
| % Parallel Roads | 20.0% | 1.00 | 0.00 |
| *Weighted* | | 0.20 | 0.00 |
| Total Project Costs | 80.0% | 1.00 | 0.00 |
| *Weighted* | | 0.80 | 0.00 |
| TOTAL | 100.0% | 1.00 | 0.00 |
| WEIGHTED TOTAL | | 0.72 | 0.00 |
| **SUM OF WEIGHTED TOTALS** | | 0.86 | 0.14 |

*Figure 47 Engineering Emphasis Redmon Road Substation to Otter Creek Substation*

TEAM SPATIAL

| Built | 33% | Route A East | Route B West |
|---|---|---|---|
| Feature | | Unit | Unit |
| Residences Within the ROW | 0.0% | - | - |
| *Weighted* | | - | - |
| Residences Within 300' of the Centerline | 95.0% | 1.00 | 0.00 |
| *Weighted* | | 0.95 | 0.00 |
| Commercial Buildings within 300' of the Centerline | 0.0% | - | - |
| *Weighted* | | - | - |
| Industrial Buildings within 300' of the Centerline | 0.0% | - | - |
| *Weighted* | | - | - |
| Agricultural Buildings within 300' of the Centerline | 5.0% | 1.00 | 0.00 |
| *Weighted* | | 0.05 | 0.00 |
| School, Daycare, Church, Cemetery, & Park within 50' of the ROW | 0.0% | - | - |
| *Weighted* | | - | - |
| Historic structures within 600' of the Centerline | 0.0% | - | - |
| *Weighted* | | - | - |
| TOTAL | 100.0% | 1.00 | 0.00 |
| WEIGHTED TOTAL | | 0.33 | 0.00 |
| **Natural** | 33% | | |
| Tree Clearing (Acres) | 100.0% | 0.00 | 1.00 |
| *Weighted* | | 0.00 | 1.00 |
| Stream / River Crossings | 0.0% | - | - |
| *Weighted* | | - | - |
| Wetlands (Acres) | 0.0% | - | - |
| *Weighted* | | - | - |
| TOTAL | 100.0% | 0.00 | 1.00 |
| WEIGHTED TOTAL | | 0.00 | 0.33 |
| **Engineering** | 33% | | |
| % Rebuild of Existing Transmission Lines | 0.0% | - | - |
| *Weighted* | | - | - |
| % Parallel with Existing Transmission Lines | 0.0% | - | - |
| *Weighted* | | - | - |
| % Parallel Roads | 20.0% | 1.00 | 0.00 |
| *Weighted* | | 0.20 | 0.00 |
| Total Project Costs | 80.0% | 1.00 | 0.00 |
| *Weighted* | | 0.80 | 0.00 |
| TOTAL | 100.0% | 1.00 | 0.00 |
| WEIGHTED TOTAL | | 0.33 | 0.00 |
| **SUM OF WEIGHTED TOTALS** | | 0.67 | 0.33 |

*Figure 48 Simple Average Redmon Road Substation to Otter Creek Substation*

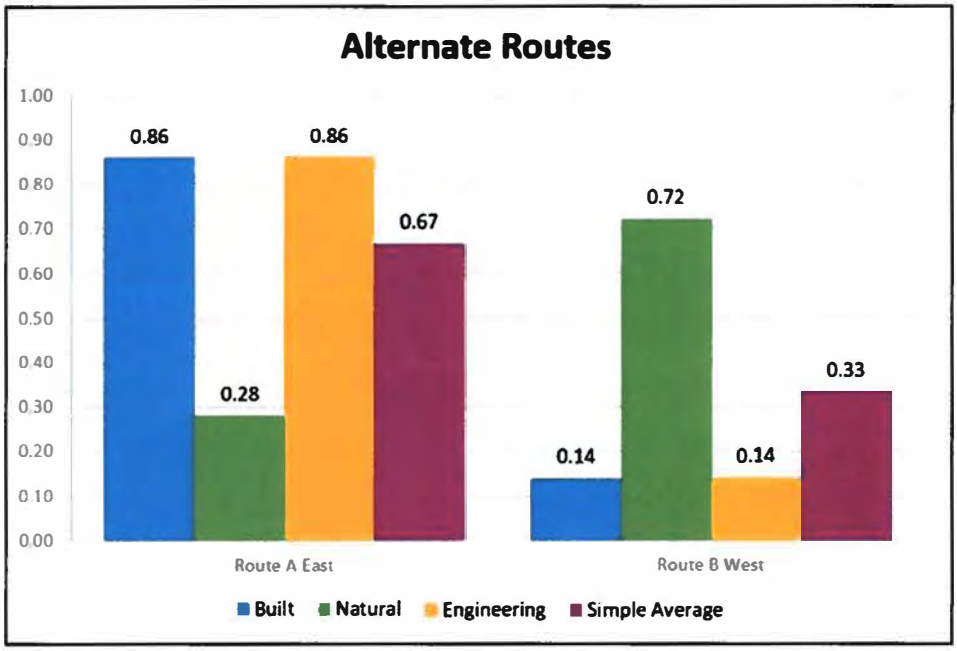



*Figure 49 Alternate Route Graph*

Route B scores the lowest (most suitable) from a Built perspective. This is due to the fact that Route B does not have any agricultural buildings with 300 feet of the route and less residences within 300 feet. While Route A has more residences and agricultural buildings within 300 feet of the route.

The Natural perspective is dictated by the tree clearing difference in both routes. Route A necessitates about 1 acre of tree clearing, while Route B would need about 5 acres of tree clearing making it less suitable.

In the Engineering perspective, Route B has the lowest score with the lowest cost being the main factor. The cost is lower since there is one less 45-90 degree angle in the route compared to Route A. Route B also has a higher percentage of colocation with roads when compared to Route A.

Route B has the lowest Simple Average score which is logical given the fact that it was either the most suitable in two of the three perspectives.

It should be noted that the Alternate Route Evaluation Model is commonly used to evaluate a larger number of routes for the purpose of identifying the top routes to carry on to the Expert Judgement model. There are usually more data in the model as well. For example, in the Natural criteria the only measured difference between these routes are less than 4 acres of tree clearing. One of the disadvantages of using this model to evaluate only two routes, that are very similar, is that the differences between the routes are exaggerated. This model is not used to select the preferred route. However, it was used on this project to help evaluate the route alternatives.

## Preferred Route Selection

The Expert Judgment Model is used by the transmission line experts on the project team to select the preferred route. The team determined the high-level siting criteria and assigned weights to represent the relative importance. Cost was weighed the most at 40% followed by Construction/Maintenance Accessibility at 30%, Community Considerations at 20%, and Schedule Delay Risk at 10%.

Next the experts ranked each route for each of the criteria. Finally, the weights are applied, and the preferred route has the lowest total score. Both Route A and B were considered in the Expert Judgement analysis.

For the Community criteria, Route A was given the best score since the route goes on the outside of a property near the proposed Redmon Road substation. Route B also may affect by a possible new apartment complex mentioned by the landowner, while Route A would not affect the possible apartment.

Route A has a lower risk of a schedule delay when compared to Route B because there are less trees and seasonal clearing restrictions due to the sensitive bat.

Route A has a slightly better score than Route B in terms of reliability due to the fact that Route A has less angles.

For the Natural Environment Considerations, Route A scores better because Route B has more tree clearing and is in proximity to a cave which may be bat habitat.

Both Route A and Route B scored the same when it comes to Accessibility.

Route B scores slightly better in terms of Cost according to the Alternate Route Evaluation Model estimation.

In consideration of all of these factors, Route A was selected as the preferred route.

| Criteria | Weight | Route A East | Route B West |
|---|---|---|---|
| Community Issues | 30% | 1.0 | 1.5 |
| ***Weighted*** | | 0.3 | 0.5 |
| Schedule Delay Risk | 15% | 1.0 | 1.5 |
| ***Weighted*** | | 0.2 | 0.2 |
| Reliability | 5% | 1.0 | 1.2 |
| ***Weighted*** | | 0.1 | 0.1 |
| Natural Environment Considerations | 10% | 1.0 | 1.5 |
| ***Weighted*** | | 0.1 | 0.2 |
| Construction/Maintenance Accessibility | 5% | 1.0 | 1.0 |
| ***Weighted*** | | 0.1 | 0.1 |
| Cost | 35% | 1.1 | 1.0 |
| ***Weighted*** | | 0.4 | 0.4 |
| **TOTAL** | **100%** | **1.02** | **1.29** |

*Figure 50 Expert Judgement Model*

## Preferred Routes Description

**Route A comes out of the Proposed Otter Creek Substation to the southwest. The route then goes to the southeast to parallel Brandenburg Road and continues to go southeast until the route goes east to avoid a series of residences along Osborne Road. Then the route goes south into the Proposed Redmon Road Substation.**

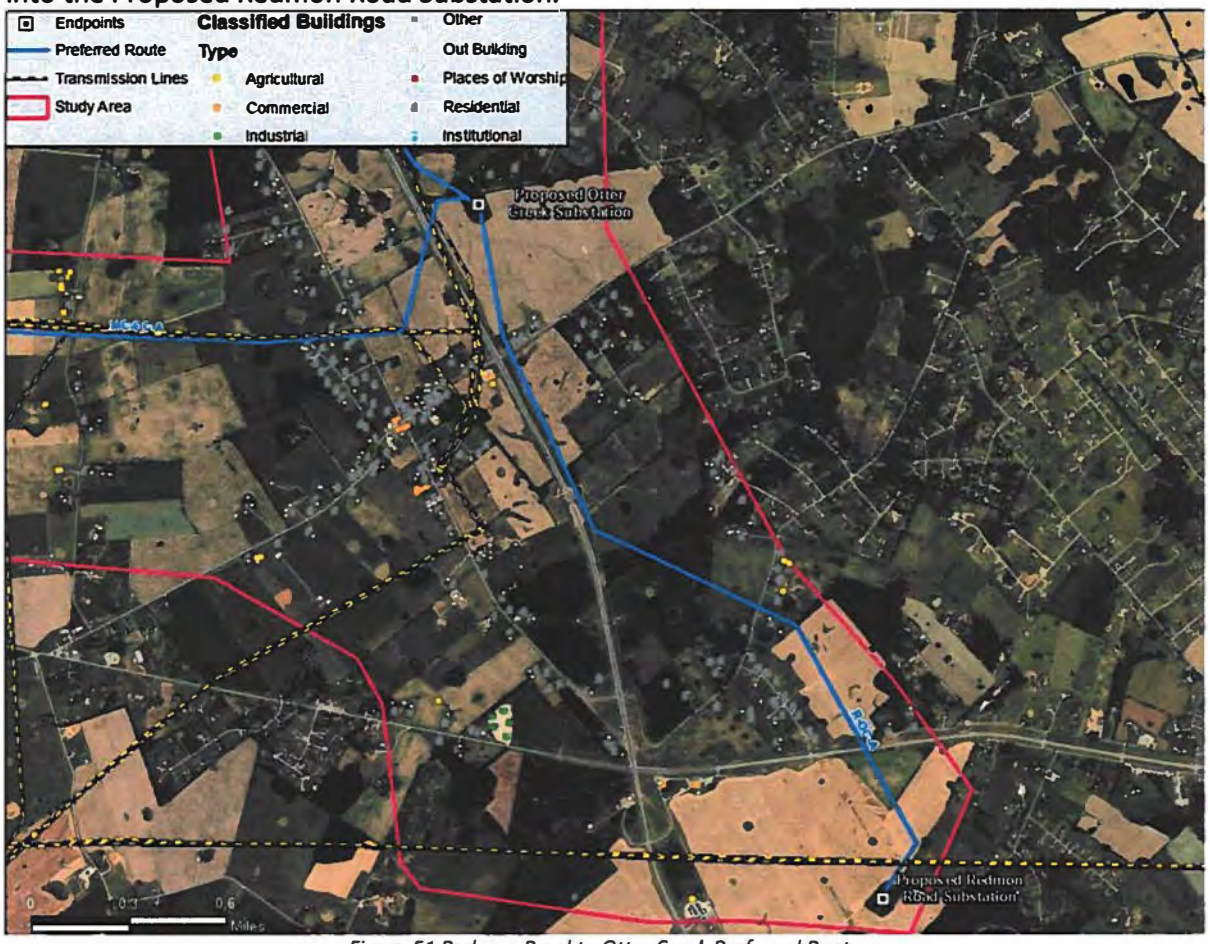



*Figure 51 Redmon Road to Otter Creek Preferred Route*

**The preferred route for the Proposed Brandenburg Steel Mill to the Proposed Otter Creek Substation is a rebuild of the two existing Big Rivers transmission lines.**

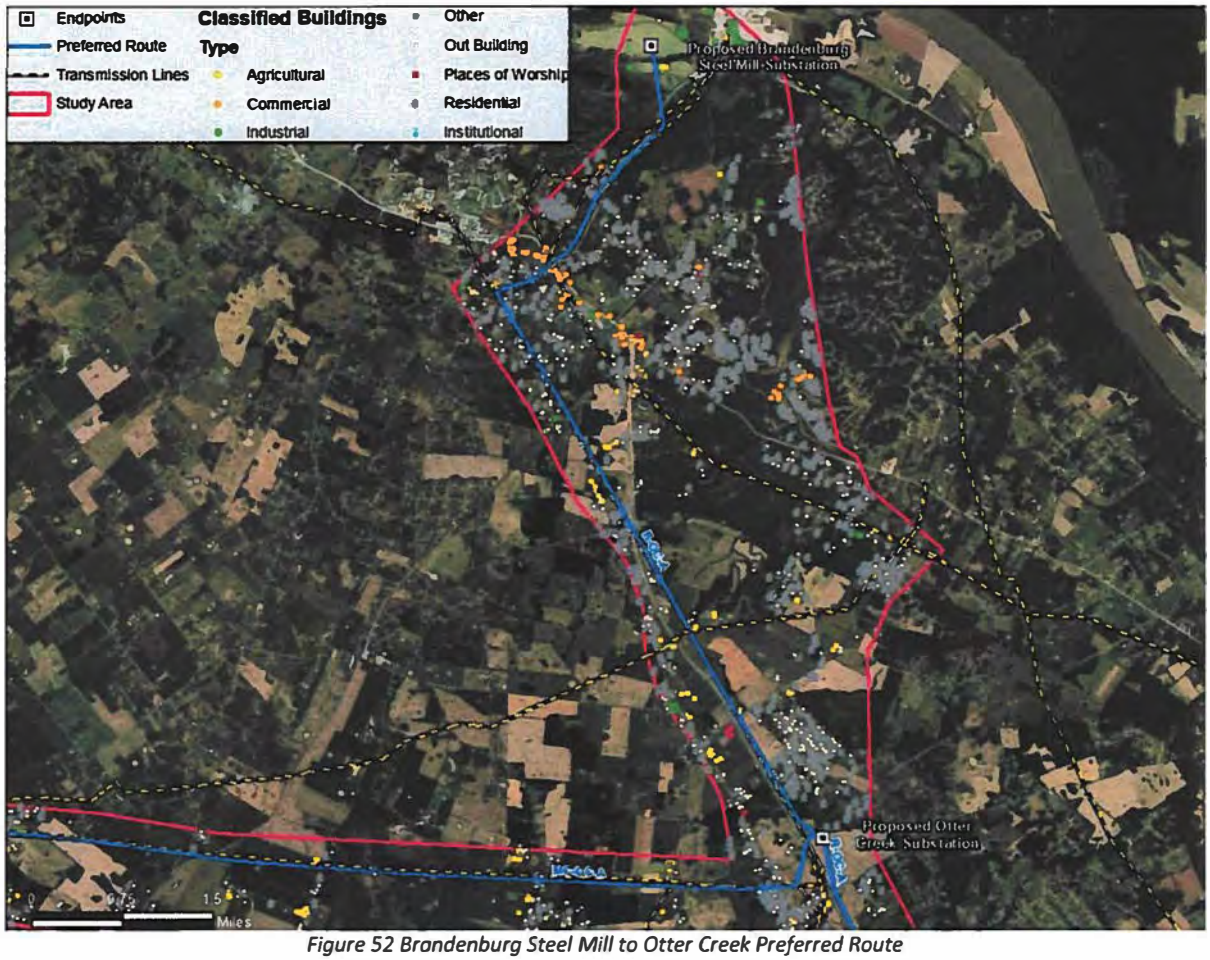



*Figure 52 Brandenburg Steel Mill to Otter Creek Preferred Route*

**The preferred route for the Meade County Substation to the Proposed Otter Creek Substation is rebuilding the existing Big Rivers transmission line.**

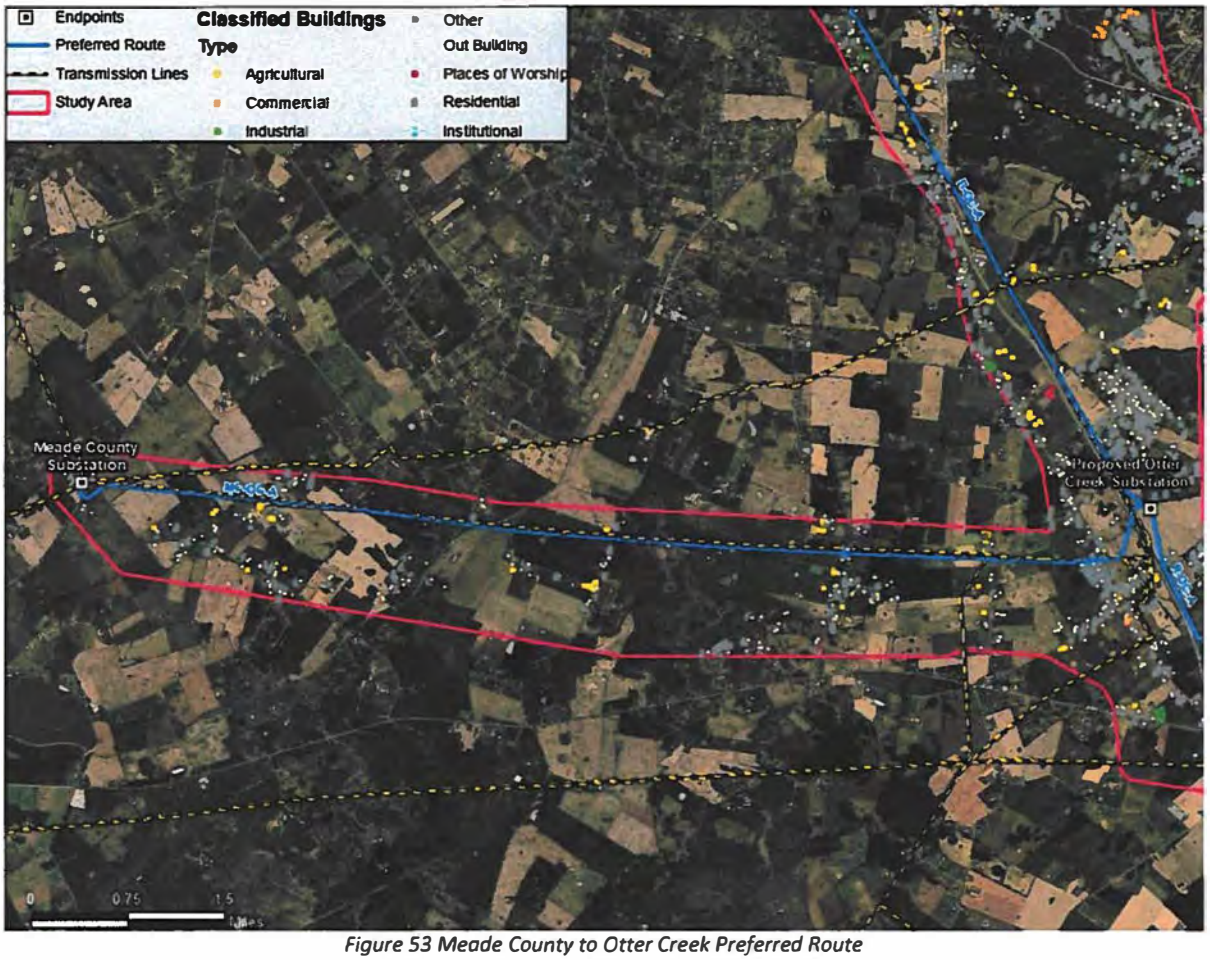



*Figure 53 Meade County to Otter Creek Preferred Route*

TEAM SPATIAL

## Source Data Appendix A

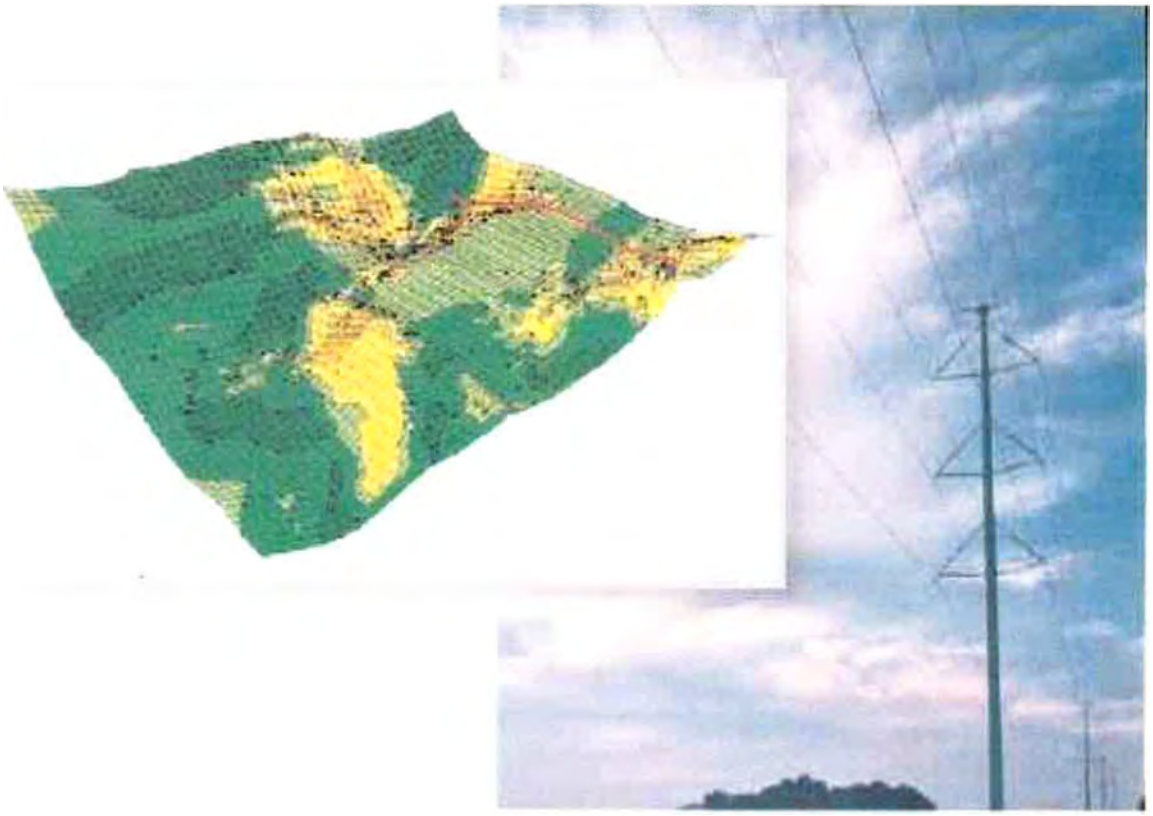
| | |
|---|---|
| Parallel Existing Transmission Lines | Big Rivers |
| Rebuild Existing Transmission Lines (good) | Big Rivers |
| Parallel Interstates ROW | Kentucky Transportation Cabinet |
| Parallel Roads ROW | Meade County PVA |
| Parallel Pipelines | National Pipeline Mapping System |
| Future DOT Plans | Kentucky Transportation Cabinet |
| Parallel Railway ROW | Kentucky Transportation Cabinet |
| Road ROW | Meade County PVA |
| Rebuild Existing Transmission Lines (bad) | Big Rivers |
| Scenic Highways ROW | Kentucky Transportation Cabinet |
| **Slope** | |
| Slope 0-15% | USGS |
| Slope 15-30% | USGS |
| Slope 30-40% | USGS |
| Slope >40% | USGS |
| **Areas of Least Preference** | |
| Non-Spannable Waterbodies | Aerial Interpretation |
| Mines and Quarries (Active) | Kentucky Geological Survey |
| Buildings | Aerial Interpretation |
| Airports | Aerial Interpretation |
| Military Facilities | USGS |
| Center Pivot Irrigation | Aerial Interpretation |
| **Natural Perspective** | |
| **Floodplain** | |
| 100 Year Floodplain | FEMA |
| **Streams/Wetlands** | |
| Streams < 5cf+Regulatory Buffer | USGS |
| Streams > 5cf+Regulatory Buffer | USGS |
| Wetlands + 30'Buffer | USGS |
| Outstanding State Resource Waters | Kentucky Energy and Environment Cabinet |
| **Public Lands** | |
| WMA + Not State Owned | Aerial Interpretation |
| USFS (proclamation area) | USFS |
| Other Conservation Land | Aerial Interpretation |
| USFS (actually owned) | USFS |
| State Owned Conservation Land | Kentucky FWS |
| **Land Cover** | |
| Developed Land | Aerial Interpretation |
| Agriculture | Aerial Interpretation |

| | |
|---|---|
| Forests | Aerial Interpretation |
| **Wildlife Habitat** | |
| Species of Concern Habitat | USFWS and Kentucky FWS |
| **Areas of Least Preference** | |
| EPA Superfund Sites | EPA |
| State and National Parks | NPS and Kentucky State Parks |
| USFS Wilderness Area | USFS |
| Wild/Scenic Rivers | National Wild and Scenic Rivers System |
| Wildlife Refuge | USFWS |
| State Nature Preserves | Kentucky State Parks |
| Designated Critical Habitat | USFWS |
| **Built Perspective** | |
| 900-1200 | Aerial Interpretation |
| 600-900 | Aerial Interpretation |
| 300-600 | Aerial Interpretation |
| 0-300 | Aerial Interpretation |
| **Building Density** | |
| 0 - 0.05 Buildings/Acre | Aerial Interpretation |
| 0.05 - 0.2 Buildings/Acre | Aerial Interpretation |
| 0.2 - 1 Buildings/Acre | Aerial Interpretation |
| 1 - 4 Buildings/Acre | Aerial Interpretation |
| >4 Buildings/Acre | Aerial Interpretation |
| **Proposed Development** | |
| Proposed Development | Big Rivers |
| **Spannable Lakes and Ponds** | |
| Spannable Lakes and Ponds | Aerial Interpretation |
| **Land Use** | |
| Commercial/Industrial | Aerial Interpretation |
| Agriculture (crops) | Aerial Interpretation |
| Agriculture (other livestock) | Aerial Interpretation |
| Silviculture | Aerial Interpretation |
| Other (forest) | Aerial Interpretation |
| Equine Agri-Tourism | Aerial Interpretation |
| Residential | Aerial Interpretation |
| **Proximity to Eligible Historic and Archeological Sites** | |
| Background | Kentucky Office of Archaeology and Kentucky Heritage Council |
| 900-100 | Kentucky Office of Archaeology and Kentucky Heritage Council |
| 600-900 | Kentucky Office of Archaeology and Kentucky Heritage Council |

| | |
|---|---|
| 0-300 | Kentucky Office of Archaeology and Kentucky Heritage Council |
| 300-600 | Kentucky Office of Archaeology and Kentucky Heritage Council |
| **Areas of Least Preference** | |
| Listed Archaeology Sites and Districts | Kentucky Office of Archaeology |
| Listed NRHP Districts and Buildings | Kentucky Heritage Council |
| Day Care Parcels | Meade County PVA |
| City and County Parcels | Meade County PVA |
| Cemetery Parcels | Meade County PVA |
| School Parcels (K-12) | Meade County PVA |
| Church Parcels | Meade County PVA |

EPRI | ELECTRIC POWER RESEARCH INSTITUTE

# Kentucky Transmission Line Siting Methodology



**WADE FAMILY FARM EXHIBIT 2**

# Kentucky Transmission Line Siting Methodology

**1016198**

Final Report, December 2007

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# PRODUCT DESCRIPTION

EPRI, in conjunction with Georgia Transmission Corporation (GTC) and Photo Science, Inc. (PSI), developed a standardized methodology for siting overhead electric transmission lines. This methodology has been applied in Georgia and currently is being applied to projects in Kentucky by East Kentucky Power Cooperative and E.ON U.S. on behalf of Louisville Gas and Electric Company and Kentucky Utilities Company. This report describes results from a stakeholder workshop addressing the issue of alternative corridors for new transmission lines and subsequent testing of the Kentucky Transmission Line Siting Methodology.

## Results & Findings

The development of the Kentucky Transmission Line Siting Methodology reflects the values and weights, as determined by a representative group of Kentucky stakeholders at the workshop detailed in this report. Testing of the Kentucky Transmission Line Siting Methodology indicates it is valid for siting overhead electric transmission lines in Kentucky.

## Challenges & Objective(s)

The project objectives included the following:

- To calibrate the Transmission Line Siting Methodology to local Kentucky concerns.
- To conduct a one-day workshop with Kentucky stakeholders in order to obtain their input into the relative suitability and importance of the criteria used to develop alternative corridors for new electric transmission lines.
- To describe the workshop, the results of the workshop, and subsequent testing of the Kentucky Transmission Line Siting Methodology.

## Applications, Values & Use

A key benefit of this siting methodology is the ability to quantitatively consider stakeholder input in the transmission route selection process.

## EPRI Perspective

Today, in the United States, there is a shortage of high-voltage transmission lines, and the demand for additional transmission lines is expected to increase by at least 20% in the next decade. Selection of transmission line routes, however, is a growing source of public controversy and regulatory scrutiny. A transmission line siting methodology, developed by EPRI and GTC, provides a logical and inclusive process for siting new lines in a socially and environmentally responsive manner. The Transmission Line Siting Methodology allows external groups to participate in the process of siting corridors, making decisions by utility professionals more transparent and credible. EPRI report 1013080, *EPRI-GTC Overhead Electric Transmission Line*

*Siting Methodology*, published February 2006, is available free of charge and provides additional information on the methodology.

## Approach

This effort involved assembling a group of Kentucky stakeholders, representing a wide range of interests, at a February 28, 2006, workshop, held in Lexington, KY. The purpose was to obtain their input into the criteria applied in developing alternative corridors for new electric transmission lines.


## Keywords

Transmission
Transmission Siting
Transmission Line Siting Methodology
Transmission Line Siting Workshop
Transmission Route Selection
Overhead Transmission Lines

# ABSTRACT

EPRI, in conjunction with Georgia Transmission Corporation (GTC) and Photo Science, Inc. (PSI), developed a standardized methodology for siting overhead electric transmission lines. EPRI report 1013080, *EPRI-GTC Overhead Electric Transmission Line Siting Methodology*, published February 2006, provides additional information. This methodology has been applied in Georgia and currently is being applied to projects in Kentucky by East Kentucky Power Cooperative and E.ON U.S. on behalf of Louisville Gas and Electric Company and Kentucky Utilities Company. A key benefit of this methodology is the ability to quantitatively consider stakeholder input in the route selection process. These companies sponsored a project to calibrate the siting methodology to local Kentucky concerns. This effort involved assembling a group of Kentucky stakeholders, representing a wide range of interests, at a February 28, 2006, workshop, held in Lexington, Kentucky. They attended this workshop in order to provide input into the relative suitability and importance of the criteria used to develop alternative corridors for new transmission lines. This report describes the workshop results and subsequent testing of the Kentucky Transmission Line Siting Methodology.

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Christy Johnson ..... A-4
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# 1
# PROJECT TEAM AND RESPONSIBILITIES

## Sponsors

This project was sponsored by Mary Jane Warner, Manager of Power Delivery Expansion, East Kentucky Power Cooperative, and Mark S. Johnson, Director of Transmission, E.ON U.S., on behalf of Louisville Gas & Electric Company and Kentucky Utilities Company, ("the Companies"). The project sponsor's responsibilities were to:

- Fund the Workshop and associated work to provide deliverables;
- Develop the Stakeholder List for invitation to the workshop;
- Extend invitations to Stakeholders;
- Solicit participation by other regulated transmission owners in Kentucky;
- Report to Kentucky Public Service Commission regarding the effort; and
- Review the Draft(s) and acceptance of the Final Report.

The project managers for the Companies were Nick Comer, Communications Coordinator, East Kentucky Power Cooperative, and Laura Douglas, Director of Communications, E.ON U.S. The project managers for the Companies acted as liaisons between the consulting team and their respective organizations. They were also instrumental in identifying and communicating with stakeholders resulting in good attendance at the workshop.

## Consulting Team

The Primary consultant was Photo Science, Inc. (PSI). The project manager and principal investigator was Mr. Jesse Glasgow, PSI. The consulting team consisted of Dr. Joe Berry, University of Denver ; Dr. Steve French, Georgia Institute of Technology; Dr. Paul Zwick, University of Florida; Dr. Liz Kramer, University of Georgia; Mr. Steve Richardson, Van Ness Feldman; Mr. Clayton Doherty, Linear Projects, Inc.; Mr. Mike Ritchie, PSI; and Mr. Chris Smith, PSI. [Please see Appendix A for additional information on the team members.] Geographic information system technical support during the workshop and model testing after the workshop was provided by Ms. Laura Galloway, Ms. Ryan Bowe, Mr. Donald Enderle, Mr. Jay Minix, and Mr. Kevin White - all with PSI.

Ms. Christy Johnson, Georgia Transmission Corp (GTC), delivered a presentation during the Kentucky Stakeholder workshop and provided additional support. GTC was very supportive of

this project, making available materials developed during their workshops. GTC personnel participated as support consultants.

Most of the members of this consulting team were on the team which developed the original EPRI/GTC Siting Methodology. That team worked together on several workshops for GTC in the past, and has developed a proven methodology of obtaining feedback from stakeholders.

The consulting team was responsible for preparing all of the presentation materials, facilitating the workshop, calibrating the siting model with stakeholder input, testing the model, and preparing this report.

Additional Consulting Team Responsibilities included the following:

- Follow the same methodology and approach as was used to develop the weights/rankings in the base document by EPRI/GTC;
- Coordinate with Sponsors to plan the Workshop and follow up meeting, if appropriate;
- Review the Sponsor-developed Stakeholder List and offer input;
- Conduct the Workshop (including the overview of the established methodology) and collect all data necessary to tune the model to Kentucky stakeholder preferences;
- Process the data gathered at the Workshop;
- Modify the rankings and weightings for the model based on Kentucky preferences;
- Prepare a draft report summarizing the process used for collection of Kentucky Stakeholder input and the recommended tuning of the model;
- Conduct a follow up meeting and record feedback to be included in the report, if appropriate; and
- Produce the final report with review and acceptance of the report by all Project Team members.

# 2
# THE WORKSHOP

## Stakeholders Identification

Stakeholders represent organizations which specialize in the various criteria that must be considered when siting an electric transmission line. Stakeholders represent varying, and often competing, interests. The Siting Methodology has three primary perspectives: the Built Environment Perspective, the Natural Environment Perspective, and the Engineering Perspective (a.k.a. Co-location Perspective). The EPRI-GTC Siting Methodology Report includes examples of stakeholders who participated in the Georgia workshops. This list of organizations was used as a starting point for the Companies to use in identifying and inviting similar organizations in Kentucky. In addition, the consulting team advised the companies as to the types of organizations that should be represented, the perspective with which each stakeholder would likely identify, and the number of participants required to conduct a successful workshop. [Please see Appendix B for a full list of invited Stakeholders and Appendix C for a sample invitation letter.]

Most organizations had one representative who "participated" in the workshop. "Participants" actively took part in discussions and provided quantitative and qualitative input used to calibrate the Siting Model with Kentucky values. Other attendees from the same organization were classified as "observers" who monitored the entire workshop proceedings. Observers were invited to offer comments and opinions. Some organizations, such as the Kentucky Public Service Commission, had no representatives who "participated" in the workshop but did have representatives who attended as "observers." [Please see Appendix D for a list of workshop attendees.]

## Workshop Proceedings

### *Opening General Session*

The workshop was held on February 28, 2006, at the Marriott Griffin Gate in Lexington, Kentucky. [Please see Appendix E for the detailed agenda.] The workshop began with opening remarks by the Companies and EPRI. Next, GTC delivered an overview presentation describing the impetus for developing the Siting Methodology, research and development efforts, and the history of implementing the Siting Methodology on projects. The consulting team then delivered a series of presentations which described, in detail, the Siting Methodology, the technical concepts employed by the Siting Methodology, the geographic data utilized, and the statistical methods for obtaining input from stakeholders. The morning's general session was wrapped up

with an overview of the Stakeholder participation process. [Please see slides presented at the workshop in Appendix F.]

### *Breakout Sessions*

After the general session the participants and observers convened in three breakout rooms. There was a breakout room for each perspective: the Built Environment Perspective, the Natural Environment Perspective, and the Engineering Perspective (a.k.a. Co-location Perspective). The Built perspective sought to minimize the impact of new transmission lines on people. The Natural perspective sought to minimize the impact of new transmission lines on wildlife, plants, animals, aquatic resources, etc. The Engineering perspective evaluated various types of co-location opportunities and gave input on physical and technical limitations of transmission line construction.

It should be noted that the consulting team suggested perspective group assignments for the participants based on their understanding of the goals of their representative organizations. However, the participants were encouraged to change groups if they felt like they could identify better with one of the other groups. For example, the representative of the U.S. Department of Defense (Ft. Knox) was originally assigned to the Built group. However, it was determined that this representative was actually involved in environmental permitting, and so she was reassigned to the Natural group.

The breakout sessions were facilitated by: Built Environment: Dr. Steve French; Natural Environment: Dr. Liz Kramer; and Engineering Considerations: Dr. Paul Zwick. The facilitators were technically assisted by: Built Environment: Laura Galloway; Natural Environment: Chris Smith; and Engineering Considerations: Ryan Bowe.

#### Review and Modify Siting Criteria

The breakout sessions began with an overview of a *suggested* set of criteria for siting in Kentucky. In preparation for this workshop, the consulting team reviewed the siting criteria used in Georgia and made some modifications to start the process of changing the model to better represent conditions in Kentucky. For example, pecan orchards were removed from the model, and agriculture was more specifically addressed. The Stakeholders then discussed the criteria. The facilitators fielded questions from the Stakeholders to ensure they had a good understanding of the criteria.

Next, the Stakeholders were asked if they thought the criteria needed to be further modified for Kentucky concerns. Facilitators documented the Stakeholders' suggestions; during the lunch break, the consulting team reviewed the Stakeholders' suggested revisions for technical feasibility and made modifications to the siting model. After lunch the facilitators addressed the revisions to the model and obtained consensus from the Stakeholders regarding acceptance of the Preliminary Kentucky Model. [Please see the Preliminary Kentucky Siting Model in figure 2-1.]

### Feature Calibration

After the model was set with Kentucky criteria, the Stakeholders began the process of calibrating the features in the model with respect to their relative suitability for siting a transmission line. For example, the Built group determined that commercial/industrial land use was the most suitable land use to site a transmission line and so it received a value of 1. They determined that residential land was the least suitable land use to site a transmission line and so it received a value of 9. Group consensus was accomplished through the Delphi process. Each participant entered suitability values into a form, and these values were entered into a statistical model which calculated the standard deviation among the participants' values. This deviation was then presented to the group and analyzed by the facilitator. The participants discussed their various perspectives and why they thought certain features were more or less suitable. After discussion the participants again assigned suitability values to the features, and this process was repeated several times until the facilitator determined that the group was as close as possible to reaching a consensus on the relative suitability of the various features within each layer.

### Weighting the Data Layers

Once the relative suitability of features was calibrated the Stakeholders began the process of determining the relative importance of criteria, or layers, in the siting process. This process was accomplished by using the Analytical Hierarchy Process (AHP) for doing pair-wise comparisons of the different layers for the purpose of assigning weights to each layer on a percentage basis. Layers, which resulted in a higher percentage, are more important in the siting process than those layers which received a lower percentage, or weight. The participants compared each layer and answered questions as to their relative importance. For example, the Natural group was asked if public lands were more important than land cover. The possible answers were on a sliding scale ranging from extremely more important, to equally important, or extremely less important. The Stakeholders completed individual pair-wise comparisons and their scores were entered into a model which calculated the deviation of the group's answers. The group then discussed their various perspectives, and this process was repeated several times until the facilitator determined that the group was as close as possible to reaching a consensus on the relative importance of the various criteria, or layers, within the perspective of the model.

After the breakout sessions the consulting team quickly entered the results of the breakout sessions into a statistical model to calculate the preliminary weights for the Kentucky Siting Model.

## *Concluding General Session*

The workshop attendees reconvened in a general session to review the day's proceedings. The consulting team facilitated a question and answer discussion where all workshop attendees, both "participants" and "observers," were encouraged to ask questions regarding the process.

After this discussion the consulting team presented the *preliminary* results from the day's proceedings. These results were considered preliminary because the consulting team quickly performed statistical calculations, which would be recalculated more thoroughly after the

workshop. For example, the preliminary results presented at the workshop showed preference for routing a transmission line over a pond when compared to areas without a pond. Post workshop calculations resulted in finding an error in the calculations done at the workshop, and these values were reversed so that, all other things being equal, a pond is now less suitable than areas without a pond.

Finally, the workshop attendees completed evaluation forms providing the consulting team with feedback regarding the effectiveness of the workshop.

## *Built Environment Report*

### Introduction

The Built Environment group consisted of nine individuals representing various aspects of the built environment. As can be seen from the list of participants, neighborhood groups were somewhat under-represented compared to the similar calibration and ranking sessions held in Georgia.

### Review and Modify Siting Criteria

The Built Environment session began with a review of the Avoidance Areas. One group member noticed that the Georgia model included Listed Archaeology Districts as Avoidance Areas in addition to the Listed Archaeology Sites as included in the preliminary Kentucky model. Dr. French indicated that he believed that districts had been dropped due to a lack of data. The state archaeologist indicated that his office does maintain a GIS database containing designated archaeology districts and provided copies of the standard data sharing agreements his office uses. Therefore, the Built Environment group decided to add Listed Archaeology Districts as an Avoidance Area.

The group also had a lengthy discussion regarding historic structures eligible for the National Register of Historic Places (NRHP). A participant noted that the Georgia model included eligible historic structures as one of the Built Environment layers. Dr. French indicated that this layer had been dropped in Kentucky due to lack of data. The representative from the state Heritage Council noted that they do not have sufficient staff to survey broad areas of the state. However, based on her assurance that a list of eligible structures including their location was available, NRHP-Eligible Structures was added as a layer within the Built Environment perspective. After the workshop, the consulting team had follow-up discussion with Dave Pollack of the Kentucky Heritage Council and settled on a data set containing approximately 1,600 eligible historic structures, which have been evaluated. [Please see Appendix H for notes on the post-workshop discussion with the Kentucky Heritage Council.]

The group also discussed including Cultural Landscapes. "Cultural Landscapes" proved to be a confusing and elusive term that means various things. However, we believe the term reasonably applies to two different categories of resources, the first being elements of the Cultural

Landscapes Inventory (CLI) as discussed by Brown, Hasty, Keohan, and Terzis (2001)[1], and the second being "a geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values" (Birnbaum, 1994)[2].

Brown, Hasty, Keohan, and Terzis state that the "Cultural Landscapes Inventory (CLI) is a comprehensive inventory of all historically significant landscapes within the National Park System," that the information about cultural landscapes is used to "assist in park management," and that cultural landscapes normally fall within one or more of the following four categories:

**Historic Designed Landscape**--a landscape that was consciously designed or laid out by a landscape architect, master gardener, architect, or horticulturist according to design principles, or an amateur gardener working in a recognized style or tradition. The landscape may be associated with a significant person(s), trend, or event in landscape architecture; or illustrate an important development in the theory and practice of landscape architecture. Aesthetic values play a significant role in designed landscapes. Examples include parks, campuses, and estates.

**Historic Vernacular Landscape**--a landscape that evolved through use by the people whose activities or occupancy shaped that landscape. Through social or cultural attitudes of an individual, family or a community, the landscape reflects the physical, biological, and cultural character of those everyday lives. Function plays a significant role in vernacular landscapes. They can be a single property such as a farm or a collection of properties such as a district of historic farms along a river valley. Examples include rural villages, industrial complexes, and agricultural landscapes.

**Historic Site**--a landscape significant for its association with a historic event, activity, or person. Examples include battlefields and president's house properties.

**Ethnographic Landscape**--a landscape containing a variety of natural and cultural resources that associated people define as heritage resources. Examples are contemporary settlements, religious sacred sites and massive geological structures. Small plant communities, animals, subsistence and ceremonial grounds are often components.

National Parks are already identified as avoidance areas in the Natural Environment perspective. Any portion of a National Park identified as a Cultural Resource under CLI would therefore already be within an avoidance area in the model.

Birnbaum states, in *Preservation Brief 36, Protecting Cultural Landscapes: Planning, Treatment and Management of Historic Landscapes,* published by Technical Preservation Services of the

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[1] Brown, Hasty, Keohan, and Terzis. *More than a Database: the National Park Service's Cultural Landscapes Inventory Improves Resource Stewardship*, from Proceedings of the 11th Conference on Research and Resource Management. 2001. http://www.georgewright.org/53brown.pdf

[2] Birnbaum, Charles A. *Protecting Cultural Landscapes: Planning, Treatment and Management of Historic Landscapes*. Washington, D.C.: Department of the Interior, National Park Service, Technical Preservation Services, Preservation Brief Number 36. 1994. http://www.cr.nps.gov/hps/TPS/briefs/brief36.htm

National Park Service, that "most historic properties have a cultural landscape component that is integral to the significance of the resource."

Within this definition, a National Register-listed or National Register-eligible structure or district exists within a cultural setting. For an historic structure, the setting might include gardens and landscaping, accessory structures and other buildings, fences and walkways, outdoor seating areas, etc. These contributing elements would form the setting and comprise the cultural landscape. Similarly, streets, sidewalks, street trees, plazas and public parks, monuments, and the like are features that provide context for an historic district and which would properly be considered to be part of the district.

Therefore, such features and elements are used to describe the boundaries of a National Register-listed or National Register-eligible structure or district. Since National Register-listed properties are already avoidance areas, so would be the cultural landscapes that help delineate and bound these resources.

We could not locate a GIS dataset for "cultural landscapes." However, cultural landscapes which are part of the National Park system or which are parts of properties listed on the National Register of Historic Places are already protected as avoidance areas.

The group had an extended discussion about horse farms and their economic importance in the Bluegrass Region. Some horse farms are not only important as economic enterprises, but also serve as an important focus of local tourism. The group noted that these farms are primarily located within a seven-county region around Lexington. Some group members viewed horses as significantly more important than other types of livestock, and all livestock was considered different from crops.

Horse farms which are important to the local and State tourism economy are considered to comprise an "equine agri-tourism" data layer. After the workshop the consulting team contacted the Kentucky Department of Tourism and was referred to the Kentucky Horse Council, then to the Kentucky Horse Park, etc. until they ended up with a referral to the Kentucky Thoroughbred Farm Managers' Club. This club was founded in 1948 and has 564 members. The club publishes a book with information on the location of their members' farms. However, while this book lists horse farms, it does not distinguish those horse farms which are important to equine agri-tourism. The consulting team did uncover a brief list developed by the Kentucky Agri-Tourism Working Group in 2001. After a discussion with a representative of the Kentucky Office of Agritourism, which is an interagency office shared by the Kentucky Department of Agriculture and the Kentucky Tourism Department, it was determined that the list is not comprehensive. Therefore the consulting team recommends using the Farm Manager's Club manual as a start, and then use aerial photography and the Property Value Administrator (PVA) maps to define the boundaries of horse farms important to equine agri-tourism. [Please see Appendix I for notes on the consulting team's research into a listing for equine agri-tourism in Kentucky.]

Tree farming was also noted as a potential replacement for the declining tobacco industry. As a result, the Agriculture category of the Land Use layer was subdivided into four categories: Equine Agri-Tourism, Other Livestock Farms, Row Crops and Silviculture.

Based on our initial discussions, the group added one new layer to the model, NRHP-Eligible Structures, and significantly refined the Agriculture category within the Land Use layer. The group also added NRHP-Listed Archaeology Districts as an Avoidance Area.

## Feature Calibration

The Built Environment participants held very divergent views regarding the suitability of various factors with respect to transmission line siting as evident by the fact that fifteen of the features had calibration values that ranged from 1 to 9. Those areas that some members thought were the most suitable (1) place to locate a transmission line were considered the least suitable (9) by at least one member of the group. This lack of consensus is reflected in the large standard deviations and coefficients of variation.

In calibrating Proximity to Buildings the majority of the participants felt that the background area, more than 1,200 feet from existing buildings, was the most suitable location for transmission lines. However, one respondent thought this was the least suitable location. The mean and median values show the group generally thought that locations that were farther away from existing buildings should be the most preferred locations for a transmission line. Similarly, most respondents thought areas with the lowest building density were the most preferred locations; however, there was some sentiment to avoid the most rural (0-.05 buildings per acre) locations in favor of areas that already had some building density. Again, one participant thought that the highest density areas were the most preferred locations for transmission lines. There was a similar pattern with the Proposed Development features. Since there are only two feature in this layer, one must receive a 1 and the other a 9. Three of the respondents said that the most suitable location for a transmission line was within proposed development and six said it was the least suitable.

The large standard deviations and coefficients of variation reflect the dichotomy of the group's thinking. All but one of the Built Environment group members ranked Spannable Lakes and Ponds as the least suitable place for a transmission line.

With the elaboration of the agriculture category, Land Use was the most complex layer that the group was asked to calibrate. There was a strong consensus that residential areas are the least suitable areas for transmissions lines. Equine Agri-Tourism was considered the next least suitable locations with most of the group ranking them as the least suitable location for a transmission line. The group also ranked forests and silviculture as relatively unsuitable areas. Commercial and industrial areas were rated as the most suitable locations, but there was much less consensus on this point. Crop land and other livestock pasture were considered the next most desirable locations, but received relatively high mean scores of 4 and 5, respectively. It should be noted that this sharp differentiation between residential and commercial urban areas and the relatively low suitability assigned to most rural areas is quite different from the Georgia results. This probably reflects the fact that the group included relatively few neighborhood representatives.

Most of the group thought that areas more than 1,200 feet from NRHP-eligible structures was the most suitable location for transmission lines; however, two participants thought this was the worst location. The lack of consensus led to one counter-intuitive result: the area 0-300 feet

from an eligible structure was ranked slightly more suitable that the areas 300-600 feet away. The difference is so small that it is unlikely to have a meaningful difference in the model.

### Weighting the Data Layers

A similar lack of consensus was evident in the layer weighting process. Five of the fifteen pair-wise comparisons had a range that extended from -9 to +9. In other words, at least one participant thought that Layer A was extremely more important than Layer B and at least one participant thought that Layer B was extremely more important than A. In only two instances were the minimum and maximum as close as 11 points apart. In most cases there was more than one participant at each extreme.

The Built Environment group ranked Land Use (35.9%) as the most important layer, followed closely by NRHP-Eligible Historic Structures (31.0%). Proximity to Buildings (16.8%) was the next most important layer, but ranked much lower than in the Georgia Model. Building Density (8.4%) ranked much lower than in the Georgia Model. Spannable Lakes and Ponds (4.0%) and Proposed Development (3.9%) were weighted as the least important data layers.

### Conclusion

Although consensus wasn't met, this group was successful in creating a set of criteria and weights that reflected their interests in siting new overhead electric transmission line facilities. In general this group tended to be less protective of developed places than past Built Environment groups. There were some Kentucky-specific results, most notably the importance assigned to Equine Agri-Tourism. The group created a much more detailed Land Use category and weighted it heavily. The group also drew a sharp distinction between residential and commercial areas.

## *Natural Environment Report*

### Introduction

The Natural Environment group was highly diverse with representatives from federal and state agencies, the utility industry, and a number of non-governmental organizations. The debate was often lively, but always respectful. The group dealt with issues of biodiversity, aquatic resource protection, and public land protection. (It is interesting to note that the results of the calibration and weighting moderated the extreme views that might have been held by some of the stakeholders. It was difficult to get some representatives of nongovernmental organizations to move away from valuing each dataset as an avoidance area. The group would have liked to see an additional data layer that dealt with issues of viewsheds.) Visibility issues are considered in the Built Model and are outside of the scope of the Natural Environment group.

## Review and Modify Siting Criteria

The first step was the discussion of avoidance areas and various features within each of the data layers. The group added two new avoidance areas. The first new avoidance area is Designated Critical Habitats for listed species (threatened and endangered species listed under the Endangered Species Act), which are identified by the U.S. Fish and Wildlife Service. To date, critical habitats have been designated for five mussel species in the Tennessee and Cumberland River Basins, one plant species, and the Indiana bat (*Myotis sodalis*). The five mussel species are the Cumberland elktoe (*Alasmidonta atropurpurea*), the Cumberland combshell (*Epioblasma brevidens*), the purple bean (*Villosa perpurpurea*), the oyster mussel (*Epioblasma capsaeformis*), and the rough rabbitsfoot (*Quadrula cylindrica strigillata*). The critical habitat maps for the mussels show a series of stream segments identifying where the mussels reside or areas for reintroduction, as described in the species recovery plan. Two caves have been designated as critical habitat for the Indiana Bat (*Myotis Sodalis*): Bat Cave in Carter County and Coach Cave in Edmonson County. The group agreed not to include the critical habitat for the plant species in the model.

The second new avoidance area is state-owned nature preserves. Georgia does not have a separate category for state nature preserves in its public lands database; therefore, it was necessary to add it to the Kentucky model. These areas were added because they provide biodiversity protection and are similar to wildlife refuges in their management.

Changes were made to three of the feature layers. The group agreed to add outstanding state resource waters to the streams/wetlands layer. This information has been developed by Kentucky's Department for Environmental Protection, Division of Water as part of the 305(b) program. The layer identifies stream segments listed as exceptional, as part of their designation under the Clean Water Act. These stream segments are reference and pristine stream and river reaches and the group felt they should be included as a separate category.

The next addition was to the public lands data layer. The group wanted to use two sets of Forest Service boundaries, the proclamation boundary and the actual boundary. The proclamation boundary is the one that Congress designated in the enabling legislation for the national forest lands in Kentucky. The actual boundary is that land which the federal government owns as part of the national forest. The idea is that the federal government will purchase the entire designated area over time. Also, the leased and state-owned lands were changed to reflect other lands besides wildlife management areas. These new categories are State-Leased Conservation Lands and State-Owned Conservation Lands (this includes both wildlife management areas and state forests).

The last change was to the land cover category. The group agreed to merge the silviculture and natural forest classes into a single category. The group agreed that a tree is a tree and, therefore, all forests should be treated the same. In addition, it was noted that there is a minimal amount of pine and hardwood plantations in the state.

## Feature Calibration

The 100-year floodplain is considered for two reasons. First, the Kentucky Division of Water permits typical transmission line support structures in the floodplain as a simple engineering matter. Nevertheless, transmission line support structures located in floodplains may not be accessible during a flood, potentially delaying restoration of service. Also, lattice steel structures can collect debris during flooding events, affecting the free flow of water in the floodplain and adding stress to that section of the transmission line. All things considered equally, it is preferable to span a floodplain rather than locate support structures there. Second, especially in more developed areas, because the 100-year floodplain is not normally developable, floodplain forests may be important to the local ecology because they intercept rainfall, provide a mesic microclimate, protect riparian soils and the water quality of receiving streams, and provide wildlife habitat and dispersal corridors linking larger habitat areas that might otherwise become isolated. The floodplain layer has only one feature and therefore requires a binary selection. There was some confusion on the first vote about the high score and the low score. This was cleared up and all of the stakeholders agreed to making the 100-year floodplain a nine (9) and the background a one (1).

The streams and wetlands layer identifies key water features that have some regulatory requirement such as stream buffers and wetland permitting requirements. The background represents all non-water features. Smaller streams (<5 cfs flows) are separated from larger streams and rivers because of construction and maintenance requirements by the utility company. These smaller headwater streams are often found in mountain areas with steep slopes. The group was not unified in their ranking of smaller streams; in fact, the results of this category showed the highest variability in stakeholder preferences for the stream and wetland data layer. Also, the group was clearly not in agreement with respect to the other river and stream category. However, no one in the group felt that the larger rivers and streams were preferred areas for transmission line crossings. The group has strong preferences for avoiding wetlands and outstanding state resource waters. The outstanding state resource waters represent reference and pristine condition; therefore, the group was in consensus about avoiding these waters if possible.

The public lands database is made up of lands owned by state or federal agencies and private lands with conservation easements. This dataset typically is put together by a national analysis program. The categories of land include Military Reservations, U.S. National Park Service, Kentucky State Parks, Kentucky State Park Resorts, Kentucky Department of Fish and Wildlife Resources, U.S. Fish and Wildlife Service, U.S. Fish and Wildlife Refuge System, U.S. Forest Service Wilderness Areas, U.S. Forest Service, The Nature Conservancy, U.S. Army Corps of Engineers, Kentucky Nature Preserves Commission, Kentucky State Forests, University Lands, and University Forests. Background includes all other lands both private and public.

Once again, the results of the Delphi process showed little overall consensus among the various stakeholders. The national forest land was split into two categories. The first category includes those lands within the proclamation boundaries, and the second category includes those lands that are presently Forest Service lands. The differences in these results reflect a viewpoint of keeping transmission lines out of the core Forest Service lands and pushing them onto private lands.

There are three categories in the land cover data layer. The group was in agreement that developed land is preferable for transmission line siting, although one member did vote it as a five. The group was in complete agreement that forested lands should be avoided. It is interesting to note, though, the lack of consensus regarding agricultural land. Many participants favored agricultural land for locating transmission lines because agricultural land is not a "natural" environment with natural native vegetation. Other participants, however, ranked agriculture as a high constraint because they wanted to protect farmland's viewshed and open space components. Because they feel such rural landscapes are aesthetically pleasing, they argued that transmission lines crossing farms would adversely affect the viewshed with poles and wires. Although the facilitator suggested that visibility issues might be better addressed by the Built Environment group, the Natural Environment participants did not agree.

Concerning wildlife habitat, as part of the State Comprehensive Wildlife Strategy, Kentucky Department of Fish and Wildlife Resources has identified a list of terrestrial vertebrate species that are listed as endangered, threatened, or candidate species under the Endangered Species Act. In addition, the state has identified species of critical concern for the state of Kentucky. In testing, we used the Kentucky GAP habitat models for these species to represent habitat for these important species. The group easily chose background as the preferred areas and the species habitat modeled results as avoidance areas. [See Appendix J for discussion of a more involved methodology to model wildlife habitat for Kentucky.]

### Weighting the Data Layers

The Kentucky Natural Environment stakeholders felt that streams, wetlands, and wildlife habitat should have the highest influence in the Natural Environment model. These data layers were then followed by land cover, public lands, and floodplains. These results were somewhat similar to those of the Georgia model. Biodiversity had a higher rating than streams and wetlands in Georgia. It is important to note there was little agreement among the individuals within the stakeholder group on many of the layer weightings. This lack of consensus has led to using average values for each of the weightings.

### Conclusion

Similar to the Built Environment group, consensus wasn't met. However, this group was successful in creating a set of criteria and weights that reflected their interests overall in siting new overhead electric transmission line facilities.

## *Engineering (Co-location) Report*

### Introduction

The Engineering (Co-location) group included representatives from the electric utilities who build and operate transmission lines in Kentucky as well as representatives from the Kentucky Transportation Cabinet, the Kentucky Geological Survey, U.S. Department of Defense and the gas pipeline industry.

## Review and Modify Siting Criteria

The group discussed the criteria developed in the Georgia model and decided to make a few minor changes. They decided to add a class to the slope layer due to the more mountainous terrain encountered in Kentucky. The group also distinguished between a good rebuild opportunity and a bad rebuild opportunity based on electric system constraints.

Center pivot irrigation fields were added to the avoidance category. In the Georgia model, these were represented in the Intensive Agriculture layer. This was determined not to be appropriate for the Kentucky Model. In Georgia, center pivot irrigation fields are numerous in the coastal plains. However, there are fewer in Kentucky, which led the group to characterize them as avoidance areas.

## Feature Calibration

In the Engineering (Co-location) group, while there was not absolute consensus, the ranges of votes cast were much less extreme than the previously discussed groups. The most diverse features were the votes for paralleling pipelines (minimum: 3, maximum: 9, standard deviation: 2.19) and road right-of-ways (minimum: 4, maximum: 9, standard deviation: 2.25).

In the Linear Infrastructure layer, paralleling existing transmission lines received a value of 1, and rebuilding existing transmission lines (good) received a value of 2.2. Paralleling existing transmission lines is modeled for all transmission lines, whether determined good or bad for rebuild. The reasons offered for rebuild options receiving a less suitable value were cost and reliability issues related to replacing an existing transmission line with larger structures that share lines. The next suitable feature in this layer was background (4.4) or not co-locating with existing linear features. In essence, if paralleling existing transmission lines or rebuilding transmission lines (good) are not available, the next suitable place would be a cross country route.

Paralleling interstate right-of-ways (4.7), paralleling road right-of-ways (5.4), paralleling pipelines (5.6), future DOT plans (5.6), and paralleling railway right-of-ways (6.1) were valued less suitable than cross country options that don't parallel anything. Each of the features was discussed and various issues were determined that influenced the values. Paralleling interstates will encounter more urbanized areas and have visibility and access issues. Paralleling roads will have visibility issues and engineering constraints due to curved alignments. Paralleling pipelines raises potential problems related to corrosion and stray voltage. Future transportation plans could present conflicts if the exact location of transportation facilities has not been finalized; and there could also be visibility issues with the future transportation route. Paralleling railway right-of-ways could affect signals along the railroad, and there could be engineering constraints due to curved alignments.

The last three linear features received the lowest suitability. Road right-of-ways received a value of 7.5, and rebuild existing transmission lines (bad) received a value of 8.6. These two features can be crossed, but there is already linear infrastructure located in these areas, which cannot be moved and cannot accommodate additional facilities in their immediate location. However,

these items can be paralleled. Scenic highways were set apart from other linear infrastructure and received the least suitable score of 9 due to visibility issues to this sensitive linear feature.

The votes cast for the four slope categories had only slight variations from each participant, and all agreed that 0 to15 percent was the most suitable area, 15 to 30 percent was the next suitable, 30 to 40 percent was less suitable, and greater than 40 percent slope was the least suitable area for a transmission line. The resulting values were: 0 to15 percent (1), 15 to 30 percent (4), 30 to 40 percent (6.7), and greater than 40 percent slope (9).

## Weighting the Data Layers

Determining the weighting for the layers in this group was much simpler than the previously discussed groups. Since there were only two data layers, only one question was required for the group to answer: When siting a transmission line is it more preferable to co-locate with existing linear infrastructure or to avoid steep slope? All participants agreed that co-locating with linear infrastructure was more preferable but with slightly different degrees. The resulting weights were 86.2% for the Linear Infrastructure layer and 13.8% for the Slope layer.

## Conclusion

The group came much closer to meeting consensus than the previous two. This group was successful in creating a set of criteria and weights that reflected their interests in siting new overhead electric transmission line facilities.

| Engineering (Co-location) | |
|---|---|
| Linear Infrastructure | 45.2% |
| 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 | 5.8 |
| Parallel Railway ROW | 6.1 |
| Road ROW | 7.2 |
| Rebuild Existing Transmission Lines (bad) | 8.8 |
| Scenic Highways ROW | 9 |
| Slope | [illegible] |
| Slope 0-15% | 1 |
| Slope 15-30% | 4 |
| Slope 30-40% | 6.7 |
| Slope >40% | 9 |
| AVOIDANCE AREAS | |
| Non Spannable Waterbodies | |
| Mines and Quarries (Active) | |
| Buildings | |
| Airports | |
| Military Facilities | |
| Center Pivot Irrigation | |

| Natural Environment | |
|---|---|
| Floodplain | 4.6% |
| Background | 1 |
| 100 Year Floodplain | 9 |
| Streams/Wetlands | 29.2% |
| Background | 1 |
| Streams < 5cfs+ Regulatory Buffer | 6.2 |
| Rivers/Streams > 5cfs+ Regulatory Buffer | 7.1 |
| Wetlands + 30' Buffer | 8.7 |
| Outstanding State Resource Waters | 9 |
| Public Lands | 17.4% |
| 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 | 28.4% |
| Background | 1 |
| Species of Concern Habitat | 9 |
| AVOIDANCE AREAS | |
| EPA Superfund Sites | |
| State and National Parks | |
| USFS Wilderness Area | |
| Wild/Scenic Rivers | |
| Wildlife Refuge | |
| State Nature Preserves | |
| Designated Critical Habitat | |

| Built Environment | |
|---|---|
| Proximity to Buildings | 16.8% |
| Background | 1 |
| 900-1200 | 3.4 |
| 600-900 | 5.7 |
| 300-600 | 8 |
| 0-300 | 9 |
| Building Density | 8.4% |
| 0 - 0.05 Buildings/Acre | 1 |
| 0.05 - 0.2 Buildings/Acre | 3 |
| 0.2 - 1 Buildings/Acre | 5.6 |
| 1 - 4 Buildings/Acre | 8.5 |
| > 4 Buildings/Acre | 9 |
| Proposed Development | [illegible] |
| Background | 1 |
| Proposed Development | 9 |
| Spannable Lakes and Ponds | [illegible] |
| Background | 1 |
| Spannable Lakes and Ponds | 9 |
| Land Use | [illegible] |
| Commercial/Industrial | 1 |
| Agriculture (crops) | 3.5 |
| Agriculture (other livestock) | 4.6 |
| Silviculture | 8 |
| Other (forest) | 8.7 |
| 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 |
| AVOIDANCE AREAS | |
| Listed Archaeology Sites & Dist. | |
| Listed NRHP Districts and Buildings | |
| City and County Parks | |
| Day Care Parcels | |
| Cemetery Parcels | |
| School Parcels (K-12) | |
| Church Parcels | |

**Figure 2-1**
**Preliminary Kentucky Transmission Line Siting Model**

### *The Siting Methodology*

The Kentucky Transmission Line Siting Model weightings (see Appendix G) that resulted from this calibration workshop are designed to be used as part of the "Standardized Methodology for Siting Overhead Electric Transmission Lines" developed by the Electric Power Research Institute (EPRI) in conjunction with Georgia Transmission Corporation and Photo Science, Inc. For more information about this methodology, and how the Kentucky Siting Model is implemented, please see the EPRI report by the same name. The key benefit of this methodology is the ability to quantitatively consider stakeholder input in the route-selection process. The methodology examines progressively more-detailed information and assesses potential locations for transmission lines using values and weights from external and internal stakeholders, as well as the expert judgment of transmission line siting professionals. See Figure 2-2 below for a conceptual diagram representing the methodology.

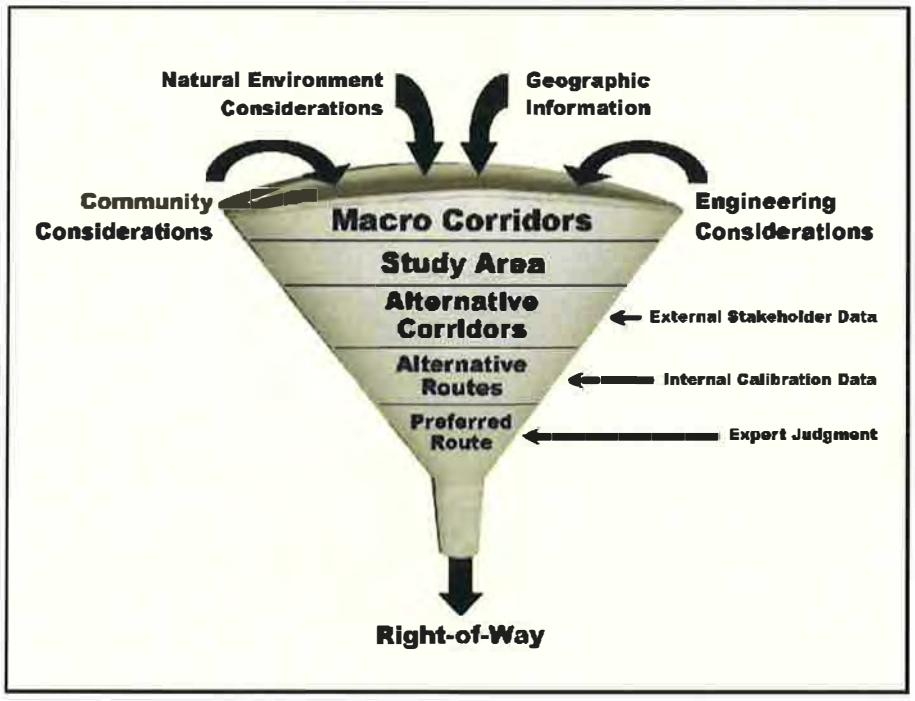


**Figure 2-2**
**"Corridor Analyst Funnel"**

# 3
# TESTING THE MODEL

## Test Case Identification

Prior to recommending use of this model on actual transmission projects, the consulting team considered it prudent to conduct tests on hypothetical projects to validate the results. This helps ensure that there are not unintended consequences resulting in the often complex interaction of the various data and values. In order to conduct this testing, the team required detailed data sets that are expensive to create, so areas where data had been collected in the past were used for this testing. Four test projects were identified representing the following conditions:

- National Forest Test Case
- Mountain/Valley Test Case
- Bluegrass Region Test Case
- Co-Location Test Case

For each test case, four scenarios were run creating four corridors. All criteria are considered in each scenario. The built environment emphasis scenario places five times as much emphasis on minimizing impacts to the built environment as defined by the stakeholders. The natural environment emphasis scenario places five times as much emphasis on minimizing impacts to the natural environment. The Engineering (Co-location) scenario places five times as much emphasis on collocating. The Simple Average scenario weighs each of the three perspectives equally.

## National Forest Test Case

The purpose of this test case is to determine the performance of the model in areas where public lands are present. This test case falls completely within a U.S. Forest Service Proclamation area with approximately 42% of land owned by the U.S. Forest Service (See figure 3-2). The study area is comprised of mainly forested mountainous terrain with some rural residential and agricultural areas in the valleys. (See figure 3-1 for the land use/land cover break down of the study area.). There are no existing transmission lines to parallel or rebuild. The straight line distance between the start and end points is approximately 5.3 miles, and the study area is approximately 2.5 miles wide.

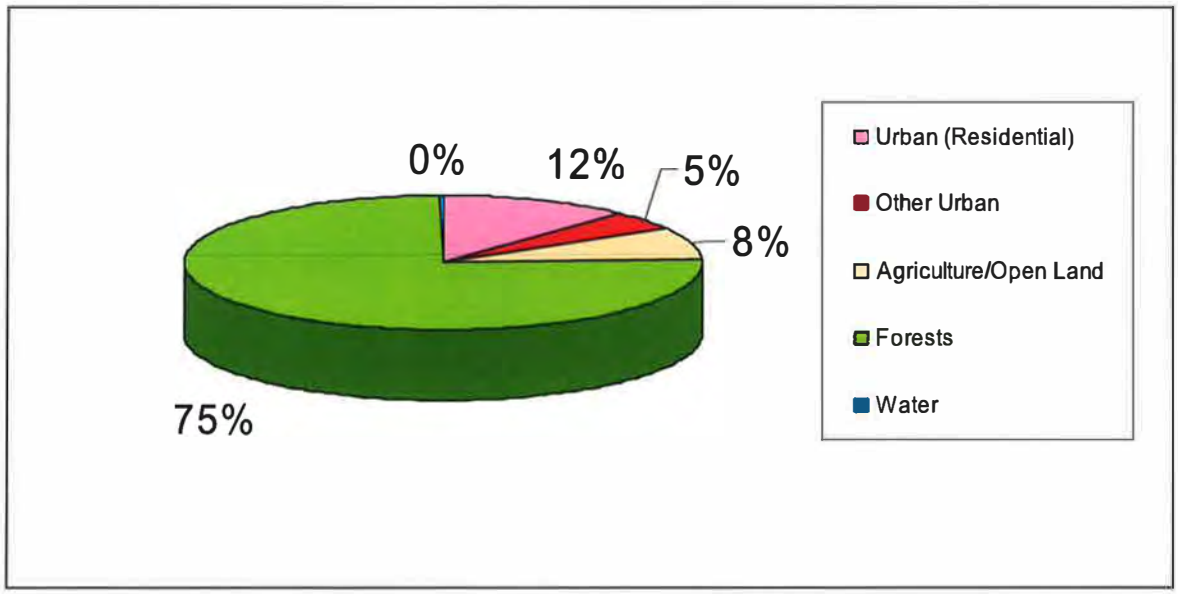


**Figure 3-1**
**Land Use/Land Cover of National Forest Test Case Study Area**

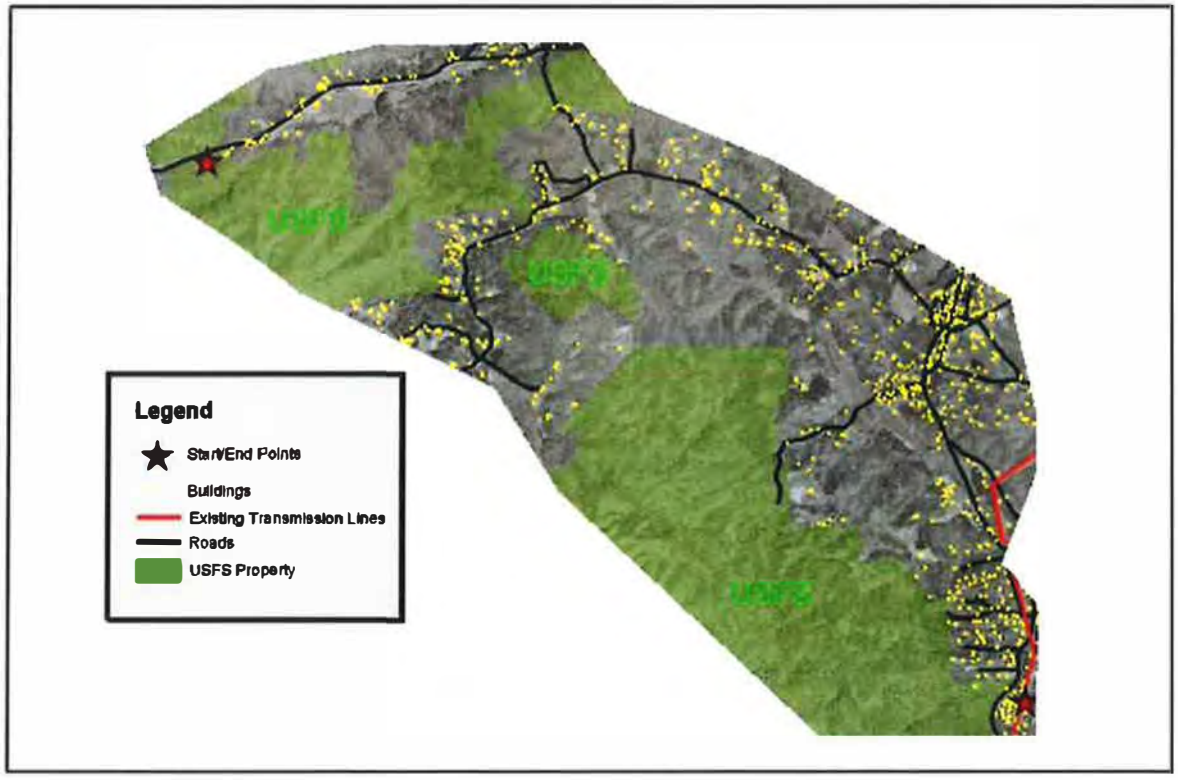


**Figure 3-2**
**Study Area of National Forest Test Case**

### *Built Model*

The Built Environment Model produced a fairly straight corridor (See figure 3-2) that minimizes impact to buildings and eligible historic resources in the valleys and along the roads. This pushes the corridor into the mountainous forested areas that are mostly U.S. Forest Service tracts, although it must cross some rural residential areas to reach its destination. This corridor is approximately 5.3 miles long. (See figure 3-3 for the land use/land cover break down of the corridor.)

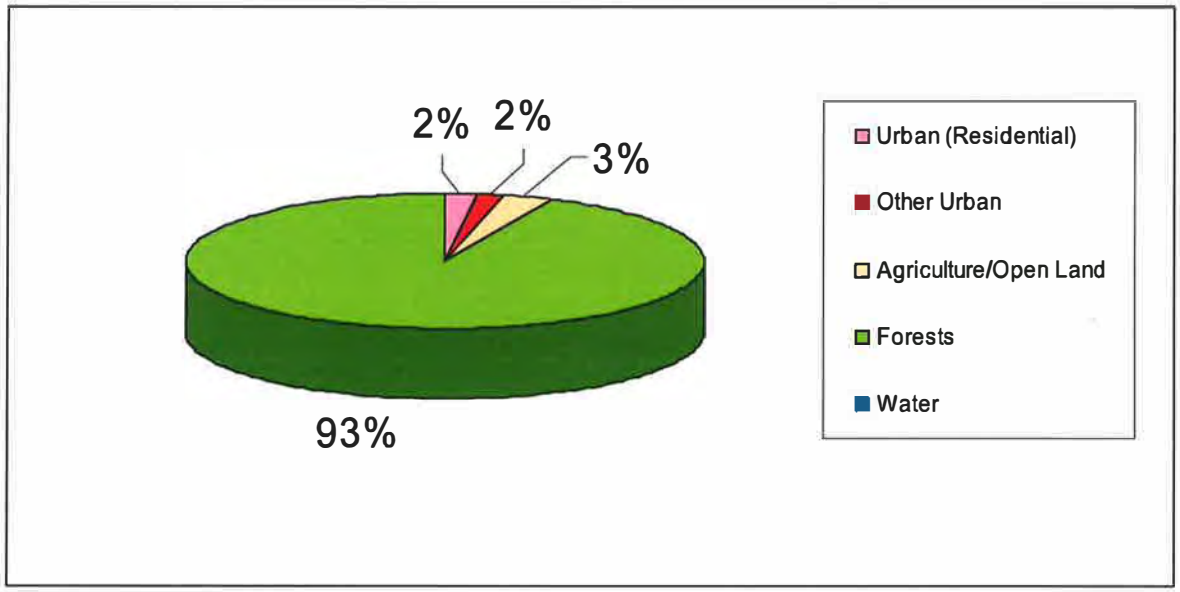


**Figure 3-3**
**Land Use/Land Cover of National Forest Test Case Built Environment Corridor**

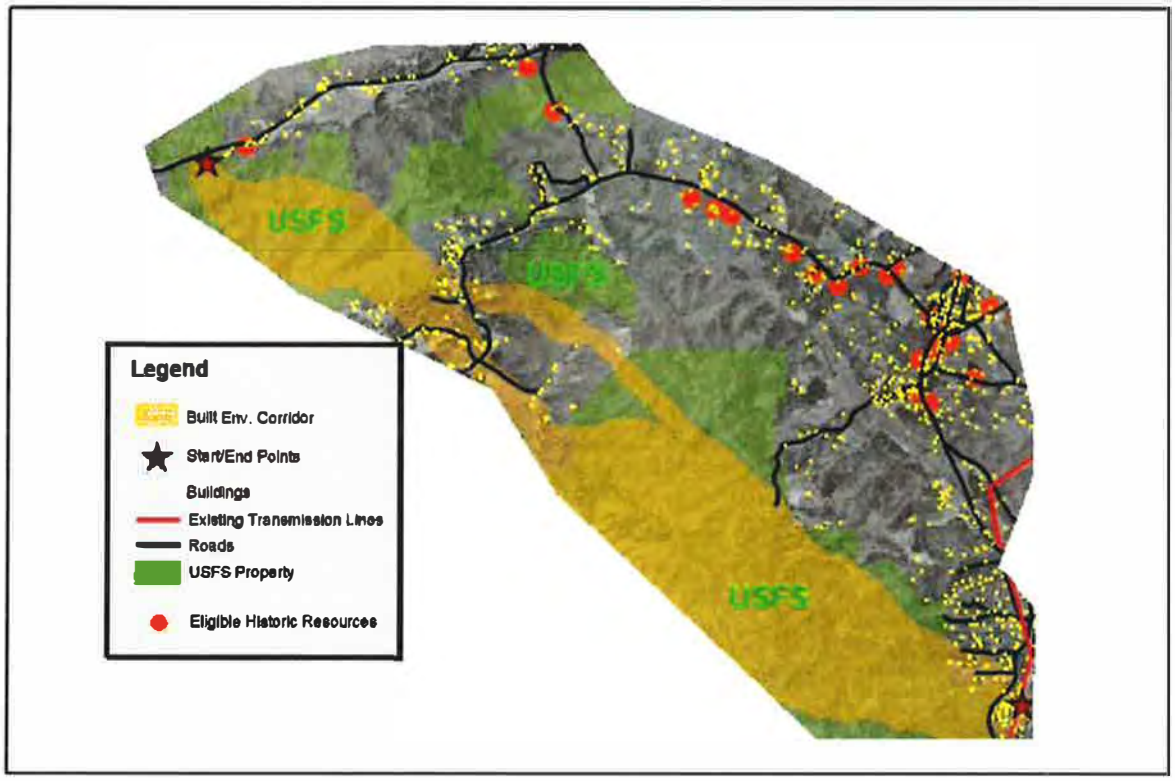


**Figure 3-4**
**Built Environment Corridor for National Forest Test Case**

## *Natural Model*

The Natural Environment Model produced a longer corridor (See figure 3-6) than the Built Environment. The corridor minimizes impacts to the U.S. Forest Service tracts and other forested areas. The corridor developed in the agricultural and rural residential areas. Roughly half of the route utilizes roads in the area due to its attraction to developed areas. The corridor is approximately 6.5 miles long. (See figure 3-5 for the land use/land cover break down of the corridor.)

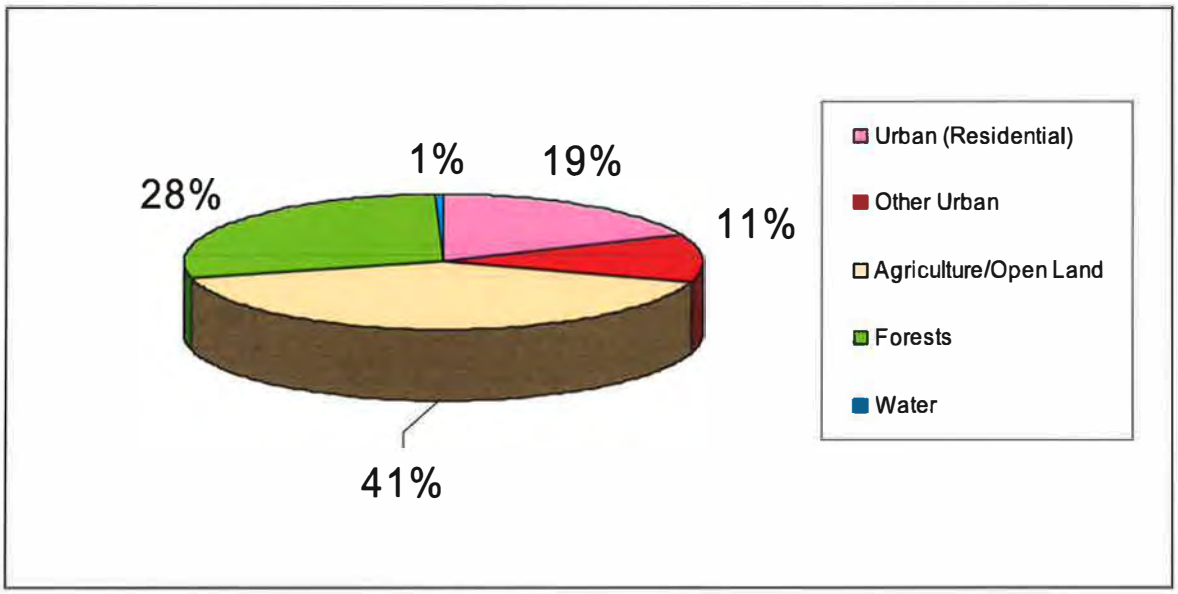


**Figure 3-5**
**Land Use/Land Cover of National Forest Test Case Natural Environment Corridor**

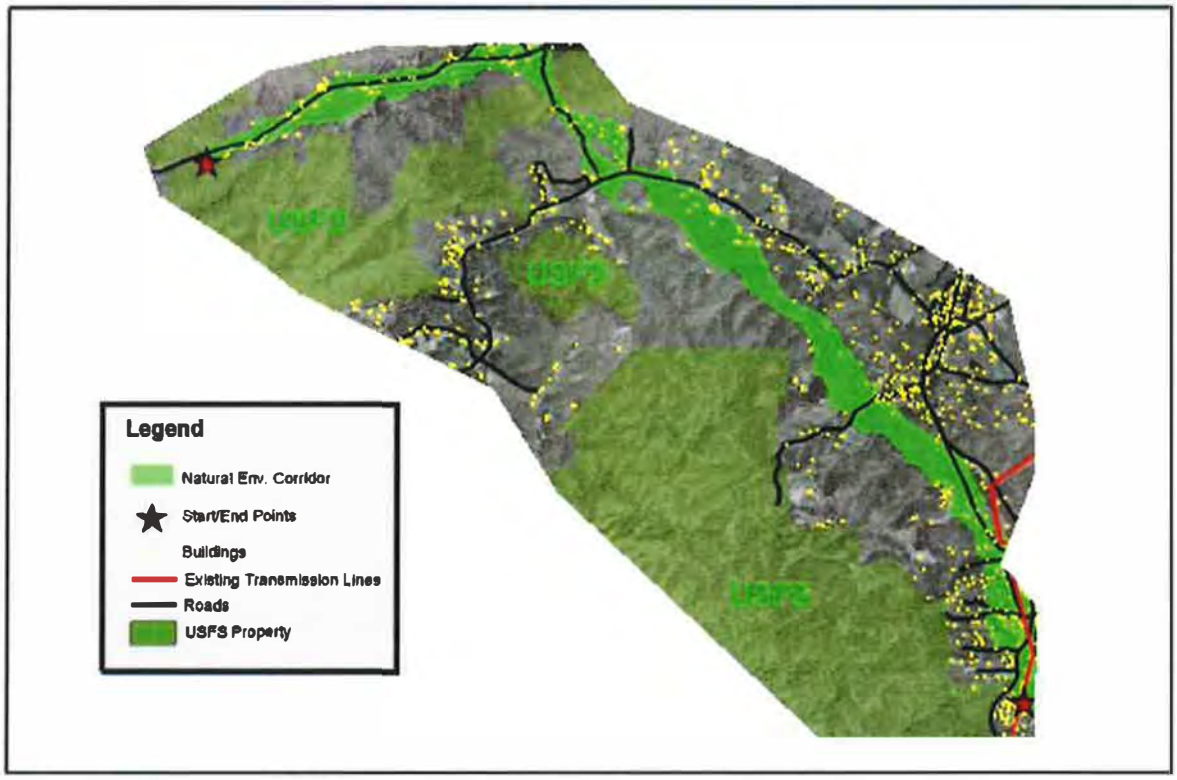


**Figure 3-6**
**Natural Environment Corridor for National Forest Test Case**

## *Engineering (Co-location) Model*

The Engineering (Co-location) Model utilizes a short area of existing transmission lines on the southeast edge of the study area and then takes a fairly straight path to the destination point. There are several areas of severe slope in the area that the corridor must cross . It appears that the corridor crosses these areas of slope in a perpendicular manner to minimize the impacts. Also a narrow area that avoids the highest slope areas breaks off from the main corridor (See figure 3-7). In this test case, the Engineering (Co-location) Model is not attracted to road corridors. The length of this corridor is approximately 5.8 miles.

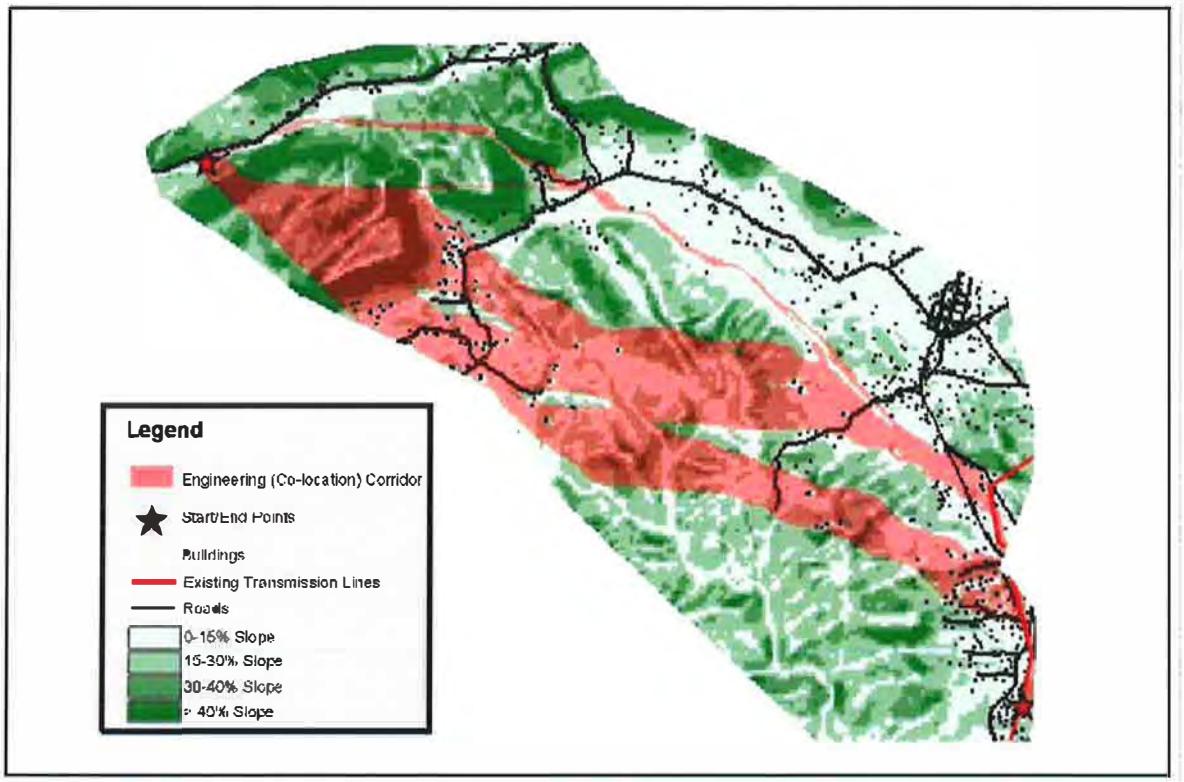


**Figure 3-7**
**Engineering (Co-location) Corridor for National Forest Test Case**

### *Simple Average Model*

The Simple Average Corridor produced similar results as the Engineering (Co-location) Model with the exception of the narrow branch that avoided the high slope areas (See figure 3-8).

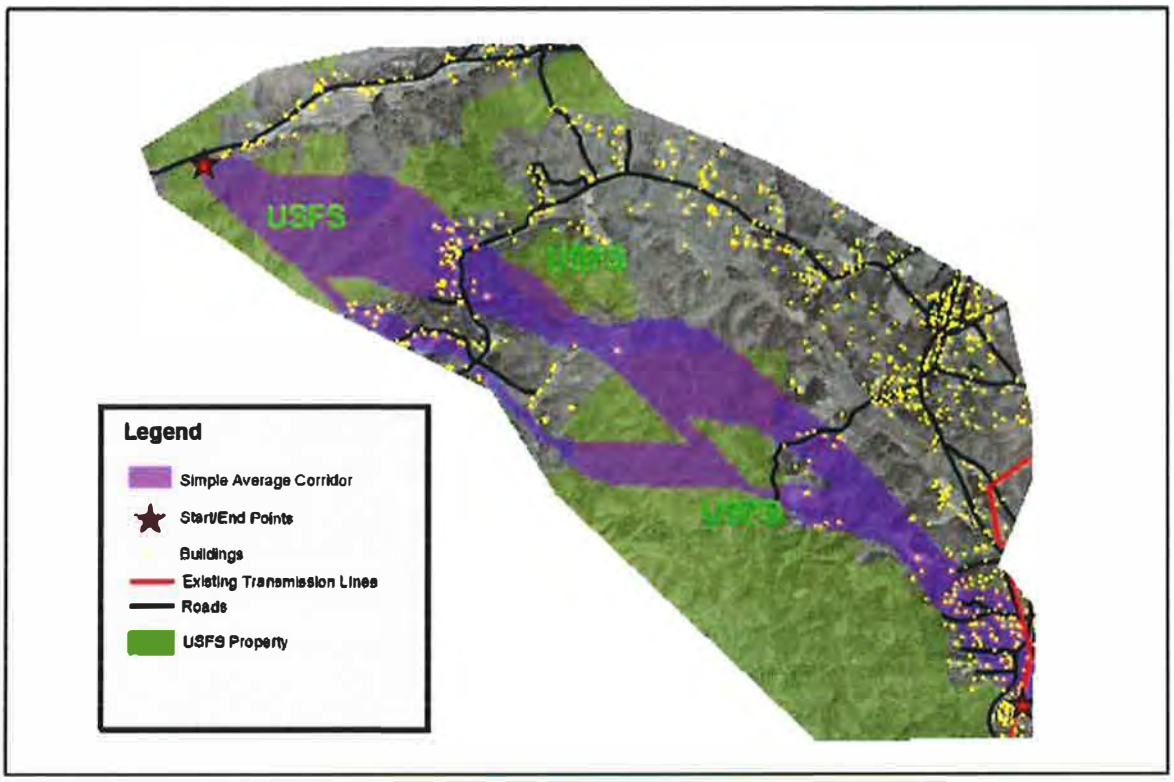


**Figure 3-8**
**Simple Average Corridor for National Forest Test Case**

## Mountain/Valley Test Case

The purpose of this test case is to determine the model's performance in mountainous areas such as those found in Eastern Kentucky. This test case is similar to the National Forest Test Case with respect to mountainous terrain and steep slopes. However, this test area has no features that fall within the Public Lands layer in the Natural Environment model, the forested areas are not as contiguous, and there are more agricultural areas. (See figure 3-9 for the land use/land cover break down of the study area.) There is also a significant river that flows through the southern half of the study area. The straight line distance between start and end points is approximately 7.5 miles, and the study area is approximately 4 miles wide (See figure 3-10).

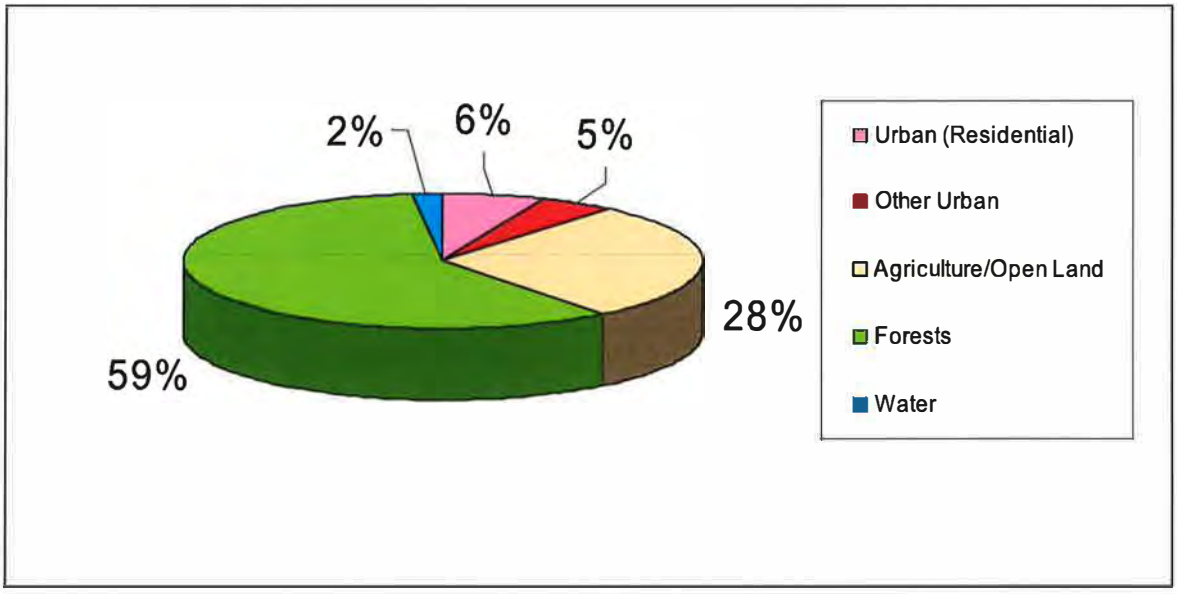


**Figure 3-9**
**Land Use/Land Cover of Mountain/Valley Test Case Study Area**

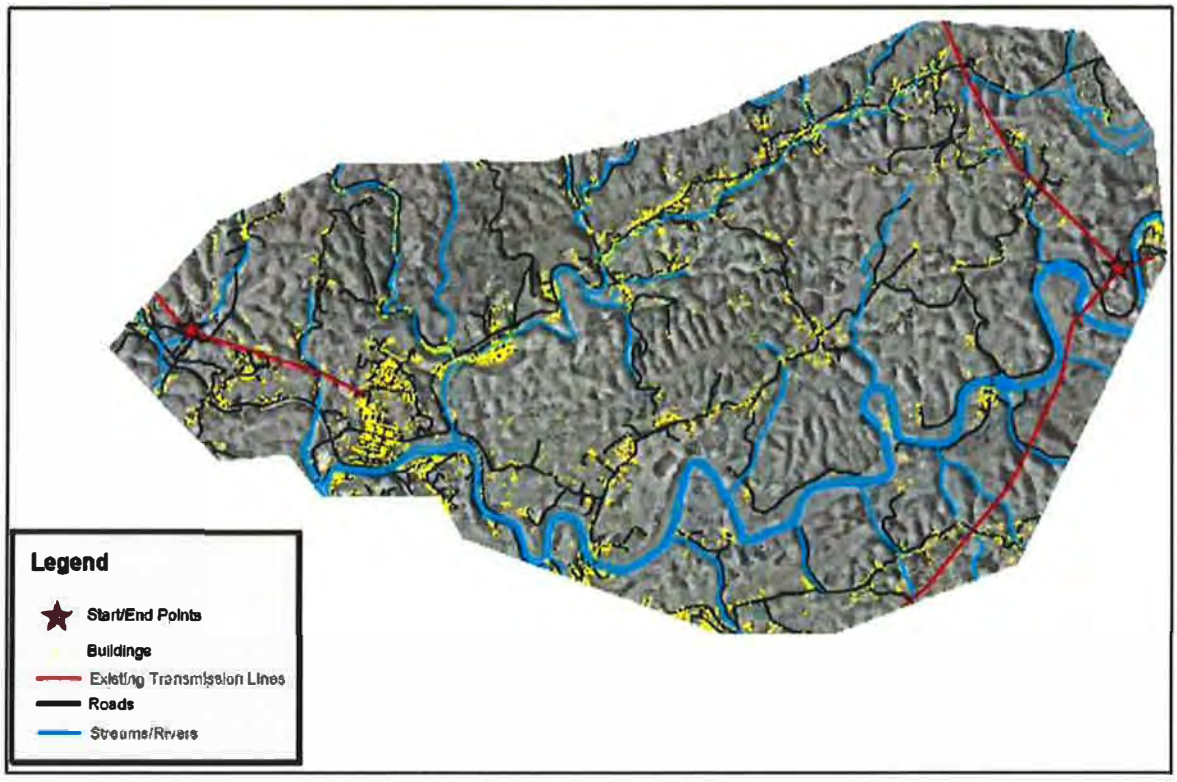


**Figure 3-10**
**Study Area of Mountain/Valley Test Case**

### *Built Model*

The Built Environment Model produced two distinct corridors, one to the north and one to the south (See figure 3-12). The corridors minimize impact to the built environment in the valleys and traverse some of the more mountainous areas. However, the southern area passes through a densely developed area in order to co-locate with an existing transmission line. This corridor is approximately eight (8) miles long. (See figure 3-11 for the land use/land cover break down of the corridor.)

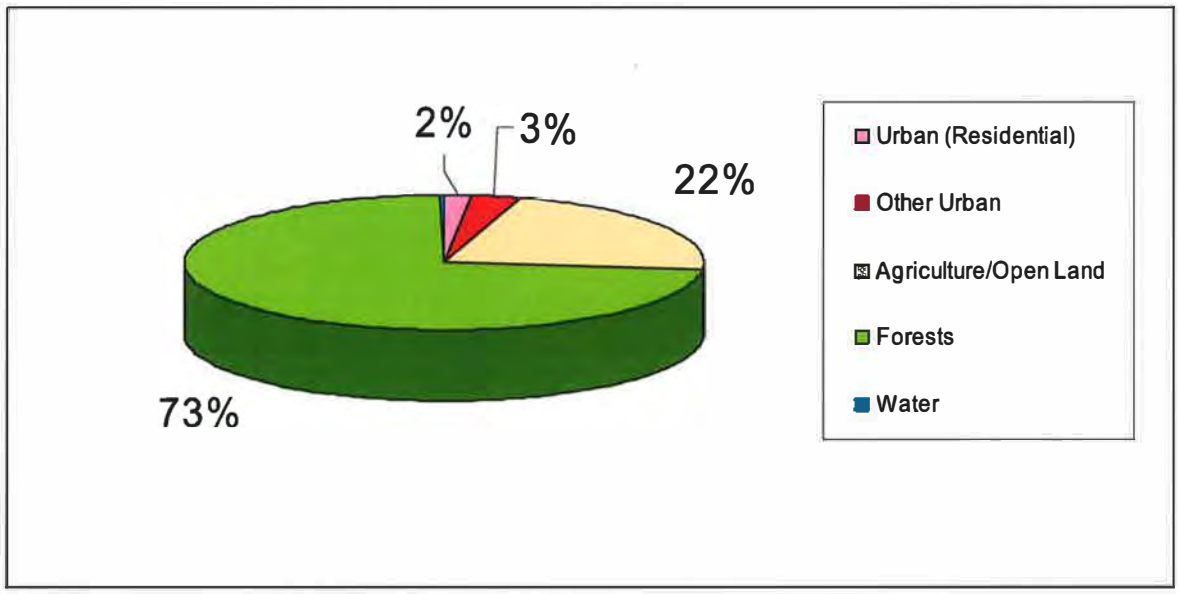


**Figure 3-11**
**Land Use/Land Cover of Mountain/Valley Test Case Built Environment Corridor**

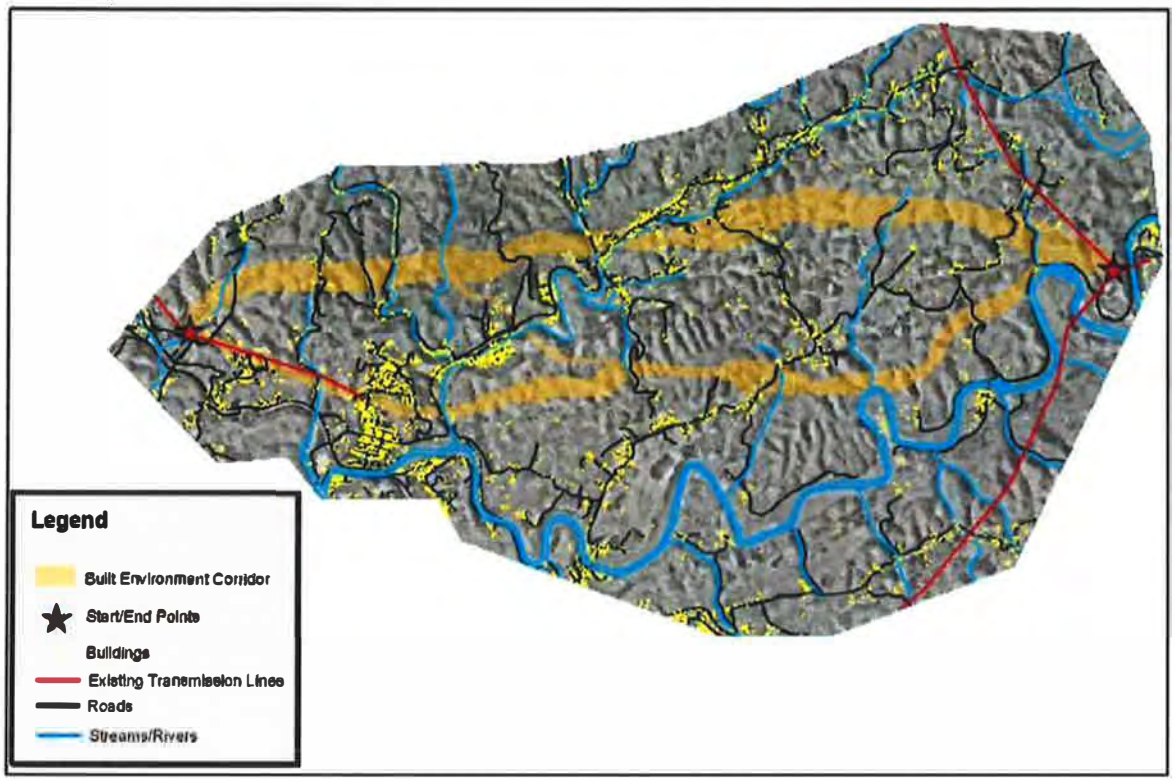


**Figure 3-12**
**Built Environment Corridor for the Mountain/Valley Test Case**

### *Natural Model*

The Natural Environment Corridor (See figure 3-14) minimizes impacts to forested areas and follows valleys, parallels roads, and crosses developed and agricultural areas. (See figure 3-13 for the land use/land cover break down of the corridor.) However, it eludes the most densely developed areas in the study area. Like the Built Environment Corridor, it utilizes the existing transmission line on the western end of the study area. The approximate length of this corridor is eight (8) miles.

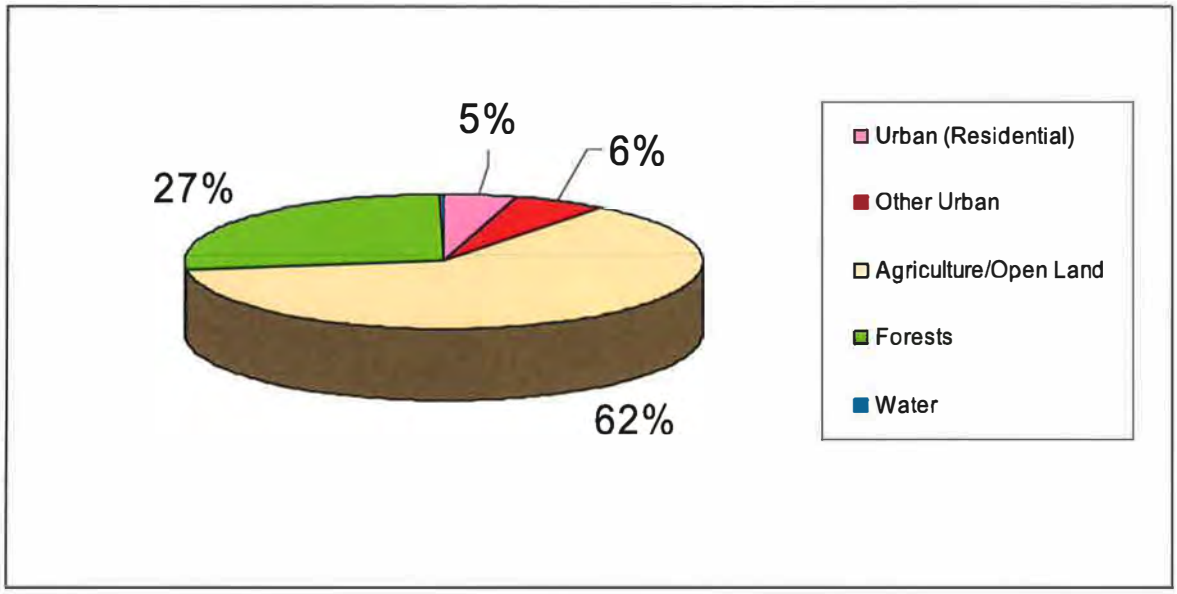


**Figure 3-13**
**Land Use/Land Cover of Mountain/Valley Test Case Natural Environment Corridor**

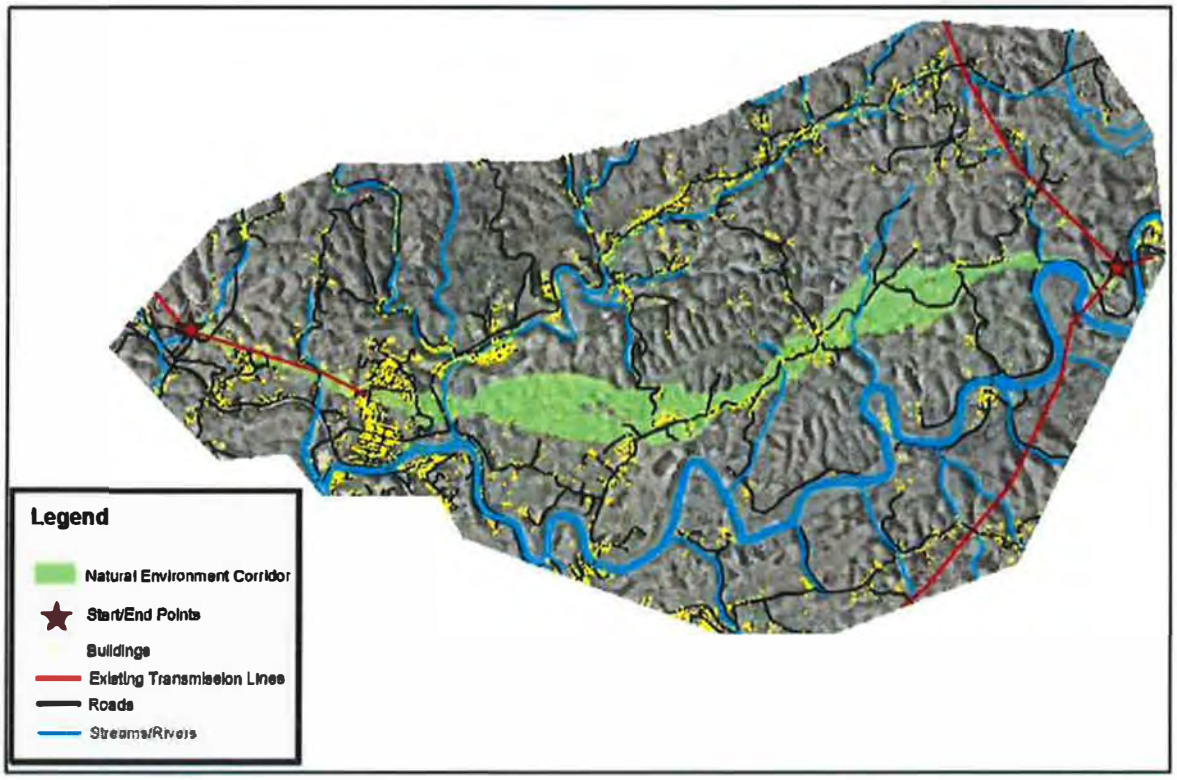


**Figure 3-14**
**Natural Environment Corridor for the Mountain/Valley Test Case**

### *Engineering (Co-location) Model*

The Engineering (Co-location) Model takes a path similar to the Natural Environment Corridor. However, it shifts farther north to run along ridge lines in certain areas instead of traversing valleys (See figure 3-15).

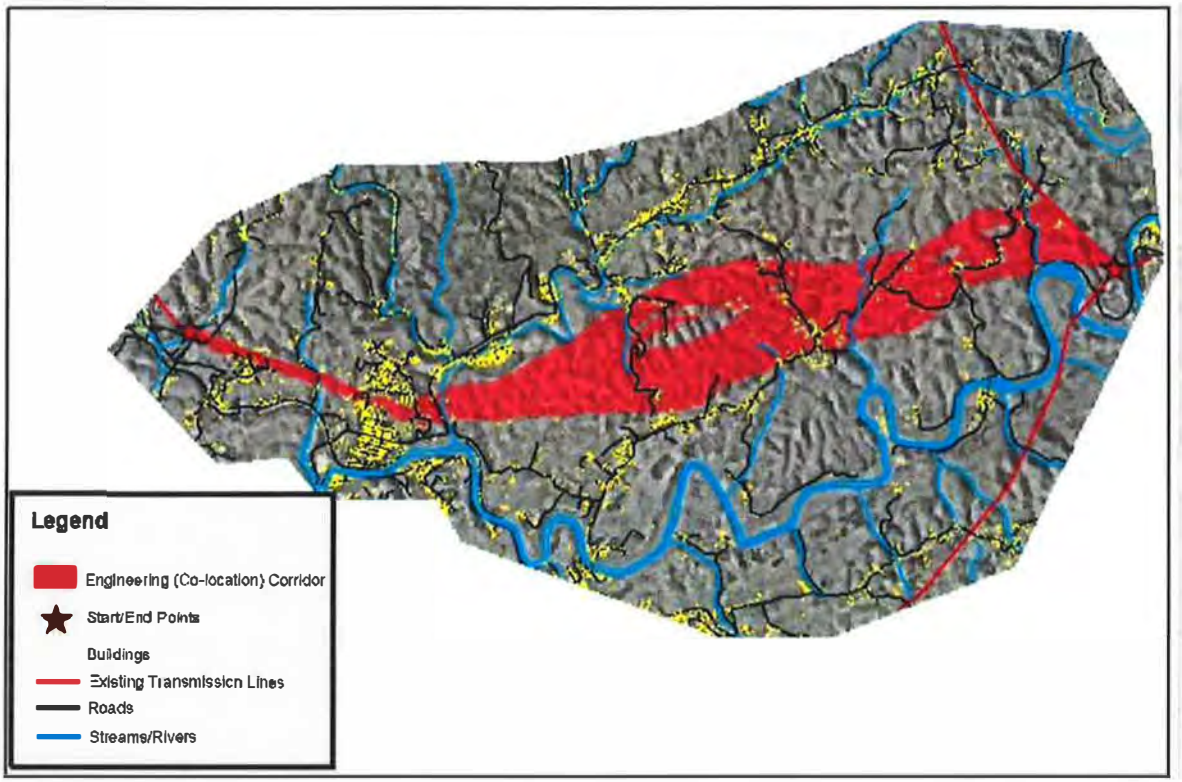


**Figure 3-15**
**Engineering (Co-location) Corridor for the Mountain/Valley Test Case**

### *Simple Average Model*

The Simple Average Corridor produced similar results to the Engineering (Co-location) Model (See figure 3-16).

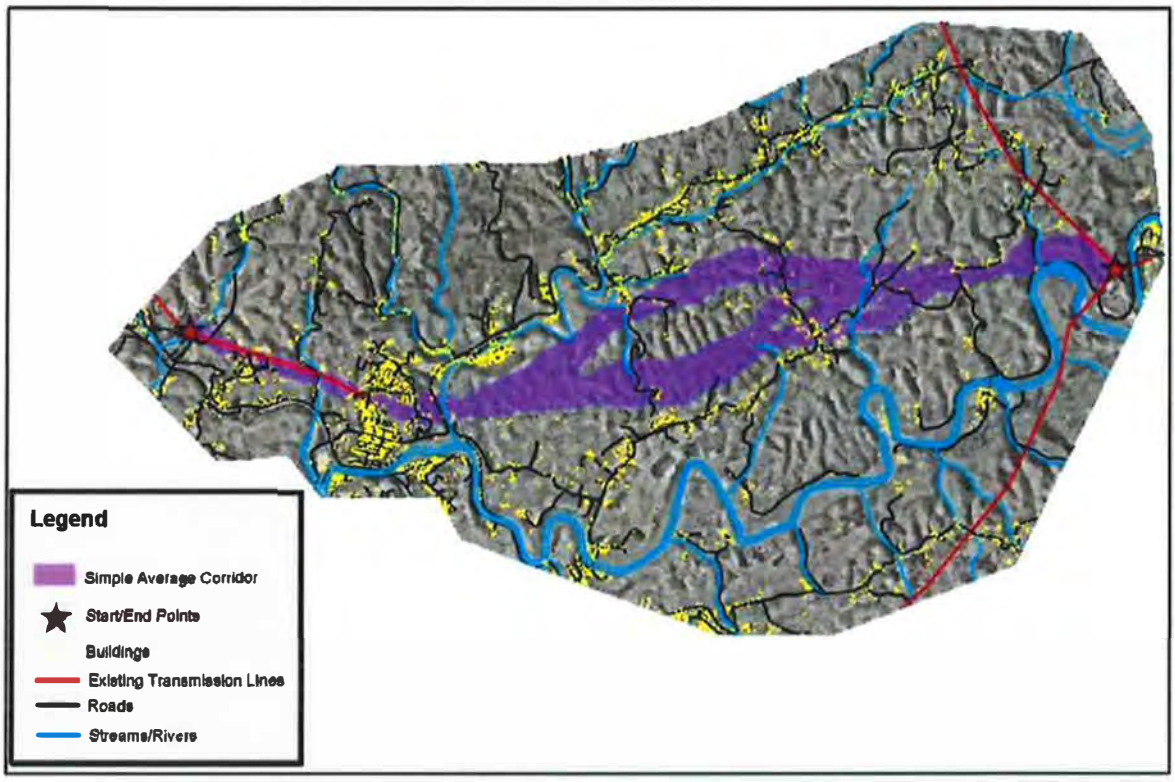


**Figure 3-16**
**Simple Average Corridor for the Mountain/Valley Test Case**

## Bluegrass Region Test Case

The purpose of this Test Case is to determine the effects that the unique land use of the Bluegrass region (Equine Agri-tourism) has on the model. Other characteristics of this model are the small amount of forests, greater amount of suburban development, and a large number of historic resources. (See figure 3-17 for the land use/land cover break down of the study area.) The straight line distance between the start and end point is approximately 16 miles, and the study area is approximately four miles wide.

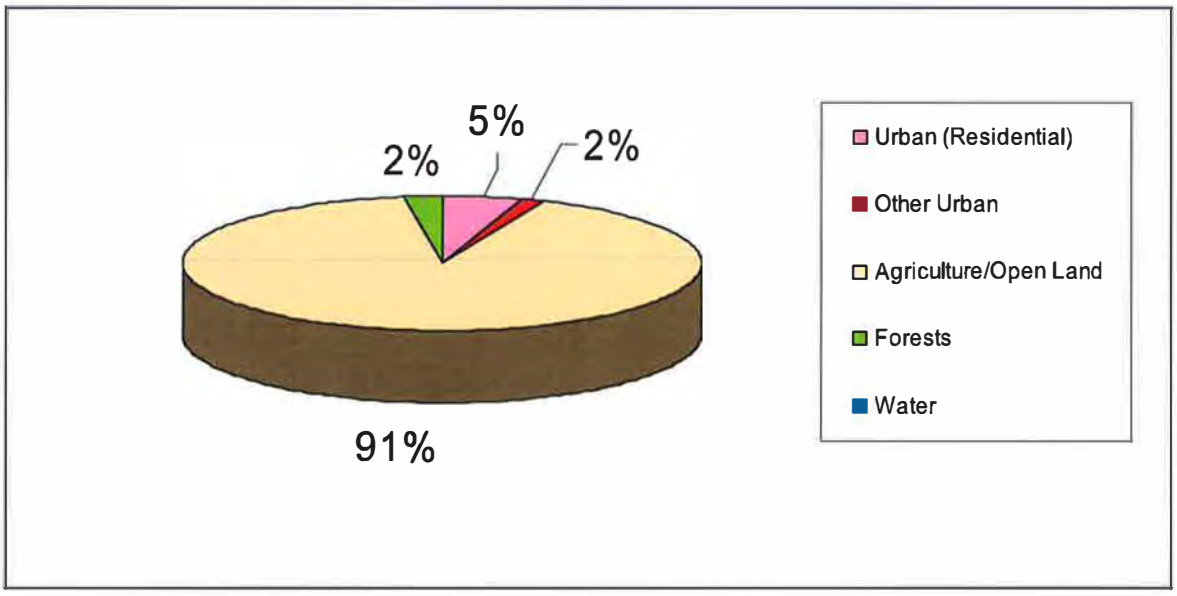


**Figure 3-17**
**Land Use/Land Cover of Bluegrass Region Test Case Study Area**

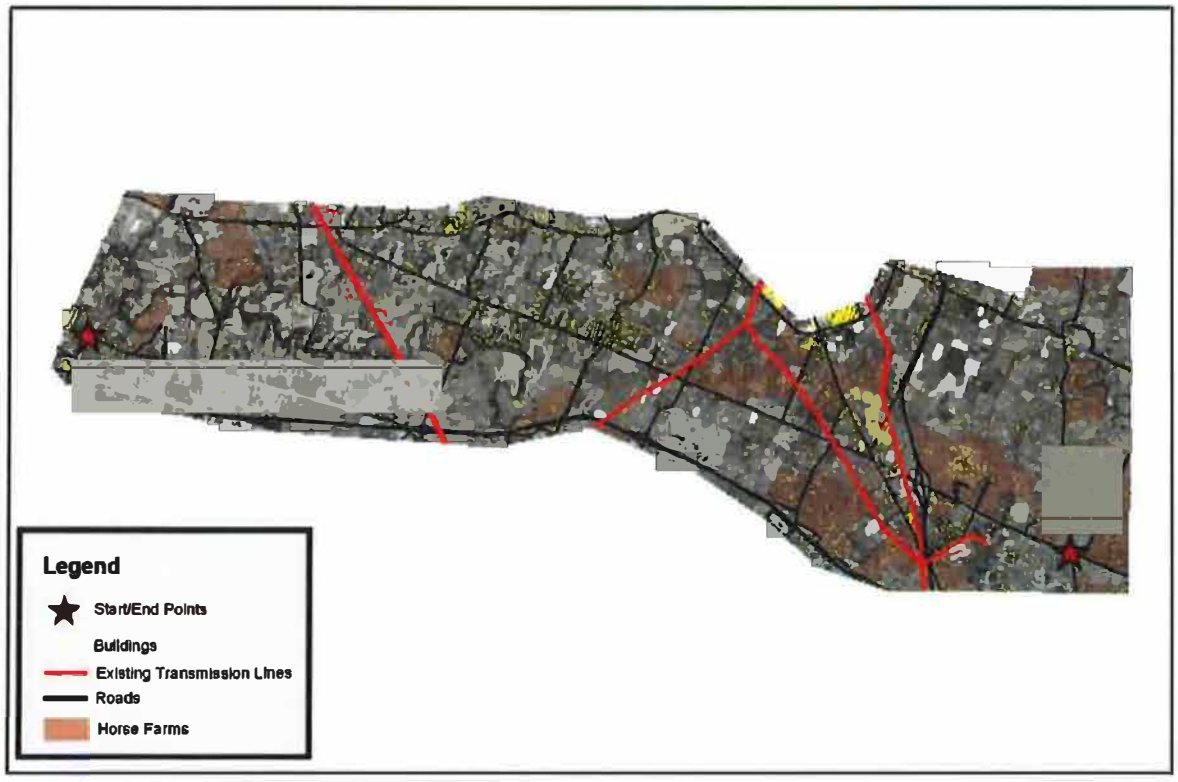


**Figure 3-18**
**Study Area of Bluegrass Region Test Case**

### *Built Model*

The Built Environment Model produced a fairly straight corridor (See figure 3-19) from the start point to the end point while minimizing impacts to Equine Agri-tourism, suburban development, and historic resources. The corridor is approximately 16 miles.


**Figure 3-19**
**Built Environment Corridor for the Bluegrass Region Test Case**

### *Natural Model*

The Natural Environment Model produced a corridor (See figure 3-20) similar to the built corridor; but with several, narrow branches that traverse Equine Agri-tourism parcels.

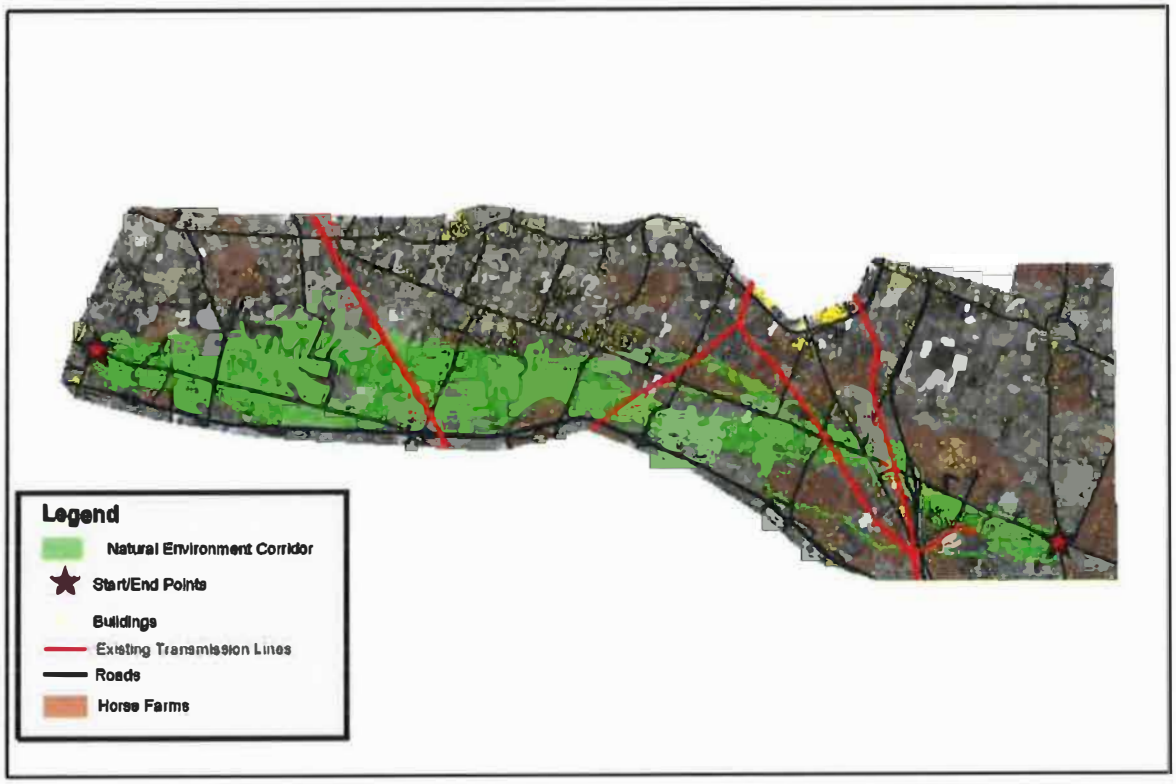


**Figure 3-20**
**Natural Environment Corridor for the Bluegrass Region Test Case**

### *Engineering (Co-location) Model*

The Engineering (Co-location) Model's corridor (See figure 3-21) co-locates with existing transmission lines as much as possible through the study area. The resulting corridor is approximately 19 miles, with approximately 10.5 miles co-locating. This corridor is approximately three miles longer than the Built or Natural Environment Corridors.

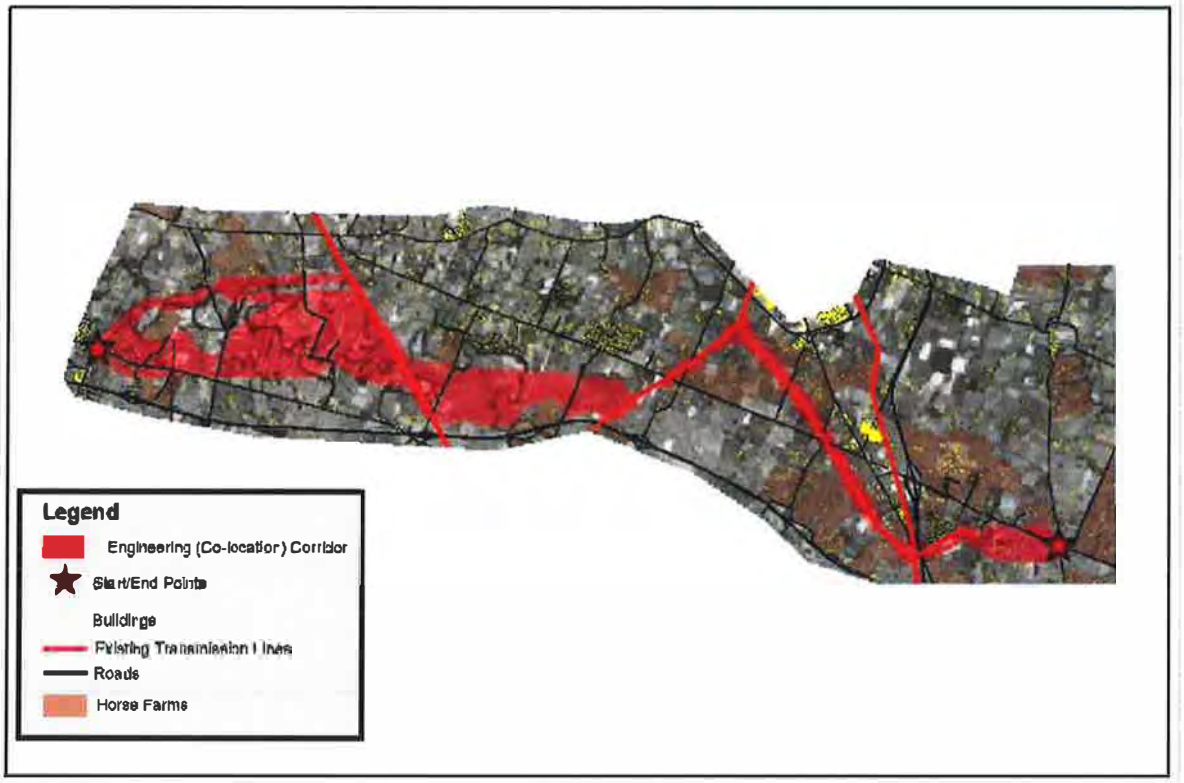


**Figure 3-21**
**Engineering (Co-location) Corridor for the Bluegrass Region Test Case**

### *Simple Average Model*

The Simple Average Corridor (See figure 3-22) most closely resembles the Built Environment Corridor. However, in a few areas this corridor is not quite as sensitive to the proximity of developed areas.

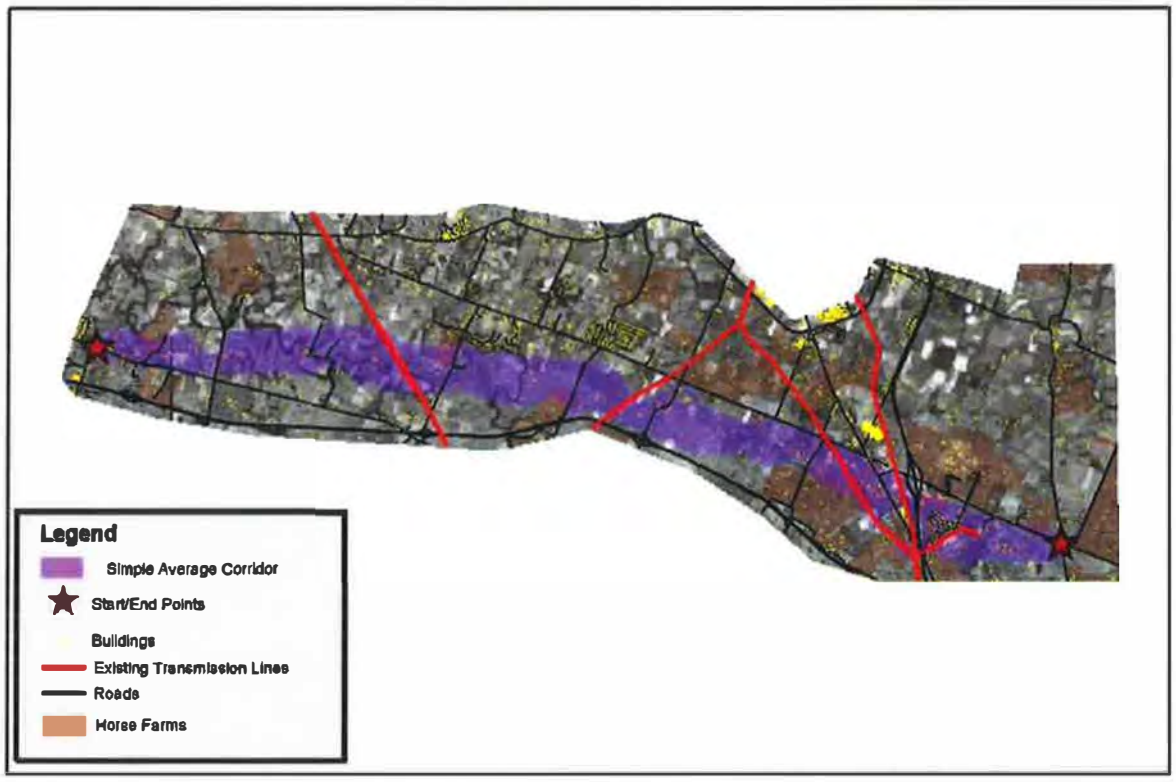


**Figure 3-22**
**Simple Average Corridor for the Bluegrass Region Test Case**

## Co-location Test Case

The purpose of this Test Case is to determine if the model utilizes co-location in appropriate situations. This test case has an existing transmission line that is deemed suitable (good) for rebuilding. Although this opportunity does not make a beeline between the start and end points, it does connect the two. This study area is primarily rural residential and agricultural with forested areas in steep terrain and along streams and rivers. (See figure 3-23 for land use/land cover break down of the study area.) The straight line distance between the start and end point is approximately 16 miles, and the study area is approximately 4.5 miles wide (See figure 3-24).

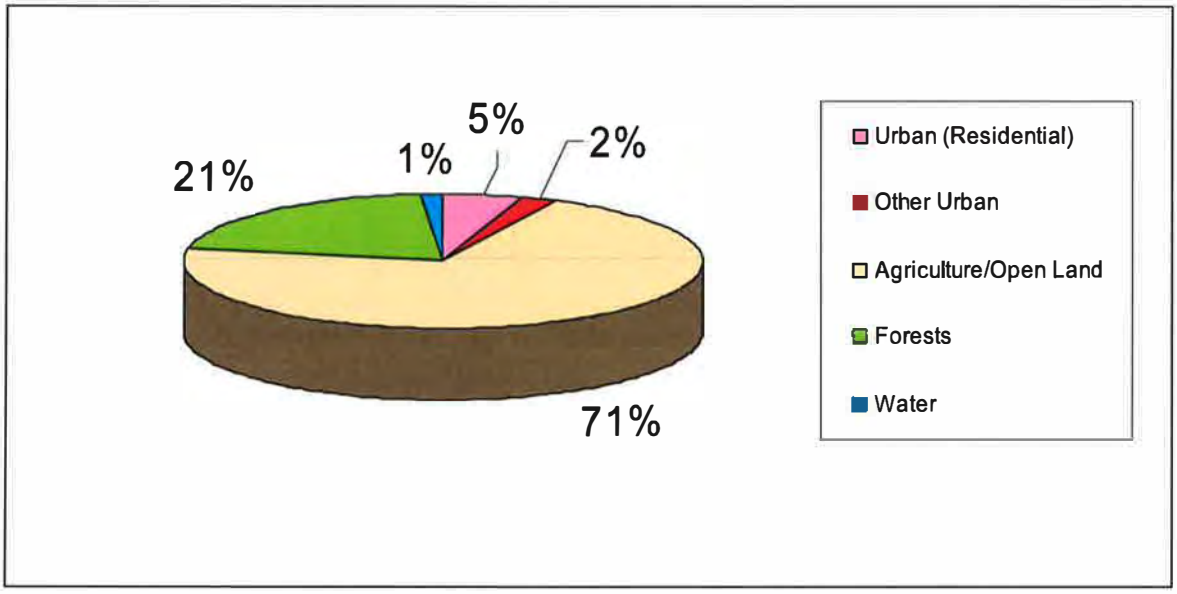


**Figure 3-23**
**Land Use/Land Cover of Co-Location Test Case Study Area**

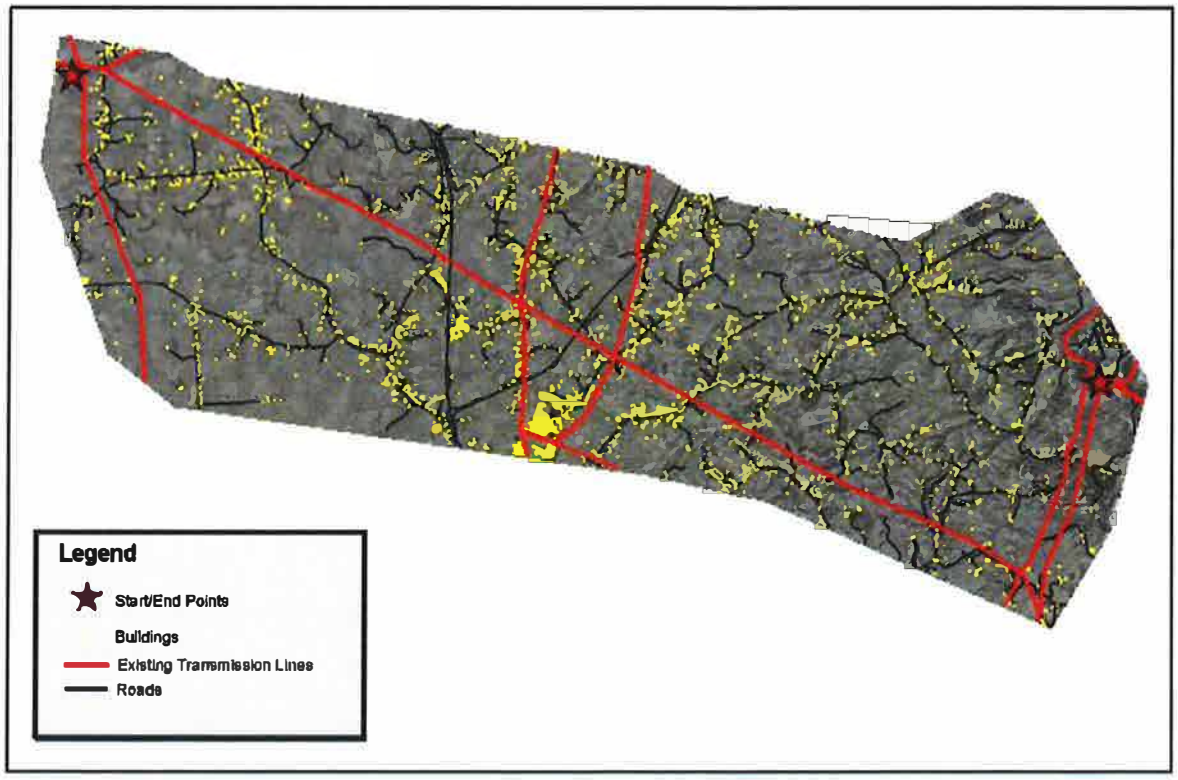


**Figure 3-24**
**Study Area of Co-Location Test Case**

### *Built Model*

The Built Environment Model's corridor (See figure 3-25) co-locates with the "good" rebuild opportunity. The corridor is approximately 19 miles long.

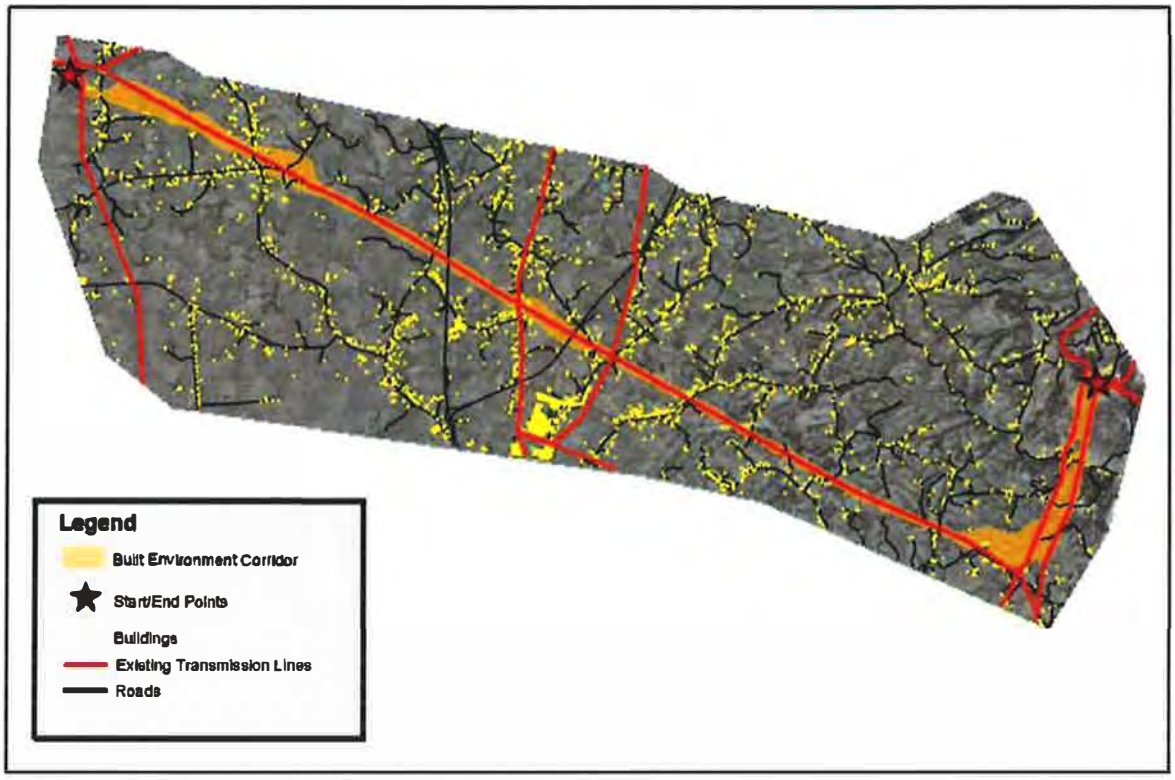


**Figure 3-25**
**Built Environment Corridor for the Co-location Test Case**

### *Natural Model*

The Natural Environment Corridor (See figure 3-26) only co-locates for approximately 1/3 of its length. The approximate length of this corridor is 16 miles, about three miles less than the Built Environment Corridor. This corridor appears to be attracted to the more developed areas that are located in the direct path to the end point. Also, due to the shorter length of this corridor, it has less effect on the environmental constraints (i.e., streams and forests).

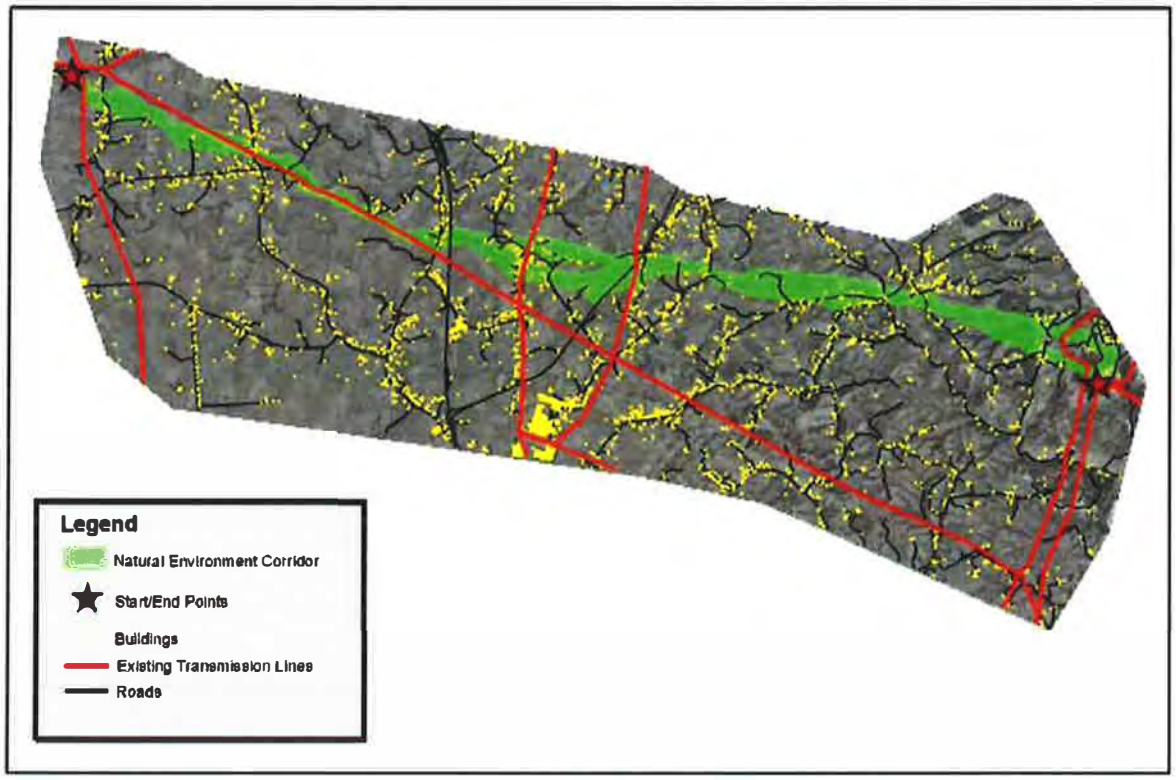


**Figure 3-26**
**Natural Environment Corridor for the Co-location Test Case**

### *Engineering (Co-location) Model*

The Engineering (Co-location) Corridor (See figure 3-27) co-locates with the "good" rebuild opportunity, similar to the Built Environment Corridor.

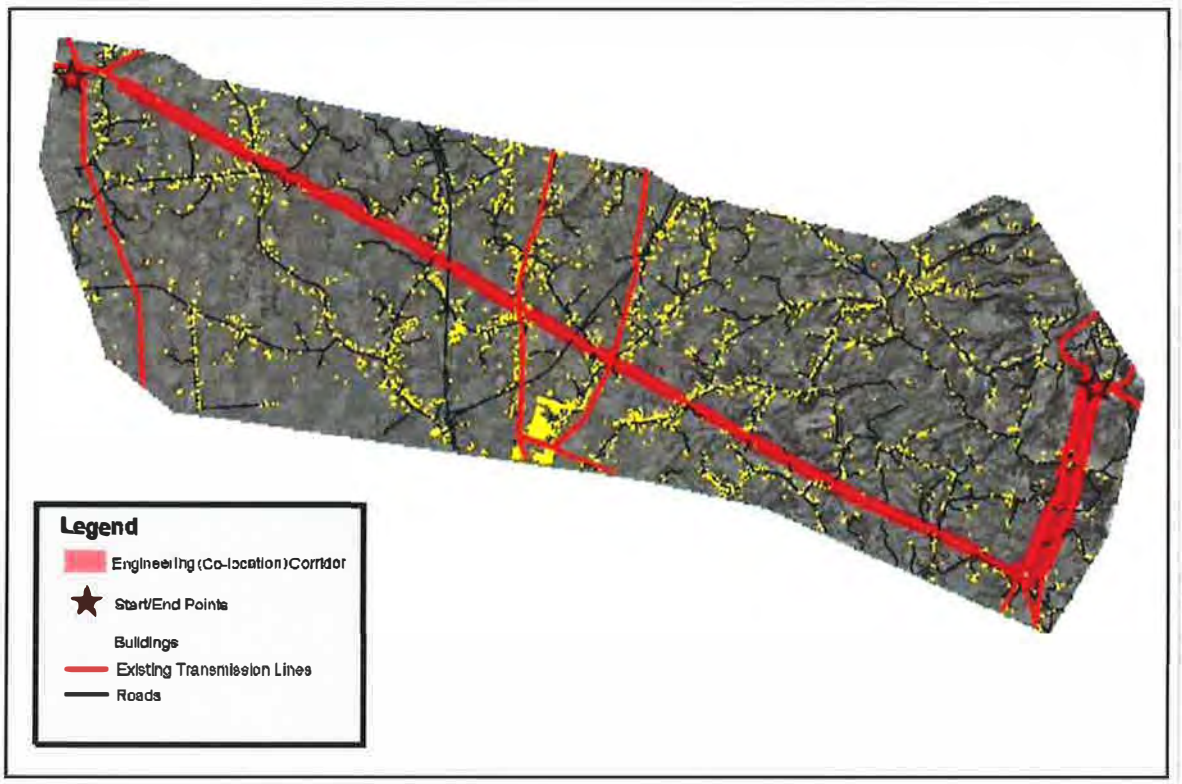


**Figure 3-27**
**Engineering (Co-location) Corridor for the Co-location Test Case**

### *Simple Average Model*

The Simple Average Corridor (See figure 3-28) also co-locates with the "good" rebuild opportunity, similar to the Built Environment Corridor and Engineering (Co-location) Corridor. However, in the southeast portion of the study area, it finds additional opportunities to "cut the corner" and reduces the length by up to one mile.

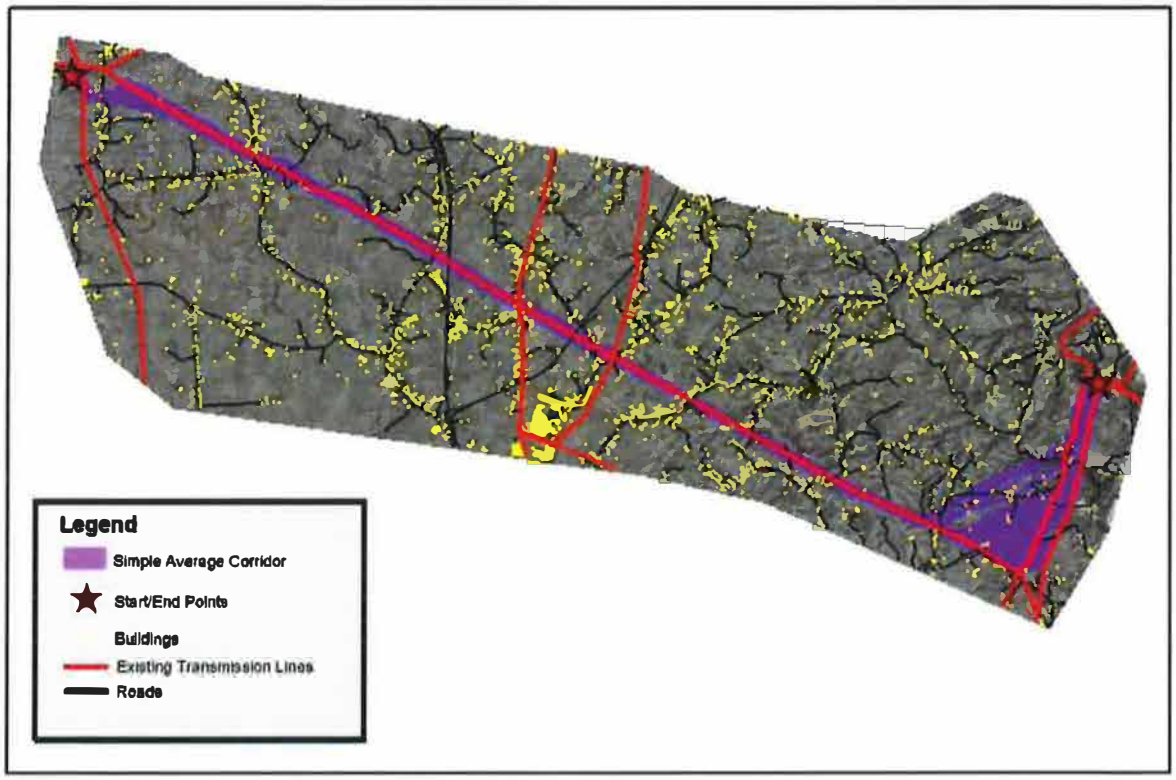


**Figure 3-28**
**Simple Average Corridor for the Co-location Test Case**

## Testing Summary

### *Built Environment Model*

In all test cases, the Built Environment Model minimizes impacts to densely developed areas, residential land uses, and historic resources. In the Bluegrass Region Test Case, the corridor also minimizes impacts to Equine Agri-tourism. In two cases, this model also utilized co-location with existing transmission lines. This appears to be consistent with the values and weights received in the workshop.

### *Natural Environment Model*

In three test cases, the Natural Environment Model produces corridors that minimize impacts to forested areas while utilizing developed areas. In the National Forest Test Case, the combination of forested land cover and National Forests are in the area directly between the start and end points. This produces a corridor that is attracted to more agricultural and developed areas and is approximately 15% longer than other corridors produced in this test case. In the Co-location Test Case, the suitability given to developed land appears to override the suitability of co-locating with existing transmission lines and produces more of a cross-country corridor.

In the Bluegrass Test Case, there are very few forested areas for which the Natural Environment Corridor might be expected to minimize impacts. Therefore, the agricultural areas - including Equine Agri-tourism parcels - are the next category in the Land Cover layer for which the Natural Environment Model will minimize impact. This causes the path of the Natural Environment Corridor to be similar to the Built Environment Corridor. However, the Natural Environment Model has little distinction between types of agriculture, which is why the corridors did not minimize impact to Equine Agri-tourism as well as the Built Environment Corridor.

### *Engineering (Co-location) Model*

The Engineering (Co-location) Model co-locates with existing transmission lines wherever possible. This is so regardless of whether the transmission line is a rebuild opportunity or involves paralleling an existing transmission line. The only linear feature that this model finds suitable for corridor development is existing transmission lines, which is a direct reflection of the values given to the Linear Infrastructure model.

In areas where there are no existing transmission lines for the corridors to utilize, the corridors tend to cross steep slopes perpendicularly and to a smaller degree, minimize impacts to developed areas.

### *Simple Average Model*

The Simple Average Corridor in all cases resembles one of the previous corridors. In the National Forest, Mountain/Valley, and the Co-location Test Cases, the Simple Average Corridor resembles the Engineering (Co-location) Models. In the Bluegrass Region Test Case, the corridor more closely resembles the Built Environment Corridor. This is probably due to the number of Built Environment features in the study area, including Equine Agri-tourism, historic resources, and suburban areas. The Built Environment Corridor also takes a more direct path and impacts less features than the Engineering (Co-location) Corridor that takes a longer path, affecting more features in order to co-locate with sections of several different existing transmission lines.

## The Effect of the Data, Weights, and Values

This section discusses how data layers, weights, and the values for feature classes within data layers as derived from this workshop affect the development of the alternate corridors.

Some perspectives have heavily weighted individual layers. These layers not only influence the general area of corridors within that perspective, but are capable of also affecting the other perspective corridors. (The term "general area of the corridor" is used here to refer to the basic spatial pattern that a corridor utilizes to get from the starting point to the end point.) For example, Linear Infrastructure, Land Use, and Proximity to Eligible Historic and Archeological Sites were observed to influence not only the general area of the corridor within their own perspective, but also the general area of the corridor within the other three perspectives.

If one of the most or least suitable features in a layer having a relatively heavy weight was to change, this may cause the alternate corridor to develop in a different area. For example, if an existing transmission line was located in the northern portion of the study area, alternate corridors may develop along the line in the northern part of the study area. If all other data layers stayed the same but an existing transmission line were located in the southern part of the study area instead, alternate corridors might form in the southern part of the study area.

Layers that have a more moderate weighting may influence only the general area of the corridor within its own perspective model. For example, Land Cover and Public Lands were observed to influence the general area of the corridor only within the Natural Environment perspective.

Finally, some layers having a relatively small weight may not affect the general area of its own perspective corridor much if at all. Those layers, however, have some slight influence on the corridor but in a more specific manner. For example, if the model faces a choice between traversing across two adjacent properties having similar suitability values, the layer with the smaller weight will influence which property the corridor crosses. Examples of lightly-weighted layers include Slope, Spannable Lakes and Ponds, Floodplain, and Proposed Developments.

### *Built Environment Model*

#### Proximity to Buildings and Building Density

These two layers work together to minimize impact to the built environment. Proximity to Buildings minimizes impacts to individual buildings, while Building Density minimizes impacts to areas that have a higher density of buildings. The stakeholders assigned twice the weight to Proximity to Buildings compared to Building Density. This causes buildings in a more densely populated area to be a slightly greater constraint than buildings located in a more dispersed, rural setting. We believe this result is consistent with the views of the stakeholders. Although transmission line siting professionals might give greater deference to Building Density (as a surrogate for neighborhoods), the test cases show the model to be clearly protective of buildings in densely populated areas.

#### Proposed Developments

Proposed Developments received a low weight from the stakeholders. These features will not influence the corridors greatly. However, if the corridor has a choice of traversing across two adjacent tracts which are otherwise similar, the corridor will develop through the tract without a

proposed development. We believe this result is consistent with the views of the stakeholders as well as with the preferences of transmission line siting professionals.

### Spannable Lakes and Ponds

Similarly to Proposed Developments, this layer also received a low weight. If the corridor has a choice of traversing across two adjacent tracts which are otherwise similar, the corridor will develop through the tract without a Spannable Lake or Pond. We believe this result is consistent with the views of the stakeholders as well as with the preferences of transmission line siting professionals.

### Land Use

Land Use received the greatest weight from the stakeholders and has the greatest influence on the corridor for the Built Environment. As the testing shows especially in the Bluegrass Region Test Case, Land Use may also influence the corridors in the other perspectives.

The greatest constraints in this layer are Residential Land Use and Equine Agri-tourism. In all test cases, Residential Land Use is minimally affected in the Built Environment Model unless there is a compelling option for co-location. In the Bluegrass Region Test Case, the Built Environment corridor minimizes impacts to Equine Agri-tourism just as it does for Residential Areas. However, the corridors traverse other types of agricultural land use. If there were a situation where a corridor had to be located either through a horse farm or a residential neighborhood, the corridor would choose the horse farm due to the residential neighborhood having a slightly higher value and also the additional weighting associated with the Proximity to Buildings and Building Density layers.

The other types of land use do not appear to influence the general area of the corridor as much as Residential Land Use and Equine Agri-tourism. One concern was that Commercial/Industrial Land Use would unduly influence corridor development due to its value as the most suitable land use type. An additional test was preformed to determine the effects of isolated occurrence of commercial/industrial land uses.

To test the effects of the Commercial/Industrial Land Use value in the Built Environment Model, two large areas in the model for the Bluegrass Region Test Case were recharacterized as industrial. These two areas were not connected and were placed outside the corridors of the original test case to determine whether Commercial/Industrial Land Use parcels would pull the original corridors over to include them in the general area of the corridor. To give an idea of their size and infrastructure, they are comparable in size to the existing Toyota assemble plant actually located in the "Bluegrass Region."

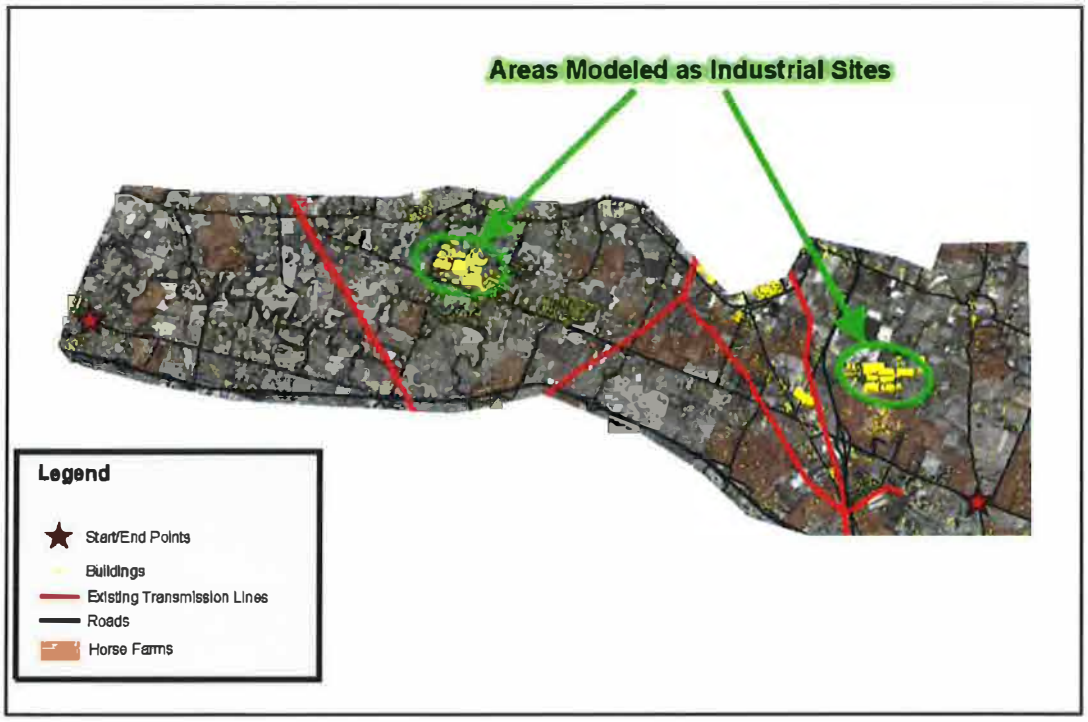


**Figure 3-29**
**Additional Test Case for Commercial/Industrial Land Use effects**

When the values and weights are applied in this test case, the values for the two industrial areas contain some of the most suitable areas in the study areas. See figure 3-30 below.

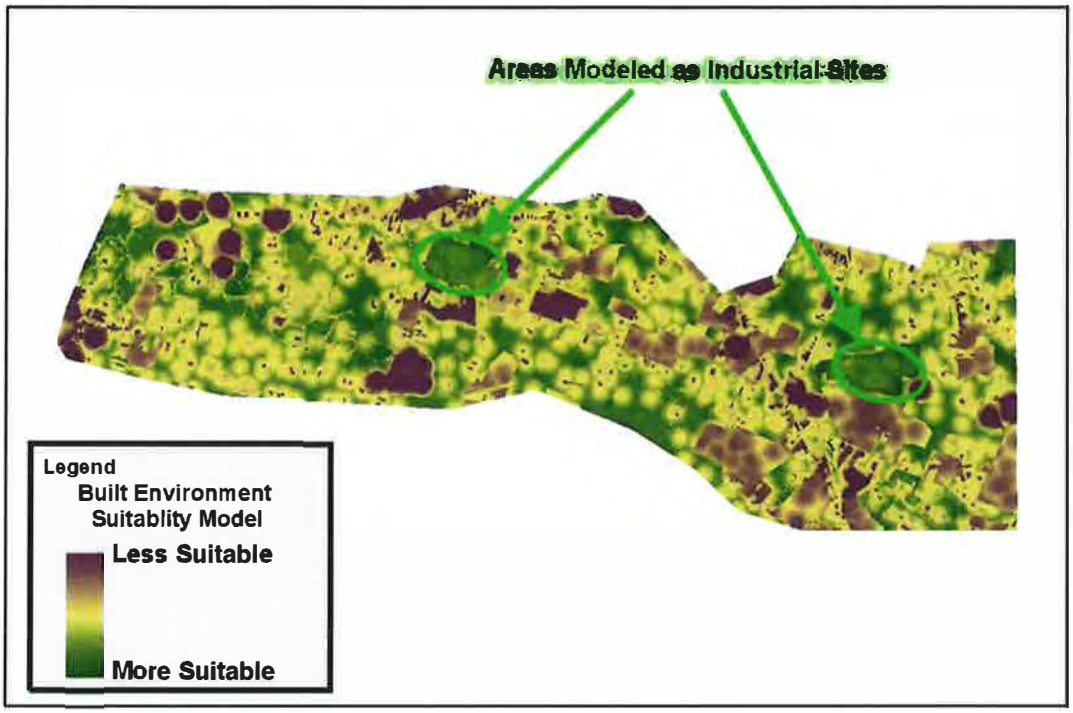


**Figure 3-30**
**Built Environment Suitability Model for Additional Test Case**

However, the resulting corridors vary little from the original test case in the Built Environment Model, Natural Environment Model, and Engineering (Co-location) Model. See figure 3-31 below.

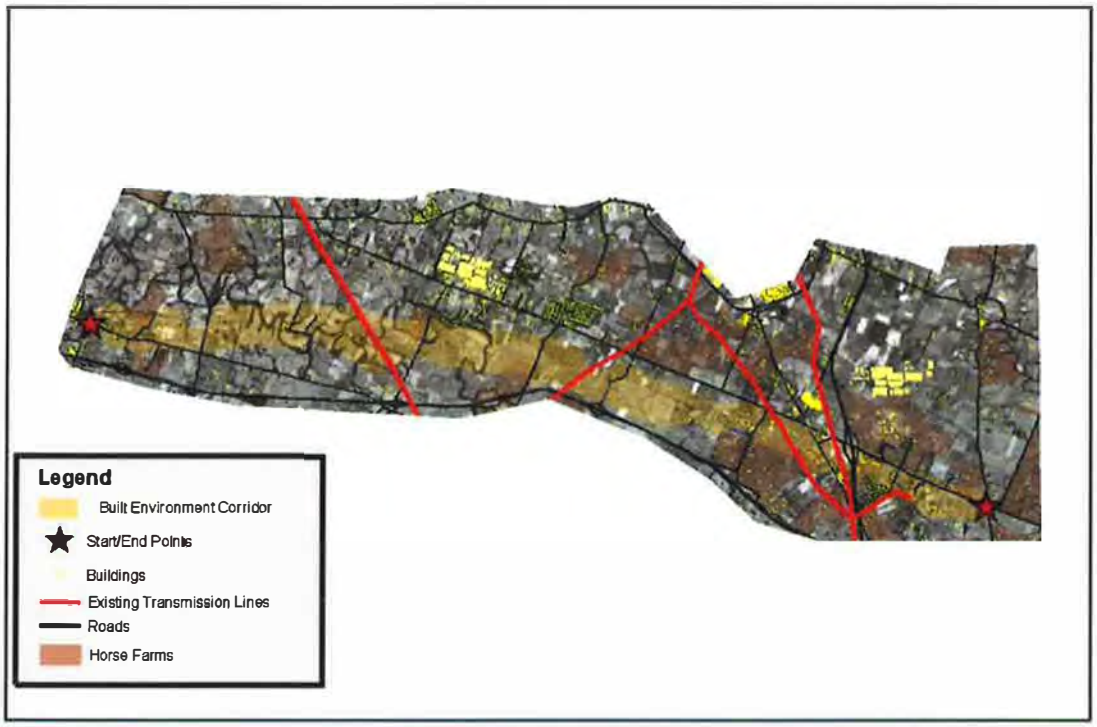


**Figure 3-31**
**Built Environment Corridor for Additional Test Case**

The reason why these areas do not act as magnets pulling the corridor over to them is that the Least Cost Path algorithm does not merely seek out those areas that are the most suitable areas, but finds those complete pathways that are most suitable overall. This test demonstrates that although commercial and industrial sites are recognized as suitable by the model, their attractive qualities are not strong enough to cause the corridor to leave its more direct path and cross less suitable areas in order to get to the noncontiguous industrial areas. If the model were based solely on the Land Use layer, the suitability of these areas might be strong enough to cause the corridor to leave its current path. In the current model, however, Building Density and Proximity to Buildings lessen the suitability of the paths needed to access the more suitable commercial and industrial areas.

In cases where linear commercial and industrial development exist along highways that are themselves aligned between the starting and end points, we believe that such development would attract corridor development due to its contiguous nature and relatively direct approach. We believe these results are consistent with the views of the stakeholders as well as with the preferences of transmission line siting professionals.

### Proximity to Eligible Historic and Archeological Sites

The stakeholders gave the second highest weighting in the Built Environment Model to Proximity to Eligible Historic and Archeological Sites. These layers affect the corridors in the Built Environment perspectives as well as in the other three perspectives; all four test cases minimize impact to the historic and archeological resources.

Proximity to National Register-eligible archaeological sites is an unusual routing criterion. Unlike proximity to eligible historic structures, there normally is not the same visual resource component to archaeological sites as there is to historic structures or districts. While it is reasonable to expect that utilities will not place transmission line support structures or guy wires or otherwise indulge in land-disturbing activities within the footprint of an eligible archaeological site, it is not at all unusual for utilities to protect a site, clear by hand, and span eligible archaeological sites, an accepted mitigation technique known as preservation-in-place. We are aware of no regulatory requirement to minimize visual impacts to archaeological sites; these are subsurface cultural properties which derive their importance from avoiding disturbance to the features and assemblage of materials below the ground surface. While avoiding a known eligible archaeological site is reasonable when developing alternate corridors, all things considered, a miss is as good as a mile.

We believe the results may be consistent with the views of the stakeholders with respect to weighting proximity to eligible historic structures and districts. However, with respect to weighting proximity to eligible archaeological sites, the weighting may not have been thoroughly considered. We do not suspect that inappropriate corridors will result from this weighting, and certainly transmission line siting professionals can centerline closer to an eligible archaeological site with proper documentation. However, if a second stakeholder meeting is ever convened, it would be useful to obtain greater clarity as to the reasoning behind treating eligible archaeological sites the same as eligible historic structures. With this exception noted, the results are also consistent with the preferences of transmission line siting professionals.

## *Natural Environment Model*

### Floodplain

The Floodplain layer received the least weighting and by itself will not influence the direction a corridor will take. However, when faced with a stream or river crossing with floodplains associated with it, the corridor will attempt to cross the floodplain system at one of the more narrow points. We believe this result is consistent with the views of the stakeholders as well as with the preferences of transmission line siting professionals.

### Streams/Wetlands

The Streams/Wetlands layer received the greatest weighting of the layers in the Natural Environment Model. However, in general, these features do not consume large areas of land in the test cases. Therefore, they do not greatly influence the direction of the corridor, but they do

avoid ordinary problem areas such as the confluences of streams and rivers. This layer encourages corridors to traverse ridge lines so as to reduce the number of stream crossings, a desirable outcome. However, in the Mountain/Valley and National Forest Service test cases, the Natural Environment Corridor prefers the valleys due to the more suitable values of the Land Cover layers where the larger streams and wetlands are found. When operating in relation to other layers (Slope, Land Use, Building Density, Proximity of Buildings) in the other perspectives, this layer helps the Built Environment Corridor and Engineering (Co-location) Corridor to focus on ridgelines in mountainous terrain.

Outstanding State Resource Waters were given the highest value by the stakeholders. In the test cases, these features were not present. These features are relatively rare and are found in limited areas of the state. Because of this, in the test cases we ran, wetlands were valued as the highest constraint. In cases where wetlands were associated with streams and river systems, the weighting of the layer encourages corridors to cross streams where the streams are narrow and wetlands are absent. Where wetlands are more isolated, the corridors would route around them. Where wetlands are large and expansive (wide alluvial floodplain wetland systems, for example), this layer will have a greater influence in corridor development as the model searches for ways to avoid or minimize wetland crossings. We believe these results are consistent with the views of the stakeholders as well as with the preferences of transmission line siting professionals.

### Public Lands

This layer received the next to lowest weight in the Natural Environment Model. However, it is significantly higher than the floodplain weight. This layer was tested in the National Forest test case, where it greatly influenced the location of the Natural Environment perspective corridor. Along with the Land Use layer, it created a corridor that was less direct than the others in order to minimize impact to U.S. Forest Service lands. We believe this result is consistent with the views of the stakeholders as well as with the preferences of transmission line siting professionals.

### Land Cover

This layer received a slightly greater weight than the Public Lands layer. It significantly influences the development of the Natural Environment Corridor. In the Mountain/Valley and National Forest test cases, it helped the Natural Environment Corridors cross through more developed and cultivated valleys instead of taking a more direct path though forested areas. Although transportation corridors are not modeled as a suitable infrastructure to parallel, the resulting corridor often parallels a road due to the linear nature of development along the roads.

However, in the Bluegrass Region test case (which lacks significant amounts of forested areas); the Land Cover layer had little effect on corridor development. With agricultural land cover being weighted as a fairly high constraint, one might conclude that the corridor would develop through urbanized areas, whether it be residential or commercial/industrial. However, the dominant layers in the Built Environment Model (Land Use and Proximity to Eligible Historic and Archeological Resources) seem to have a greater influence over the general area of the Natural Environment corridor.

This is a good example of why, when generating the alternate corridors for each perspective, the other de-emphasized perspectives are nevertheless included in the model. Although the Natural Environment Corridor mimics the Built Environment Corridor in this test case, one notices a tendency not to observe the more highly constrained areas as strictly as the Built Environment Corridor. For example, the Built Environment Corridor fails to cross horse farms, but the Natural Environment Corridor has some narrow branches off the main corridor that does traverse them. If urban development were more linear and ran more in the general direction between the starting and end points in this test case, a more urban route clearly different from the Built Environment Corridor might have developed. We believe this result is consistent with the views of the stakeholders as well as with the preferences of transmission line siting professionals.

### Wildlife Habitat

This layer received the second highest weight in the Natural Environment Model. However, this layer does not appear to influence the corridors in a positive or negative manner. This is not due to the weight or values given to the layer but to the scale of the source of this dataset. This layer was derived from the data from the GAP analysis program, which is based on 30 meter (+/- 98.4 feet) cell size. Our methodology uses suitability surfaces which are 15-foot cell size. All species that have a state status of S1 or S2 and are mammals, herpitiles, or breeding birds (with the exception of some species that have urban areas for habitat) were included in this layer. This creates a dataset which displays habitat as existing over the majority of the area in the state and does not model wildlife habitat appropriately for this model. Using this dataset does not result in irrational corridor development so much as it fails to influence the development of corridors much one way or the other. Please see Appendix J for a possible source for this layer.

## *Engineering/Co-location Model*

### Linear Infrastructure

This layer received by far the greatest weight. Not only does it dictate the general area of the corridor for the Engineering/Co-location model, it also influences the development in the other perspectives as well, as demonstrated in the Mountain/Valley and Co-location test cases. However, in the Bluegrass Region test case, the existing transmission lines in the area ran roughly north to south, while the direct route between the starting and end points was east to west. In this case only, the Engineering/Co-location model followed a route with minimal co-location, using existing transmission lines only where reasonable.

Per the values assigned to this layer by the stakeholders, only paralleling existing electrical transmission lines and rebuilding transmission lines that are technically feasible are the only linear infrastructure that this model will co-locate. The other linear infrastructure features (parallel to interstate highways, parallel to pipelines, parallel to roads, and parallel to railways) are less suitable than "background" or cross country areas and do not play a significant role in the corridor development. We believe this result is consistent with the views of the stakeholders as well as with the preferences of transmission line siting professionals.

### Slope

The Slope layer received a small weight relative to the Linear Infrastructure layer. However, this layer aids in corridor development in areas where much of the landform is homogenous. An example of this is in the National Forest test case, where large areas of land are both forested and within U.S. Forest Service property. The slope layer helped define where corridor development could locate to minimize impacts to severe slope areas, either by crossing severe slopes at a narrow point or routing around severe slopes altogether. We believe this result is consistent with the views of the stakeholders as well as with the preferences of transmission line siting professionals.

## Conclusion

The test cases examined were representative of areas in Kentucky. However, all possible scenarios that may occur throughout the state can not be fully tested beforehand. Unique routing situations may arise in the future that may cause this model to be re-evaluated.

The Kentucky Siting Model reflects the values and weights as determined by a representative group of Kentucky stakeholders at the workshop detailed in this report. Testing of the Kentucky Siting Model indicates it is a valid model for siting overhead electric transmission lines. The alternate corridors generated by testing of the model were reflective of the values and weights of features as determined by the stakeholders, and the resulting corridors showed no obviously flawed or outlandish outcomes. The corridors minimized impacts to the layers and features valued by the stakeholders while producing an acceptable array of alternate corridors for developing viable alternate routes. Based on our analysis of the test case results, we recommend this model can be used to begin routing electrical transmission line projects in Kentucky.

# A
# PROFILES OF CONSULTING TEAM

## Dr. Joseph K. Berry

Dr. Joseph K. Berry is the principal of Berry and Associates // Spatial Information Systems (BASIS), consultants and software developers in Geographic Information Systems (GIS) technology. He is a contributing editor and author of the Beyond Mapping column for GeoWorld magazine since 1989. He has written over two hundred papers on the analytic capabilities of GIS technology, and is the author of the popular books Beyond Mapping (Wiley, 1993), Spatial Reasoning (Wiley 1995) and Map Analysis (in preparation, online). Since 1977, he has presented workshops on GIS technology and map analysis concepts to thousands of professionals. Dr. Berry taught graduate level courses and performed basic research in GIS for twelve years as an associate professor and the associate dean at Yale University's School of Forestry and Environmental Studies, and currently is a special faculty member at Colorado State University and the W. M. Keck Scholar at the University of Denver. He is the author of the original Academic Map Analysis Package and the current MapCalc Learner-Academic educational materials used in research and instruction by universities worldwide and by thousands of individuals for self-instruction in map analysis principles. Dr. Berry's research and consulting has been broad. Such studies have involved the spatial characterization of timber supply, outdoor recreation opportunity, comprehensive land use plans, wildlife habitat, marine ecosystem populations, haul road networks, surface and ground water hydrology, island resources planning, retail market analysis, in-store movement analysis, hazardous waste siting, air pollution modeling, precision agriculture and site-specific management. Of particular concern have been applications that fully incorporate map analysis into the decision-making process through spatial consideration of social and economic factors, as well as physical descriptors.

## Clayton M. Doherty

Clayton Doherty is the president of Linear Projects, Inc., a Savannah, Georgia based company specializing in facility siting, environmental assessments, and regulatory permitting. Mr. Doherty worked 17 years as a land use planner, environmental specialist, and environmental and regulatory coordinator for Oglethorpe Power Corporation (OPC) and Georgia Transmission Corporation (GTC). During that time, Mr. Doherty was responsible for coordinating siting activities and securing environmental and regulatory approvals for more than 70 electric transmission line projects and 120 electric substation projects. Mr. Doherty also worked as a senior planner with the city of Key West, Florida, where he migrated the planning department GIS software from ESRI ArcView 3.2 to ESRI ArcGIS 8.1.

While working with OPC and GTC, Mr. Doherty also provided support to the corporations' regulatory and legislative efforts, serving as Secretary-Treasurer and Director of Membership Development with The National Wetlands Coalition (NWC), as a member of the Board of Directors of the National Endangered Species Act Reform Coalition (NESARC), as a member of the Policy Committee and Section 404 Task Force of the Utility Water Act Group (UWAG), and as a liaison with the National Rural Electric Environmental Association, serving as Chairman of the Water Quality Subcommittee and as a member of the Transmission Environmental Subcommittee of the G&T Manager's Association Technical Advisory Committee. Mr. Doherty, a graduate of the University of Georgia, received his Bachelor of Arts in English from the College of Arts and Sciences in 1971 and a Master of Landscape Architecture from the School of Environmental Design in 1983.

## Dr. Steven P. French

Steven French, an urban planner, completed his PhD at the University of North Carolina at Chapel Hill in 1980. He is also a member of the American Institute of Certified Planners, Urban and Regional Information Systems Association and Earthquake Engineering Research Institute. Dr. French, is the director of the City Planning Program at the Georgia Institute of Technology in Atlanta. His teaching, research and consulting activities are primarily in the areas of computer applications in city and regional planning and in analysis of the risk posed to urban development by earthquakes and other natural hazards.

Dr. French has had a long involvement in teaching and research on the application of database management techniques and geographic information systems to urban systems. He has prepared several parcel level land use databases for local communities on the central coast of California. As a consultant to the county of San Luis Obispo he recently conducted a user needs assessment to determine the feasibility and requirements of an automated mapping system to serve the planning, engineering and assessor departments. His primary teaching areas are in computer applications in city and regional planning, including quantitative methods, database management and geographic information systems. Dr. French has participated in a number of National Science Foundation (NSF) projects dealing with flood and earthquake hazards. With colleagues at Stanford University he currently is developing an expert system for conducting building inventories based on secondary data sources. He recently developed a risk analysis method that uses GIS to model damage to urban infrastructure as a part of a National Science Foundation research project. He has also had NSF support to analyze damage to urban infrastructure caused by the Whittier Narrows and Loma Prieta earthquakes. As a part of a previous NSF project, he demonstrated the application of a raster-based geographic information system to earthquake damage modeling for land use planning. This work entailed the development of a structural inventory in a case study community and damage modeling based on structure type, ground motion and site conditions over a large area. An earlier NSF project supported Dr. French's dissertation and a subsequent book on flood plain land use management.

Prior to his doctoral work at North Carolina, Dr. French was a professional planner in Colorado in both public and private practice. He served as the land use administrator for Garfield County, Colorado, and worked in two civil engineering firms involved with land use and oil shale development. He was a major contributor to the 1975 report "Evaluation of Selected

Community Needs," which detailed the infrastructure and fiscal capabilities of fifteen communities in Western Colorado subject to energy related growth.

## Laura Galloway

Laura Galloway is a GIS Analyst, with Photo Science, Inc., with 2 years of professional experience in Geographic Information Systems (GIS). Her experience is centered in the utility sector through use of ArcView 3.2-8.3 and GE Smallworld software. Ms. Galloway specializes in cartography, database development, public involvement, spatial analysis, and many other relevant geoprocessing activities. She has worked on several route selection projects where she provided GIS support to all team members including environmental, engineering, land acquisition, and external affairs. She is familiar with the process of acquiring GIS data and coordinating databases from various sources into a common system. She has much experience creating statistical reports, which are used to evaluate route alternatives. She has participated in open houses and worked directly with the public to locate their property in relation to the proposed project. Ms. Galloway specializes in desktop GIS applications. She is proficient in GIS applications, which utilize ArcView and Spatial Analyst. Her image processing experience includes using ERDAS Imagine to analyze and classify satellite imagery. Several field mapping projects have afforded her knowledge of geographic data collection techniques and strategies utilizing Trimble GPS field equipment. She has had formal introduction and basic training in Java, C++, and Visual Basic programming languages and she exercises basic knowledge of ArcSDE/Oracle geodatabase solutions as applied in an enterprise GIS environment. Her knowledge and mastery of cartographic principles has been cultivated in both academic and professional settings, encompassing a host of topical interests and applied in a variety of production mediums.

## Jesse Glasgow

Mr. Glasgow is a project manager, consultant, and operations manager, with Photo Science, Inc., specializing in corridor selection for new linear facilities such as electric transmission lines, water transmission lines, gas pipelines, and roads. He has over seven years experience routing electric transmission lines using GIS and ten years experience providing geospatial solutions. He was a team leader on the Electric Power Research Institute's research project to develop a national standard electric transmission line siting methodology. He lead the development of *Corridor Analyst*™ GIS software, which is used to automate the corridor analysis methodology. Mr. Glasgow is skilled in the use of ArcView including Spatial Analyst, 3D Analyst, Network Analyst, and custom extensions. He has experience creating, editing, and analyzing spatial data using ArcInfo. His image processing experience includes using ERDAS Imagine to analyze and classify satellite imagery. Other GIS software he has used includes IDRISI and GeoMedia. He also has extensive experience using Trimble and Topcon GPS field equipment and processing software. He has been trained in programming languages including Visual Basic and C++. Mr. Glasgow has managed the successful implementation of ArcIMS Internet applications as well as ArcSDE/Oracle geodatabase solutions.

Mr. Glasgow implemented an enterprise geographic information system for an electric transmission company, which facilitates interdepartmental access to multiple forms of

information throughout all phases of the corporate workflow including facility planning, public involvement, facility siting, facility maintenance, and land management. This system is the basis for all siting and routing activities within this company. He also has worked on projects for government agencies including the Northwest Alabama Council of Local Governments; the cities of Florence, Tuscumbia, Haleyville, Russellville, Red Bay, and Hamilton, Alabama; Winston County, Alabama 911; West Lauderdale County, Alabama Water Authority; Florence, Alabama Police Department; and the University of North Alabama.

Glasgow also manages GIS software development projects and coordinates survey activities. Prior to joining Photo Science, he was a planner at the Northwest Alabama Council of Local Governments. In this position he worked on several local government initiatives. He also participated in transportation planning for the Metropolitan Planning Organization. Jesse holds a Bachelor of Science in Professional Geography from the University of North Alabama, with a Certificate in GIS. He is a registered professional GIS Surveyor in South Carolina.

## John W. Goodrich-Mahoney

John Goodrich-Mahoney is a technical leader and program manager with the Electric Power Research Institute and project manager for the EPRI-GTC Overhead Electric Transmission Line Siting Methodology. He manages the Mercury, Metals and Organics in Aquatic Environments and the Rights-of-Way Environmental Issues in Siting, Development and Management research programs within the Water and Waste Management Business Area. He develops, with input from staff and members, the research portfolios for these two research programs and manages research budgets. Research subjects include: water quality criteria (e.g., mercury and selenium); development of site-specific criteria; bioaccumulation of metals; integrated risk assessments; vegetation management (e.g., use of herbicides); endangered species; bank and trade; avian interaction; and remote sensing. For seven years, he served as a project manager in the Land and Water Quality Studies Program, where he was responsible for research projects for assessing the effects on ground-water quality from the land disposal and land application of utility solid wastes. He developed and continues to manage an innovative research program on the use of constructed wetlands and other passive technologies for the treatment of wastewater. The program includes a plant genetic research component to improve plants for phytoremediation. John earned a Bachelors of Science in Geology from St. Lawrence University, Canton, N.Y., and a Master of Science in Geochemistry from Brown University, Providence, R.I.

## Christy Johnson

Christy Johnson is an environmental and regulatory compliance coordinator for Georgia Transmission Corporation and project manager for the EPRI-GTC Overhead Electric Transmission Line Siting Methodology study. Ms. Johnson has served as a coordinator in GTC's Electric System Maintenance since 1996. Christy is responsible for environmental compliance at electric facilities in GTC's transmission and distribution system. She monitors construction sites for compliance with federal and state environmental regulations, providing designs and implementation plans for remedial site stabilization projects. Christy provides technical assistance to internal planning, legal and maintenance staffs and has been called upon to provide expert testimony to state environmental regulatory agencies. Her previous work with

Soil Systems Incorporated involved archaeological investigations of historic and prehistoric sites. Christy was responsible for the coordination of several cultural resource surveys and mitigation projects in Maryland, South Carolina and Delaware. Christy holds a Bachelor of Arts in Anthropology and a Master of Landscape Architecture from the University of Georgia in Athens.

## Dr. Elizabeth A. Kramer

Dr. Liz Kramer received her B.S. in Forest Resources from Michigan State University, her Masters in Forest Science from the Yale School of Forestry and Environmental Studies, and her PhD in Ecology from the University of Georgia. She currently is a public service assistant and the director of the Natural Resource Spatial Analysis Laboratory (NARSAL) at the Institute of Ecology, College of Environment and Design. The mission of NARSAL is to conduct research, training and public service and outreach in the application of geospatial technology to natural resource management and planning. A primary goal is to conduct work in an interdisciplinary fashion to bring ecological science to the environmental policy arena.

Some projects that the laboratory is involved with include: GIS and remote sensing analysis for a multi-disciplinary study of stream structure and function in the Chattahoochee watershed; the integration of landscape, geomorphic and biological indicators for understanding water quality in Piedmont streams in the Etowah Watershed; Georgia GAP and the SE Regional GAP, a biodiversity mapping program; the development of a GIS enabled Greenspace Planning tool; Georgia Land Use Trends Project (GLUT), an analysis of 25 years of land use change for the State of Georgia; the development of a Regional Greenspace Plan with local governments in the Upper Etowah River Watershed; and the development of a multi-species aquatic Habitat Conservation Plan for the Upper Etowah Watershed.

## Steven Richardson

Steven Richardson's practice focuses on representing companies, Tribes and individuals on land and water issues before the U.S. Departments of the Interior, Agriculture and Energy; other federal agencies; the U.S. Congress; and state and federal courts. He specializes in providing strategic, legal and legislative counseling for clients seeking project approvals for the use and occupation of federal, state, Tribal and private lands. Mr. Richardson has three decades of public and private experience in using sound science, innovative strategies and cutting-edge technology to design, develop and expedite the approvals that get projects built on time and at lower cost, using state of the art environmental documentation techniques and innovative project management solutions.

Prior to joining Van Ness Feldman, Mr. Richardson served for five years as the chief of staff for the Bureau of Reclamation, where he oversaw the daily operation of the largest wholesaler of water in the country, serving more than 31 million people and providing water for farmland that produces sixty percent of the nation's vegetables and twenty-five percent of its fruits and nuts, and producer of more than 40 billion kilowatt hours of electricity each year. During his tenure at the Department of the Interior, Mr. Richardson served for seven years as a principal policy advisor to Secretary of the Interior Bruce Babbitt. In that role, he directed the environmental

compliance, habitat conservation planning and mitigation activities for two federal agencies in daily contact and consultation with the U.S. Fish and Wildlife Service.

Mr. Richardson also served as the deputy director of the Bureau of Land Management and was responsible for the management and use of 264 million acres of land, about one-eighth of the land of the United States. Additional positions held by Mr. Richardson include: professional staff member and counsel to Congressman Mike Synar (D-OK), Chairman of the Environment, Energy and Natural Resources Subcommittee of the Government Operations Committee; senior counsel for The Wilderness Society; staff director and chief counsel to the House Oversight and Investigations Subcommittee of the Interior and Insular Affairs Committee (now the Resources Committee); and legislative counsel to Representative Edward Markey (D-MA). In addition, Mr. Richardson served as counsel on the U.S. Senate Judiciary Subcommittee on the Constitution, which was chaired by then-Senator Birch E. Bayh, Jr. (D-IN). Mr. Richardson is admitted to practice in the District of Columbia and the State of Indiana.

## Chris Smith

Mr. Smith is a Senior GIS Analyst with Photo Science, Inc. He has more than seven years experience in Geographic Information Systems and Cartography. He was the technical lead on a Electric Power Research Institute's research project to develop a national standard electric transmission line siting methodology using GIS. He has experience with ARC/INFO software, ArcView software, ArcIMS software, ArcSDE and Trimble GPS equipment and software. His experience with GIS includes cartographic design (including publishing a map in ESRI's annual ESRI map book), database design and development and creating, maintaining, and editing spatial data. He has performed geographic analysis on a wide variety of projects using GIS and other methods as tools. He also has experience with developing and designing geographic related web sites, as well as developing GIS custom applications. Mr. Smith has worked on siting linear facilities for almost seven years while at Photo Science, Inc. Previously, he worked with the Montgomery Water Works and Sanitary Sewer Board in Montgomery, Ala., as a GIS co-op through the University of North Alabama. He also worked for the International Fertilizer Development Center as a GIS intern. Chris holds a Bachelor of Science in Professional Geography from the University of North Alabama, with a Certificate in GIS.

## Dr. Paul D. Zwick

Dr. Paul D. Zwick holds a Doctor of Philosophy in Environmental Engineering Science and a Master of Arts in Urban and Regional Planning. He is an associate professor and chair of the Urban and Regional Planning Department at the University of Florida. Dr. Zwick is also the director of the Geo-Facilities Planning and Information Research Center (GeoPlan), which was established in 1984 in the Department of Urban and Regional Planning at the University of Florida's College of Design, Construction and Planning. The center was developed in response to the need for a teaching and research environment in Geographic Information Systems (GIS). His research emphasis has been directed at the design, development and analysis of paradigms used for computer applications in urban and environmental planning, and engineering. Specifically, Dr. Zwick's research efforts have been directed at the analysis and design of dynamic models and the use of spatial analysis systems, commonly referred to as geographic

information systems. For the past four years, he has been the principal investigator for the development of an environmental geographic information system for the Florida Department of Transportation and for the Florida Geographic Data Library (FGDL). The FGDL is a data library for the dissemination of GIS data to the citizens of Florida, including middle schools and high schools, libraries, planning agencies, private corporations and businesses, and citizens. Dr. Zwick recently completed a five year project, as co-principal investigator, with a team of multidisciplinary researchers to identify and locate statewide greenway corridors and recreational trails. Dr. Zwick is continuing his greenways work as co-principal investigator for a grant with the U.S. Environmental Protection Agency (EPA), locating greenway opportunities in the Southeastern United States. This work has been in progress for the past two years and is expected to become an ongoing funded project with the EPA.

# B
# LIST OF INVITEES

| | |
|---|---|
| American Electric Power | Jeff Momme |
| Big Rivers Electric Corp. | Travis Housely |
| Bluegrass Tomorrow | Steve Austin |
| Bluegrass Trust for Historic Preservation | Tracee De Hahn |
| Cinergy Corp | Stephen Lane |
| City of Ashland | William Fisher |
| City of Bowling Green | Kevin DeFebbo |
| City of Florence | Patricia J. Wingo |
| City of Lexington | Teresa Isaac |
| City of Louisville | Jerry E. Abramson |
| City of Owensboro | Bob Whitmer |
| City of Paducah | James Zumwalt |
| City of Pikeville | Donovan Blackburn |
| City of Somerset | J.P. Wiles |
| Columbia Gas Transmission | Reed Robinson |
| Community Action Council | Kip Bowmar |
| CSX Corp | Mark Friedlin |
| Fayette County Neighborhood Council | Barbara Graves |
| Frost, Brown & Todd | |
| Home Builders Association of Kentucky | Robert M. Weiss |
| Kentuckians for the Commonwealth | Burt Lauderdale |
| Kentucky Arborists Association | Dino Kent |
| Kentucky Association of Counties | Tony Wilder |
| Kentucky Association of Realtors | Cinda Hatfield |
| Kentucky Attorney Generals Office | Dennis Howard |
| Kentucky Cabinet for Economic Development | Gene Fuqua |
| Kentucky Cattleman's Association | Dave Maples |
| Kentucky Chamber of Commerce | Dave Adkisson |
| Kentucky Chapter of the American Planning Association | Kristen Dunaway |
| Kentucky Chapter of the Nature Conservancy | Jim Aldrich |
| Kentucky Chapter of the Sierra Club | Ray Berry |
| Kentucky Coal Association | Bill Caylor |

| | |
|---|---|
| Kentucky Dairy Development Council | Eunice Schlappi |
| Kentucky Department of Fish and Game | Brian Smith |
| Kentucky Division of Conservation | Stephen A. Coleman |
| Kentucky Division of Forestry | Leah W. MacSwords |
| Kentucky Division of Water | Ali Daneshmand |
| Kentucky Environmental and Public Protection Cabinet | LaJuana Wilcher |
| Kentucky Farm Bureau | David S. Beck |
| Kentucky Geological Survey | Jim Cobb |
| Kentucky Heartwood | |
| Kentucky Heritage Council | David Morgan |
| Kentucky Industrial Users Coalition | Mike Kurtz |
| Kentucky Institute for the Environment and Sustainable Development (U of L) | John I. Gilderbloom, Ph.D. |
| Kentucky League of Cities | Sylvia Lovely |
| Kentucky Nursery and Landscape Association | Larry Sanders |
| Kentucky Nut Growers Association | Hugh Ligon |
| Kentucky Office of Energy Policy | Andrew McNeill |
| Kentucky Public Service Commission | Elizabeth O'Donnell |
| Kentucky Resources Council | Tom Fitzgerald |
| Kentucky State Nature Preserves Commission | Don Dott |
| Kentucky Thoroughbred Association/Owners and Breeders | David Switzer/Dan Metzger |
| Kentucky Thoroughbred Farm Managers Club | Ken Wilkins |
| Kentucky Transportation Cabinet | Bill Nighbert |
| Kentucky Turfgrass Council | David Williams |
| Office of State Archaeology | George Crothers |
| Preservation Kentucky | Joanna Hinton |
| U.S. Army Corps of Engineers | Jane Archer |
| U.S. Department of Defense | David A. McCormick, Esq. |
| U.S. EPA Region 4 | J. I. Palmer, Jr. |
| U.S. Fish and Wildlife Service | Lee Andrews |
| U.S. Forrest Service | Kathleen Atkinson |
| UK Cooperative Extension Service | Larry Turner |
| University of Kentucky College of Agriculture Cooperative Extension Service | Lori Garkovich |
| USDA/Rural Utilities Service, Engineering and Environmental Staff | Stephanie Strength |

# C
# LETTER OF INVITATION



February 9, 2006

[ATTENTION]
[TITLE]
[ORGANIZATION]
[PREADDRESS]
[ADDRESS]
[CITY, ST, ZIP]

Dear [ATTENTION],

In recent years, the routing of electric transmission lines has come under increasing scrutiny. Parties representing many interests—some in conflict—have sought input into the routing process. These include affected property owners, community groups, advocacy organizations, federal, state and local government agencies and policy makers, as well as the electric utilities themselves and their customers.

For builders of new transmission facilities, the challenge is to balance these interests using an objective, comprehensive and consistent process and to use this process to determine the most suitable route.

In 2003, Georgia Transmission Corporation (GTC) and the Electrical Power Research Institute (EPRI) developed a methodology to meet that goal. This methodology now is being used by at least three Kentucky electric utilities—East Kentucky Power Cooperative (EKPC) and ), Louisville Gas and Electric Company (LG&E) and Kentucky Utilities (KU)—to site significant transmission line projects.

Scoring within the GTC/EPRI methodology is based on information collected from representatives of the various interests like those mentioned above in order to determine the comparative importance of features that impact siting/routing decisions. When the model was developed in Georgia, this information was collected during a Siting Methodology Tailored Collaboration Workshop.

EKPC, LG&E, KU and EPRI invite you (or your representative) to participate in a similar agency workshop to discuss and determine the comparative importance of the data used in Kentucky to select the alternative transmission line corridors that ultimately result in the selection of the preferred transmission line route.

WHEN: Tuesday, Feb. 28, 2006, 8 a.m. to 5 p.m.
WHERE: MARRIOTT GRIFFIN GATE, 1800 NEWTOWN PIKE, LEXINGTON, KY.

In a recent order regarding a major transmission line project that was routed using the GTC/EPRI methodology, the Kentucky Public Service Commission wrote: "... (T)he Commission encourages the utilities and other stakeholders to refine the model and work to develop a more Kentucky-specific model through a collaborative process." (Oct. 31, 2005 PSC Order granting the application of East Kentucky Power Cooperative for a Certificate of Public Convenience and Necessity to construct a 161-kV transmission line in Barren, Warren, Butler and Ohio Counties, Kentucky, PSC Case #2005-00207)

EKPC, LG&E and KU believe developing a standardized comprehensive routing tool that utilities may consider when routing major electric transmission lines is extremely important and your participation is critical to its success. Please reserve your place in this important workshop by calling Nick Comer at 859-745-9450. Please respond by Feb. 14, 2006.

Sincerely,

Mary Jane Warner, P.E.
Manager Power Delivery Expansion
East Kentucky Power Cooperative, Inc.

Mark Johnson, P.E.
Director—Transmission
E.ON U.S.

# D
# LIST OF ATTENDEES

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**BUILT PERSPECTIVE**

| | |
|---|---|
| E.ON U.S. | Jeff Kuriger |
| Fayette County Neighborhood Council | Barbra Graves |
| Kentucky Cabinet for Economic Development | J. R. Wilhite |
| Kentucky Farm Bureau | Ed McQueen |
| Kentucky Heritage Council | Janie Rice-Brother |
| Kentucky League of Cities | Bill Hamilton |
| Kentucky Nursery and Landscape Association | Debbie A. Barnes |
| Office of State Archaeology | George Crothers |
| Preservation Kentucky | Bob Griffith |

**ENGINEERING PERSPECTIVE**

| | |
|---|---|
| American Electric Power | Jeff Momme |
| Big Rivers Electric Corp. | Glen Thweatt |
| Cinergy Corp. | Stephen Reising |
| Columbia Gas Transmission | Tony Tipton |
| E.ON U.S. | Nate Mullins |
| East Kentucky Power Cooperative | William Ballard |
| Kentucky Geological Survey | John Kiefer |
| Kentucky Transportation Cabinet | Greg Smith |
| U.S. Department of Defense | Gail Pollock |

**NATURAL PERSPECTIVE**

| | |
|---|---|
| E.ON U.S. | Mike Winkler |
| Kentucky Chapter of the Sierra Club | Hank Graddy |
| Kentucky Department of Fish and Game | Doug Dawson |
| Kentucky Division of Conservation | |
| Kentucky Division of Water | Marilyn Thomas |
| Kentucky Heartwood | Paul Lovelace |
| Kentucky Resources Council/Kentuckians for the Commonwealth | Doug Doerrfeld (represented both organizations) |
| Kentucky State Nature Preserves Commission | Debbie White |
| Kentucky State Nature Preserves Commission | Shauna Dunham |
| U.S. Fish and Wildlife Service | Mike Armstrong |
| U.S. Forrest Service | George Bane |

**OBSERVERS**

| | |
|---|---|
| American Electric Power | Carl Persing |
| Cinergy Corp. | John Finnegan |
| Cinergy Corp. | Stephen Lane |
| City of Lexington | Julian Beard |
| City of Somerset | Bill Lowery |
| Columbia Gas Transmission | Gary Sullivan |
| E.ON U.S. | Beth Cocanougher |
| E.ON U.S. | Bob Watt |
| E.ON U.S. | Laura Douglas |
| E.ON U.S. | Mark Johnson |
| East Kentucky Power Cooperative | Brandon Grillon |
| East Kentucky Power Cooperative | Garry Harvey |
| East Kentucky Power Cooperative | H. K. Cunningham |
| East Kentucky Power Cooperative | Hank List |
| East Kentucky Power Cooperative | Jeff Hohman |
| East Kentucky Power Cooperative | Mary Jane Warner |
| East Kentucky Power Cooperative | Nick Comer |
| East Kentucky Power Cooperative | Ronnie Terrill |
| East Kentucky Power Cooperative | Sherman Goodmaster |
| East Kentucky Power Cooperative | Thad Mumm |
| East Kentucky Power Cooperative | Tim Hagerty |
| Kentucky Attorney Generals Office | Elizabeth E. Blackford |
| Kentucky Attorney Generals Office | Larry Cook |
| Kentucky Heartwood | Nick Neises |
| Kentucky Public Service Commission | A. W. Turner |
| Kentucky Public Service Commission | James Welch |
| Kentucky Public Service Commission | Jeff Johnson |
| Kentucky Public Service Commission | John Rogness |
| Kentucky Public Service Commission | Ruth Rowles |
| U.S. Department of Defense | Jerry Brackett |
| U.S. Department of Defense | Pete Hill |

# E
# KENTUCKY ELECTRIC TRANSMISSION LINE SITING STAKEHOLDER WORKSHOP AGENDA

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February 28, 2006, Marriot Griffin Gate, Lexington, KY

8:00 A.M. Registration (continental breakfast)

General Session

8:30 A.M. Welcome and Opening Remarks
Mary Jane Warner, East Kentucky Power Cooperative and
Mark Johnson, E.ON U.S.

8:40 A.M. Electric Power Research Institute Overview
John Goodrich-Mahoney, EPRI

8:45 A.M. Introductions of Workshop Facilitators
Mike Ritchie, Photo Science, Inc.

8:55 A.M. GTC-EPRI Siting Methodology Overview
Christy Johnson, Georgia Transmission Corporation
Dr. Steve French, Georgia Tech
Dr. Joe Berry, University of Denver

10:00 A.M. Overview of the Siting Perspectives
Built Environment: Dr. Steve French, Georgia Tech
Natural Environment: Dr. Liz Kramer, University of Georgia
Engineering/Co-location: Dr. Paul Zwick, University of Florida

10:25 A.M. Overview of Breakout Sessions
Steve Richardson, Van Ness Feldman

10:35 A.M. Break

Breakout Sessions

10:50 A.M. Review Siting Criteria

12:00 P.M. Lunch (served in breakout rooms)

12:45 P.M. Calibrate Criteria

2:15 P.M. Break

2:30 P.M. Weight Layers

General Session

4:00 P.M. Overview of Workshop Preliminary Results
Built Environment: Dr. Steve French, Georgia Tech
Natural Environment: Dr. Liz Kramer, University of Georgia
Engineering/Co-location: Dr. Paul Zwick, University of Florida

4:45 P.M. Participant Survey/Wrap Up
Steve Richardson, Van Ness Feldman

# F
# WORKSHOP PRESENTATIONS

These slides were used as visual aides by the presenters at the workshop. Many of these slides were animated and the full effect may not be realized by viewing them in hardcopy form. These slides do not stand alone, but are complementary of a verbal presentation. Much of the language, in these slides, is hypothetical and conceptual and is meant to illustrate a concept rather than imply preferences.

# The Kentucky Stakeholder Workshop

**for**

# Siting Electric Transmission Lines

**Sponsored by:**

EAST KENTUCKY POWER COOPERATIVE
A Touchstone Energy Cooperative

e·on U.S.

## Consulting Team

- Jesse Glasgow.....
- Chris Smith.....
- Laura Galloway.....
- Ryan Bowe.....

PHOTO SCIENCE Geospatial Solutions

- Dr. Steve French..... Georgia Tech
- Dr. Joe Berry..... University of Denver
- Dr. Liz Kramer..... The University of Georgia
- Dr. Paul Zwick..... University of Florida
- Steve Richardson..... VanNess Feldman
- Clay Doherty..... Linear Projects, Inc.
- Christy Johnson..... GeorgiaTransmission

# Workshop Agenda

**General Session**

**8:30 A.M.** **Welcome and Opening Remarks**
Mary Jane Warner, East Kentucky Power Cooperative and
Mark Johnson, E.ON US

**8:40 A.M.** **Electric Power Research Institute Overview**
John Goodrich-Mahoney, EPRI

**8:45 A.M.** **Introductions of Workshop Facilitators**
Mike Ritchie, Photo Science, Inc.

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Christy Johnson, Georgia Transmission Corporation
Dr. Steve French, Georgia Tech
Dr. Joe Berry, University of Denver

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Built Environment: Dr. Steve French, Georgia Tech
Natural Environment: Dr. Liz Kramer, University of Georgia
Engineering / Co-location: Dr. Paul Zwick, University of Florida

**10:25 A.M.** **Overview of Breakout Sessions**
Steve Richardson, Van Ness Feldman

**10:35 A.M.** **Break**

# Workshop Agenda

**Breakout Sessions**

**10:50 A.M.** **Review Siting Criteria**
**12:00 P.M.** **Lunch (served in breakout rooms)**
**12:45 P.M.** **Calibrate Criteria**
**2:15 P.M.** **Break**
**2:30 P.M.** **Weight Layers**

**General Session**

**4:00 P.M.** **Overview of Workshop Preliminary Results**
Built Environment: Dr. Steve French, Georgia Tech
Natural Environment: Dr. Liz Kramer, University of Georgia
Engineering / Co-location: Dr. Paul Zwick, University of Florida

**4:45 P.M.** **Participant Survey / Wrap Up**
Steve Richardson, Van Ness Feldman

**The GTC–EPRI Standardized Methodology**

**for**

# Siting Electric Transmission Lines

Presented by Christy Johnson and Steve French

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## Georgia Transmission Corporation

- Non-profit cooperative headquartered in Tucker, GA
- Provide electric transmission services for 39 Electric Membership Cooperatives in Georgia (4 million people)
- Own/operate 2,600 miles of transmission lines
- Own/operate 580 substations
- Access more than 16,000 miles of transmission line through ITS
- $1 billion in total assets

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## Goal

**To develop transmission line siting techniques and procedures that are:**

- **Objective**
- **Quantitative**
- **Predictable**
- **Consistent**
- **Defensible**

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## History

- **1999: GTC Started using GIS to Site Facilities**
- **2003-2004: GTC EPRI TC Project**
  - **External Stakeholder Workshop**
  - **Georgia Electric Utility Stakeholder Workshop**
  - **Stakeholder Update Workshop**
  - **National Electric Utility Workshop**
  - **External Stakeholder Workshop**
  - **Project Report**
- **2004: GTC Started using new siting methodology**
  **(27 projects, 244 miles)**
- **2005: Utilities in Kentucky started using methodology**

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## Transmission Line Project Phases

- Electric System Planning (need justification)
- Transmission Line Siting
  - Macro Corridor Identification
  - Alternative Corridor Generation
  - Development of Alternative Routes within Alternative Corridors
  - Alternative Route Analysis
  - Selection of the Preferred Route
- Survey/Land Acquisition
- Compliance/Permitting
- Design
- Construction

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## Transmission Line Siting Tasks

- Macro Corridor Identification
- Alternative Corridor Generation
- Development of Alternative Routes
- Alternative Route Analysis
- Selection of the Preferred Route
- Project Documentation

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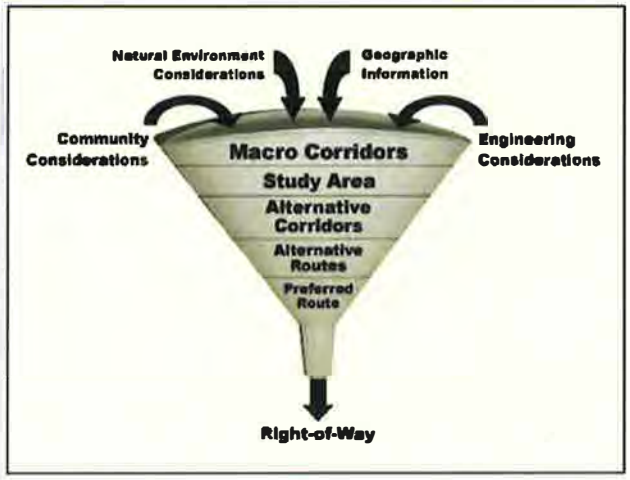
# Corridor Analysis Funnel

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# Macro Corridor Identification

- **Using Geographic Information Systems (GIS), a high level analysis of the project area is performed to identify Macro Corridors.**
- **Macro Corridors are generated using land use/land cover data from 30 meter satellite imagery and existing statewide GIS datasets.**
- **Macro Corridors are areas that minimize impact to communities and the environment while maximizing co-location with roads and existing transmission lines. These corridors are used to define the outer boundaries of the project study area.**

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## Macro Corridor Data

| LAND COVER CLASSIFICATION | CROSS COUNTRY | CO-LOCATION WITH ROADS | CO-LOCATION WITH T/Ls |
|---|---|---|---|
| Open Water | 7 | 7 | 7 |
| Secondary Roads | 5 | 1 | 5 |
| Other Utility Corridors | 5 | 5 | 5 |
| Urban | 9 | 9 | 9 |
| Open Land | 1 | 2 | 2 |
| Mining | 9 | 9 | 9 |
| Forest | 1 | 2 | 2 |
| Agriculture | 1 | 2 | 2 |
| Wetland | 5 | 9 | 9 |
| Transmission Corridors | 5 | 5 | 1 |
| Primary Roads | 5 | 1 | 5 |
| Interstate | 9 | 9 | 9 |
| Slopes > 30 degrees | 9 | 9 | 9 |

| AVOIDANCE FEATURES |
|---|
| Airports |
| Military Facilities |
| NRHP Listed Historic Structures |
| NRHP Listed Historic Districts |
| NRHP Listed Archaeology Sites |
| NRHP Listed Archaeology District |
| State and National Park Interiors |
| Non-spannable Water Bodies |
| Wildlife Refuges |
| USFS Wilderness Areas |
| EPA Superfund Sites |
| Mines and Quarries |

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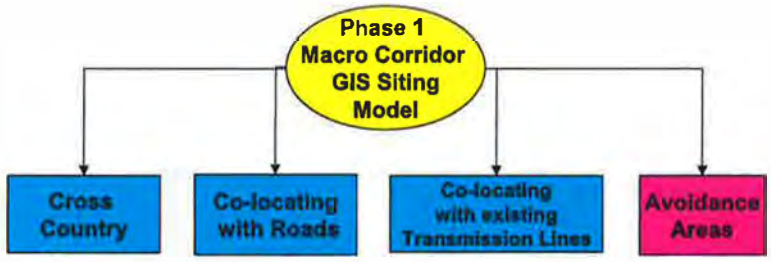
## Macro Corridor Analysis

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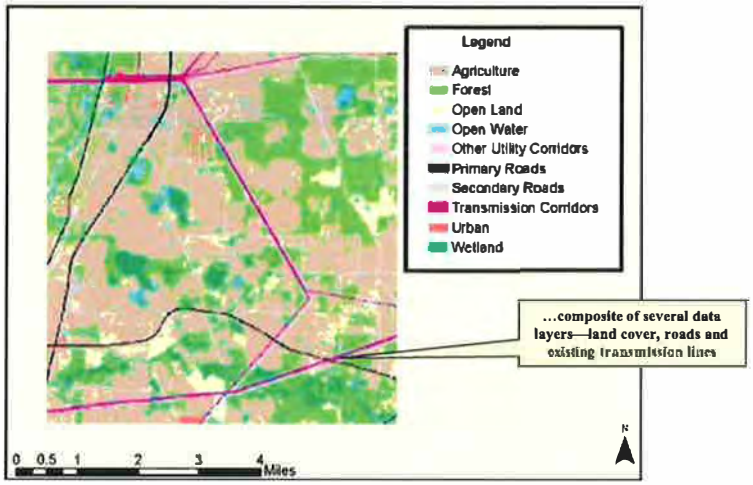
## Macro Corridor GIS Database

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## Study Area for Detailed Data Collection


**Macro Corridors are used to define the project study area for further data collection, which is site-specific, more detailed, and at a higher resolution.**

**By focusing data collection on the Macro Corridors time, money, and effort are saved.**

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## Alternative Corridor Generation

**Alternative Corridors are generated within the study area resulting from the macro corridor analysis.**

**These Alternative Corridors are modeled using criteria that produce a standardized set of alternatives.**

- **Built Environment Perspective**
  - **Minimizes impact to people places and cultural resources**
- **Co-location / Engineering Perspective**
  - **Maximizes co-location and considers physical constraints**
- **Natural Environment Perspective**
  - **Protecting water resources, plants and animals**
- **Simple Average Perspective**
  - **A composite of the Built, Natural and Engineering Perspectives**

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## Calibrating Criteria and Weighting Layers

**Calibrating Criteria:**

- Use Delphi Process
- Rate each category of from 1 (best) to 9 (worst)

**Weighting Layers:**

- Use the Analytical Hierarchy Process
- Pairwise Comparison

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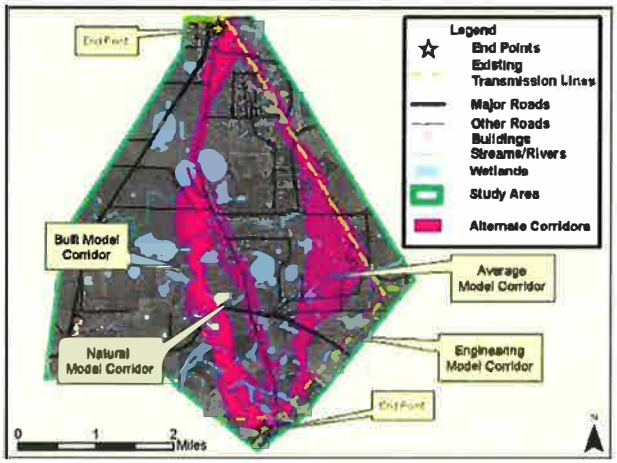
## Alternative Corridor Generation




**The Alternative Corridors are the top 3% of the reasonable routes.**

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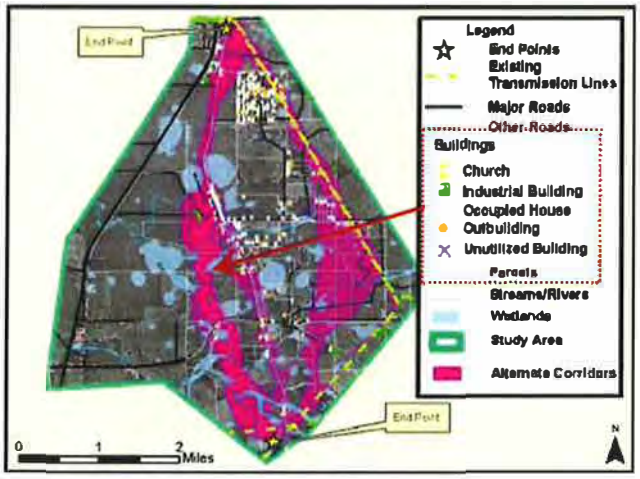
## Alternative Route Development




**Additional detailed data is gathered within the Alternative Corridors.**

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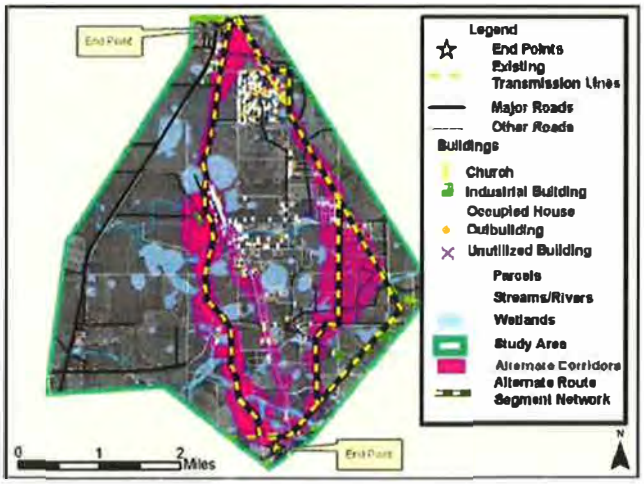
## Alternative Routes Development




**Within the Alternative Corridors, the Siting Team develops Alternative Routes.**

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## Alternative Route Evaluation

- **Evaluate Alternative Routes using data summarizing:**
  - o Built Environment
  - o Natural Environment
  - o Co-location and Engineering
- **Compare Alternative Routes**
- **Select Preferred Route**

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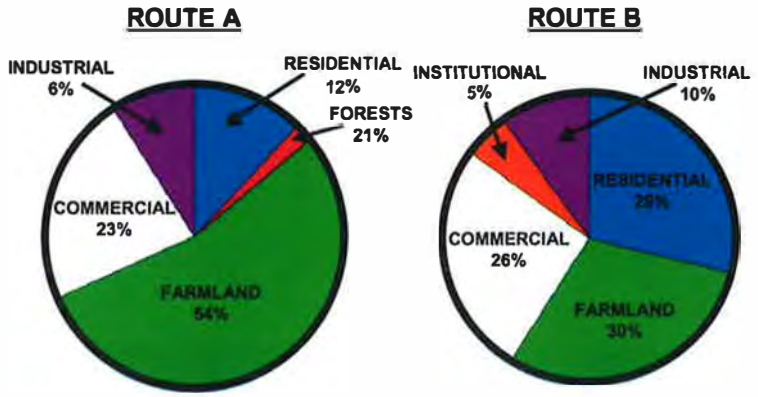
# Alternative Route Analysis

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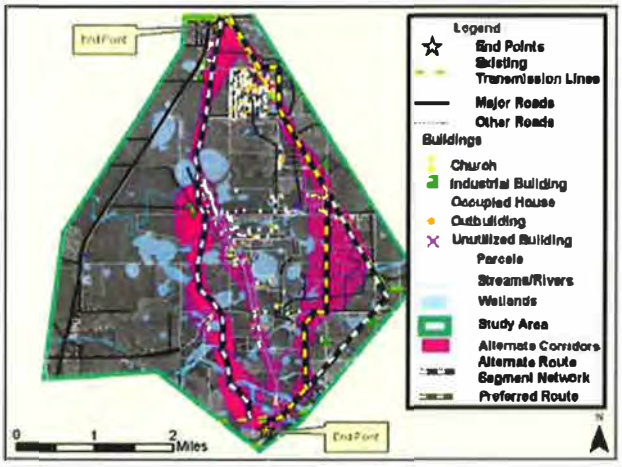
# Preferred Route Selection




**The Preferred Route is the end product of the siting methodology. A reasonable set of potential route segments considering Built, Co-location, Engineering and Natural Perspectives.**

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Additional Detail :
Presented by Dr. Steve French

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## Alternative Corridor Generation

- Macro Corridor Identification
- **Alternative Corridor Generation**
- Development of Alternative Routes within Alternative Corridors
- Alternative Route Analysis
- Selection of the Preferred Route

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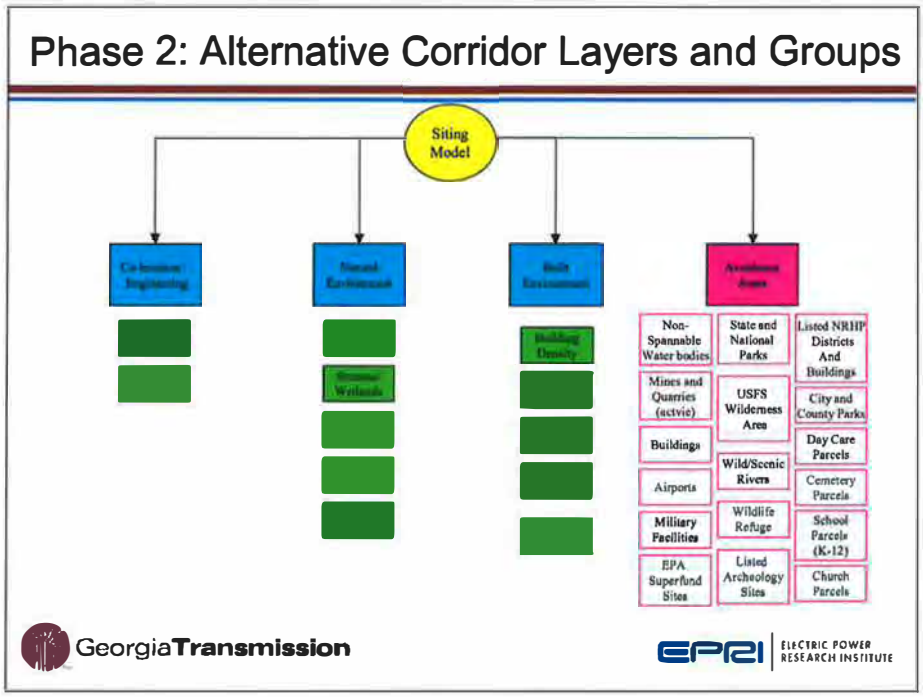
Phase 2: Alternative Corridor Layers and Groups
Siting Model
Non-Spannable Water bodies
Mines and Quarries (actvie)
Buildings
Airports
Military Facilities
EPA Superfund Sites
State and National Parks
USFS Wilderness Area
Wild/Scenic Rivers
Wildlife Refuge
Listed Archeology Sites
Listed NRHP Districts And Buildings
City and County Parks
Day Care Parcels
Cemetery Parcels
School Parcels (K-12)
Church Parcels
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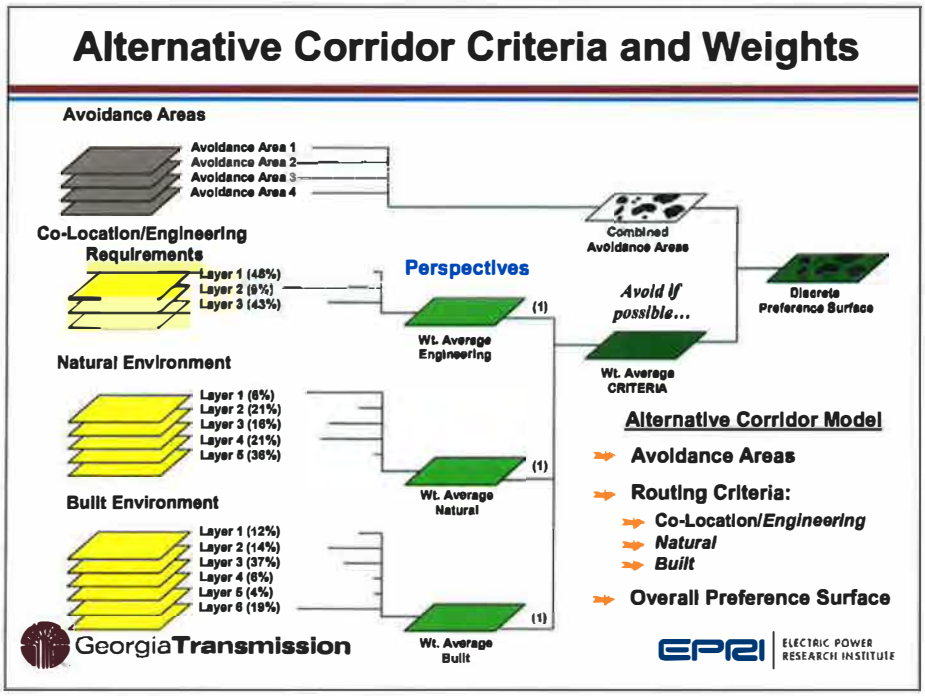
Alternative Corridor Criteria and Weights
Avoidance Areas
Avoidance Area 1
Avoidance Area 2
Avoidance Area 3
Avoidance Area 4
Co-Location/Engineering Requirements
Layer 1 (48%)
Layer 2 (9%)
Layer 3 (43%)
Natural Environment
Layer 1 (6%)
Layer 2 (21%)
Layer 3 (16%)
Layer 4 (21%)
Layer 5 (36%)
Built Environment
Layer 1 (12%)
Layer 2 (14%)
Layer 3 (37%)
Layer 4 (6%)
Layer 5 (4%)
Layer 6 (19%)
Perspectives
(1)
Wt. Average Engineering
(1)
Wt. Average Natural
(1)
Wt. Average Built
Combined Avoidance Areas
Avoid if possible...
Wt. Average CRITERIA
Discrete Preference Surface
Alternative Corridor Model
Avoidance Areas
Routing Criteria:
Co-Location/Engineering
Natural
Built
Overall Preference Surface
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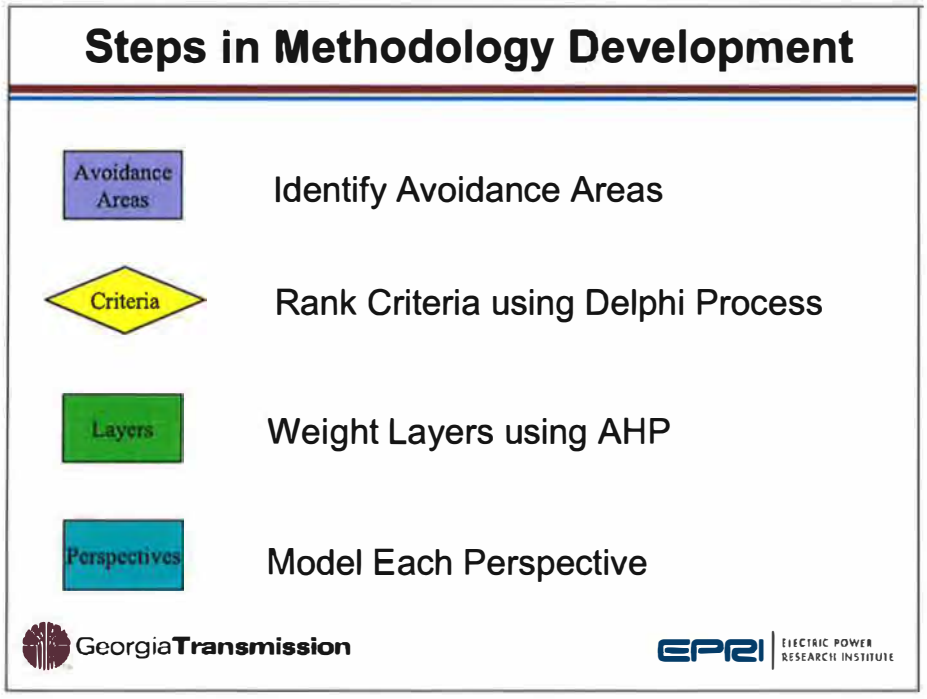
Steps in Methodology Development
Avoidance Areas
Identify Avoidance Areas
Criteria
Rank Criteria using Delphi Process
Layers
Weight Layers using AHP
Perspectives
Model Each Perspective
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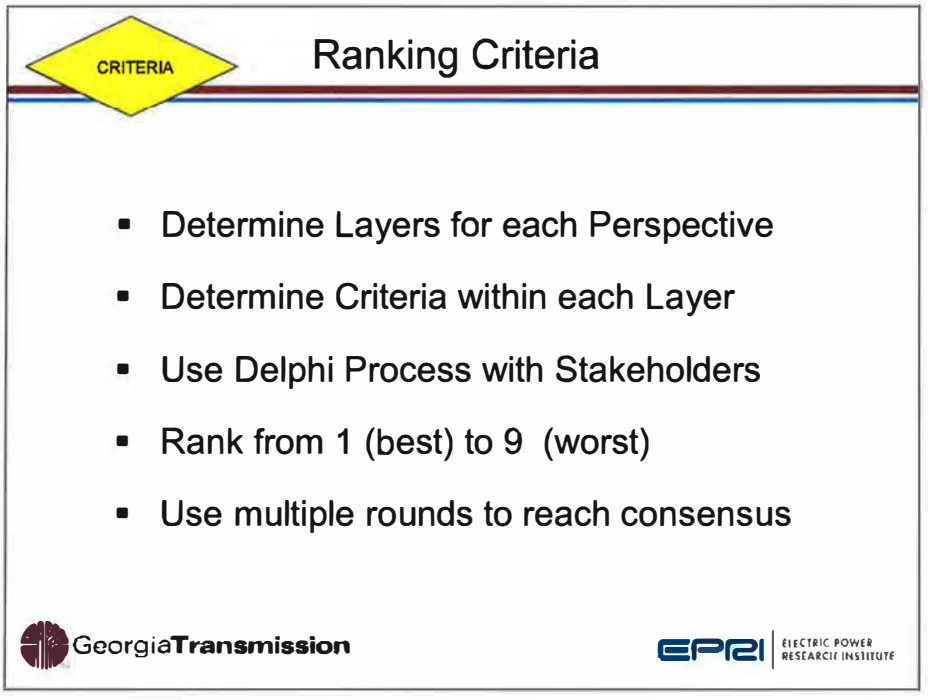
CRITERIA
Ranking Criteria
Determine Layers for each Perspective
Determine Criteria within each Layer
Use Delphi Process with Stakeholders
Rank from 1 (best) to 9 (worst)
Use multiple rounds to reach consensus
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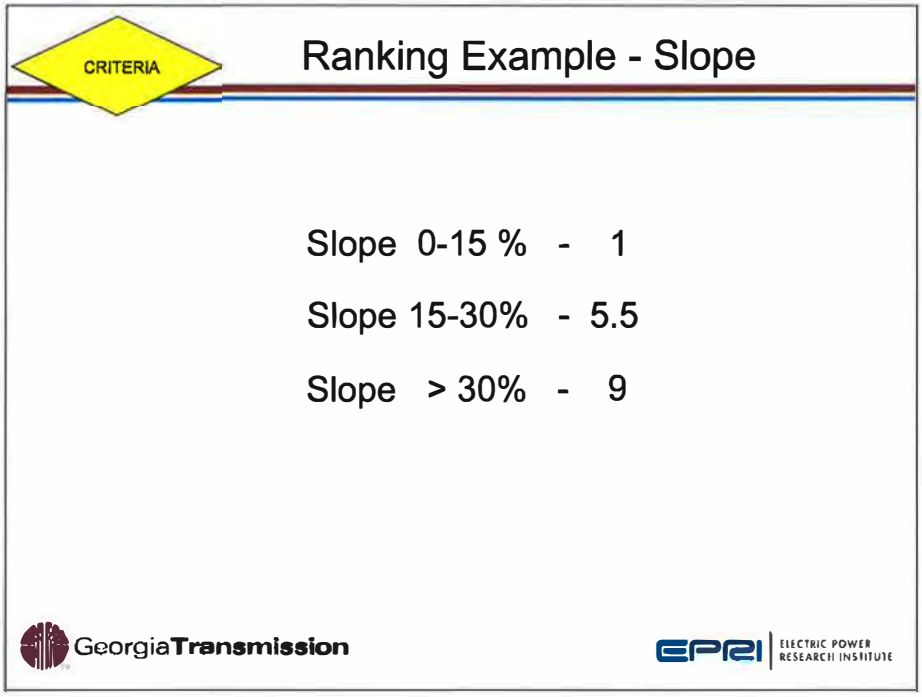
CRITERIA
Ranking Example - Slope
Slope 0-15 % - 1
Slope 15-30% - 5.5
Slope > 30% - 9
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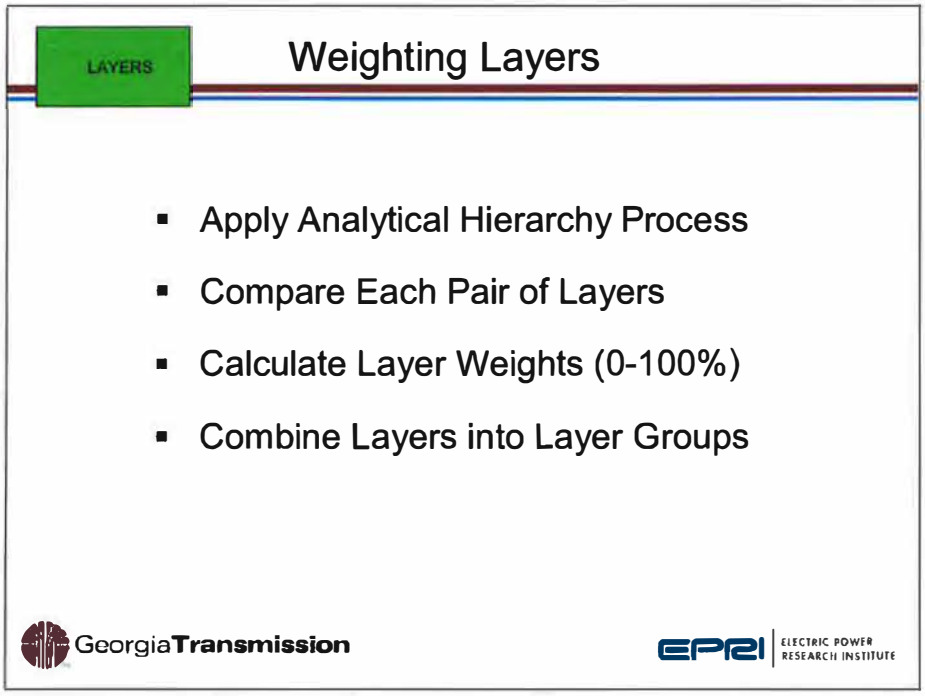
LAYERS
Weighting Layers
Apply Analytical Hierarchy Process
Compare Each Pair of Layers
Calculate Layer Weights (0-100%)
Combine Layers into Layer Groups
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LAYERS

## Analytical Hierarchy Process

### Pairwise Comparisons

Is **Proximity to Buildings** more important than **Building Density**?

Is **Proximity to Buildings** more important than **Proposed Development**?

Is **Proximity to Buildings** more important than **Lakes and Ponds**?

Is **Proximity to Buildings** more important than **Land Use**?

| Verbal Judgement of Preference | Numerical Rating |
|---|---|
| Extremely Preferred | 9 |
| Very strong to extremely | 8 |
| Very strongly preferred | 7 |
| Strongly to very strongly | 6 |
| Strongly preferred | 5 |
| Moderately to strongly | 4 |
| Moderately preferred | 3 |
| Equally to moderately | 2 |
| Equally preferred | 1 |

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## Preliminary Alternative Corridor Model

| Co-location / Engineering | Natural Environment | Built Environment |
|---|---|---|
| **Linear Infrastructure** | **Floodplain** | **Proximity to Buildings** |
| Rebuild Existing Transmission Lines | Background | Background |
| Parallel Existing Transmission Lines | 100 Year Floodplain | 900-1200 |
| Parallel Roads ROW | **Streams/Wetlands** | 600-900 |
| Parallel Gas Pipelines | Background | 300-600 |
| Parallel Railway ROW | Streams + 50' Riparian Buffer | 0-300 |
| Background | Rivers/Streams + 50' Regulatory Buffer | **Building Density** |
| Future DOT Plans | Wetlands + 50' Buffer | 0 - 0.05 Buildings/Acre |
| Parallel Interstate ROW | **Public Lands** | 0.05 - 0.2 Buildings/Acre |
| Road ROW | Background | 0.2 - 1 Buildings/Acre |
| Scenic Highways ROW | WMA - Non-State Owned | 1 - 4 Buildings/Acre |
| **Slope** | Other Conservation Land | > 4 Buildings/Acre |
| Slope 0-15% | USFS | **Proposed Development** |
| Slope 15-30% | WMA - State Owned | Background |
| Slope >30% | **Land Cover** | Proposed Development |
| **AVOIDANCE AREAS** | Agriculture | **Spannable Lakes and Ponds** |
| Non-Spannable Waterbodies | Silviculture (agriculture of trees) | Background |
| Mines and Quarries (Active) | Natural Forests | Spannable Lakes and Ponds |
| Buildings | Developed Land | **Land Use** |
| Airports | **Wildlife Habitat** | Residential |
| Military Facilities | Background | Commercial/Industrial |
| | Species of Concern Habitat | Agriculture (crops & livestock) |
| | **AVOIDANCE AREAS** | Other (forest) |
| | EPA Superfund Sites | **AVOIDANCE AREAS** |
| | State and National Parks | Listed Archaeology Sites |
| | USFS Wilderness Area | Listed NRHP Districts and Buildings |
| | Wild/Scenic Rivers | City and County Parks |
| | Wildlife Refuge | Day Care Parcels |
| | | Cemetery Parcels |
| | | School Parcels (K-12) |
| | | Church Parcels |

# Alternate Corridors

- Built
- Natural
- Co- location / Engineering
- Simple
- All

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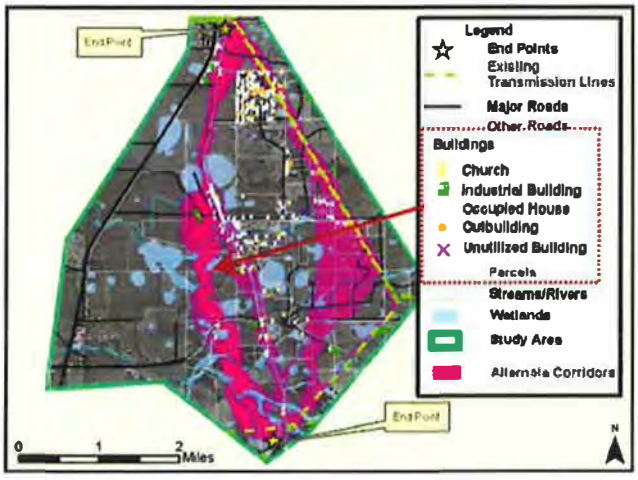
# Additional Data Collection




Additional detailed data is gathered within the Alternative Corridors.

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## Development of Alternative Routes

- Macro Corridor Identification
- Alternative Corridor Generation
- **Development of Alternative Routes within Alternative Corridors**
- Alternative Route Analysis
- Selection of the Preferred Route

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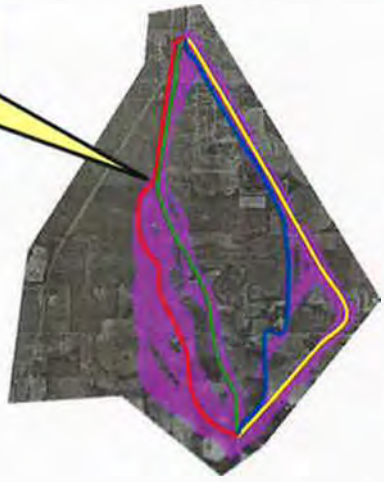
## Developing Alternative Routes

Routes are defined *within the Alternative Corridors* using expert judgment.

- Built
- Natural
- Engineering
- Simple



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## Alternative Route Analysis

- Macro Corridor Identification
- Alternative Corridor Generation
- Development of Alternative Routes within Alternative Corridors
- **Alternative Route Analysis**
- Selection of the Preferred Route

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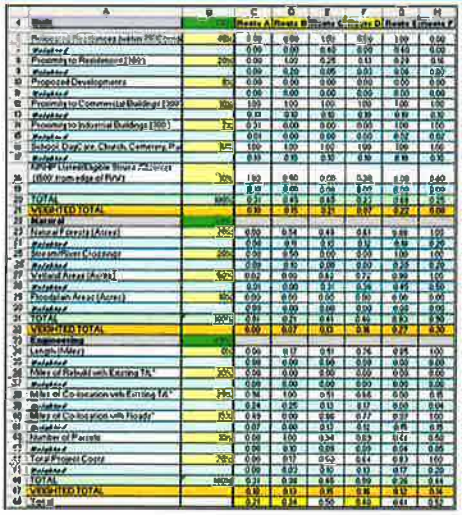
## Evaluating Alternative Routes



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## Selection of the Preferred Route

- Macro Corridor Identification
- Alternative Corridor Generation
- Development of Alternative Routes within Alternative Corridors
- Alternative Route Analysis
- **Selection of the Preferred Route**

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## Expert Judgment

| EXPERT JUDGEMENT | Weights per project | Route A | Route B | Route D |
|---|---|---|---|---|
| Visual Issues | 10% | 1 | 3 | 1 |
| *Weighted* | | 0.1 | 0.3 | 0.1 |
| Community Issues | 20% | 1 | 3 | 2 |
| *Weighted* | | 0.2 | 0.6 | 0.4 |
| Schedule Delay Risk | 0% | 0 | 0 | 0 |
| *Weighted* | | 0 | 0 | 0 |
| Special Permit Issues | 40% | 1 | 3 | 1 |
| *Weighted* | | 0.4 | 1.2 | 0.4 |
| Construction/ Maintenance Accessibility | 30% | 3 | 1 | 2 |
| *Weighted* | | 0.9 | 0.3 | 0.6 |
| Environmental Justice | 0% | 0 | 0 | 0 |
| *Weighted* | | 0 | 0 | 0 |
| TOTAL | | | | |
| | 100% | 1.6 | 2.4 | 1.5 |

*…the evaluation metrics are normalized and assigned weights to derive a relative score for the alternative routes. The siting team applies expert judgment to rank the top three routes (routes A, B and D).*

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## Preferred Route


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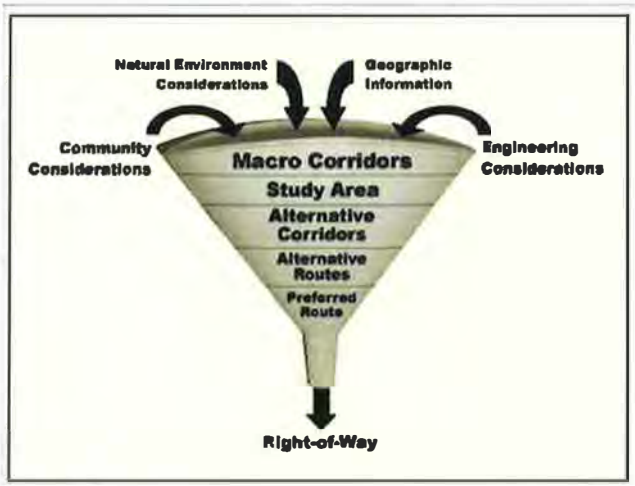
## Corridor Analysis Funnel

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Technical Overview :
Presented by Dr. Joe Berry

GeorgiaTransmission

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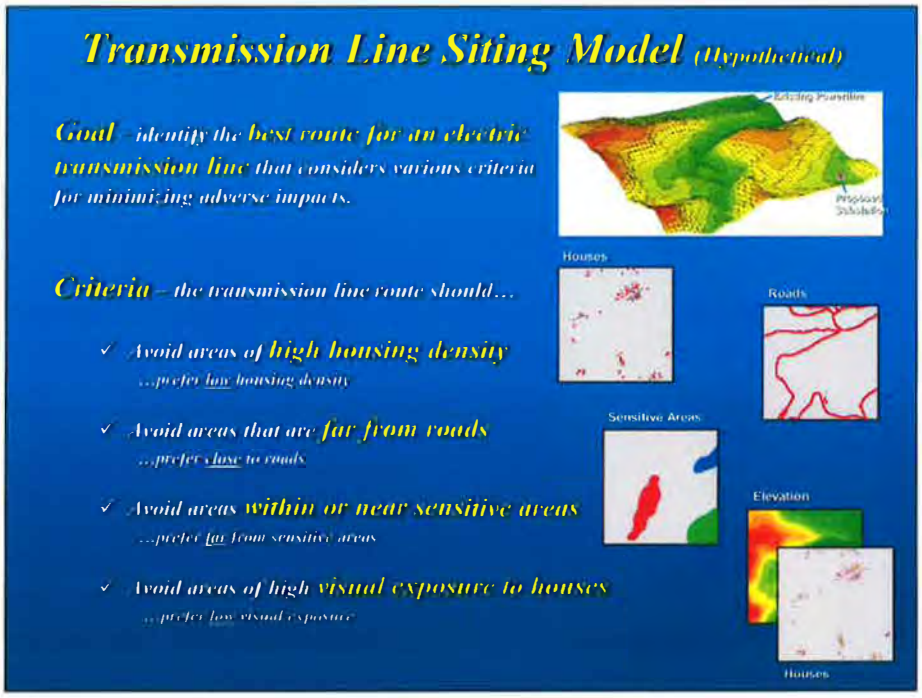
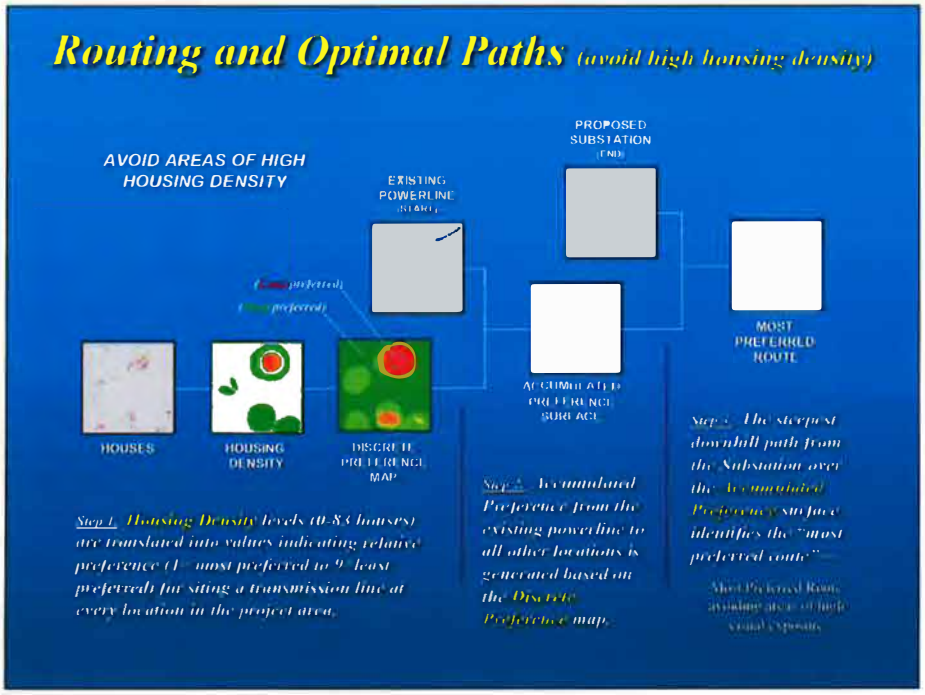
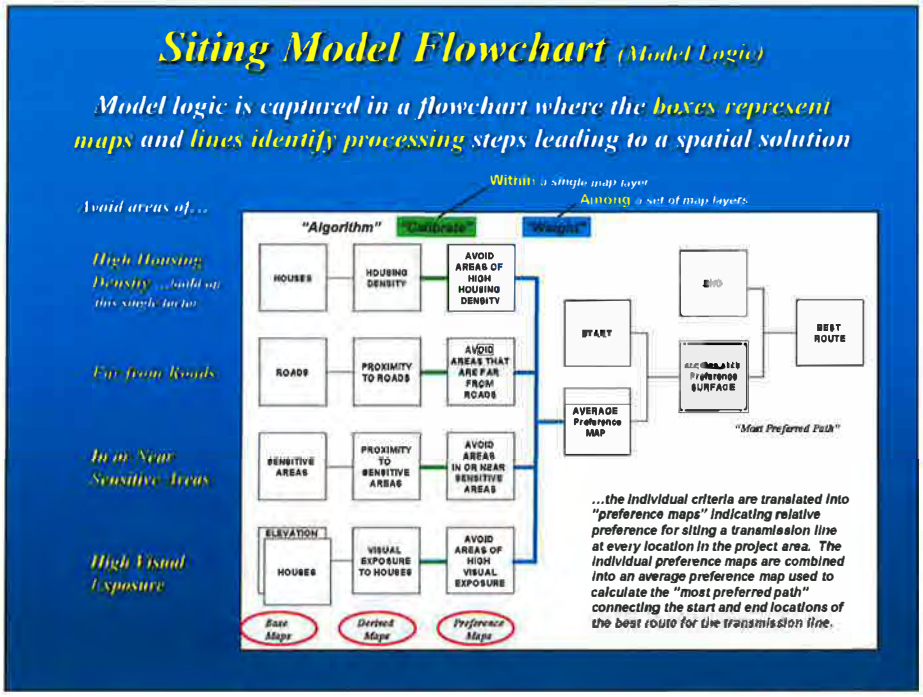
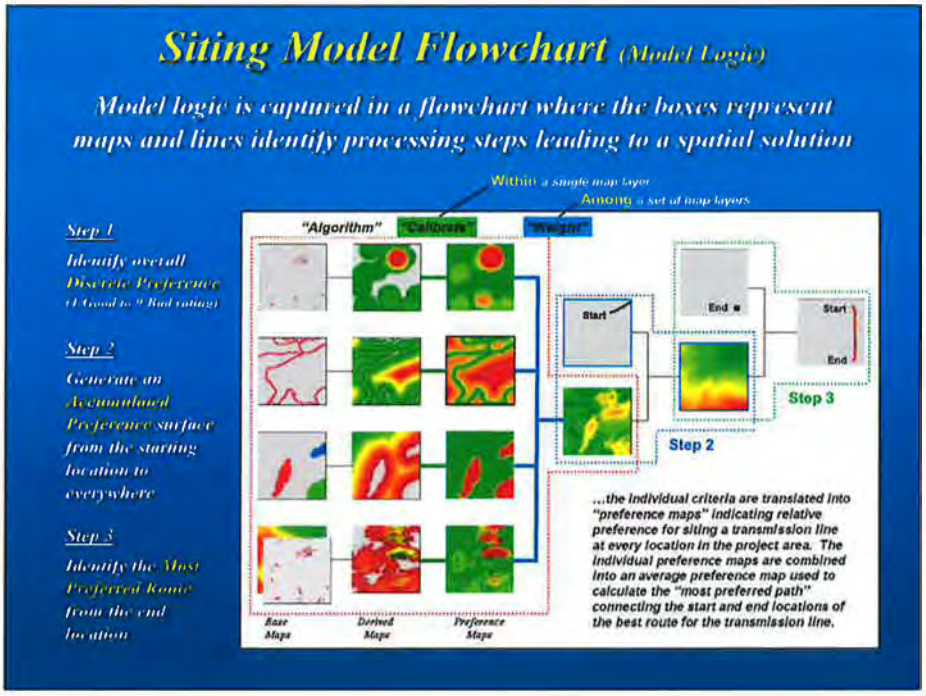
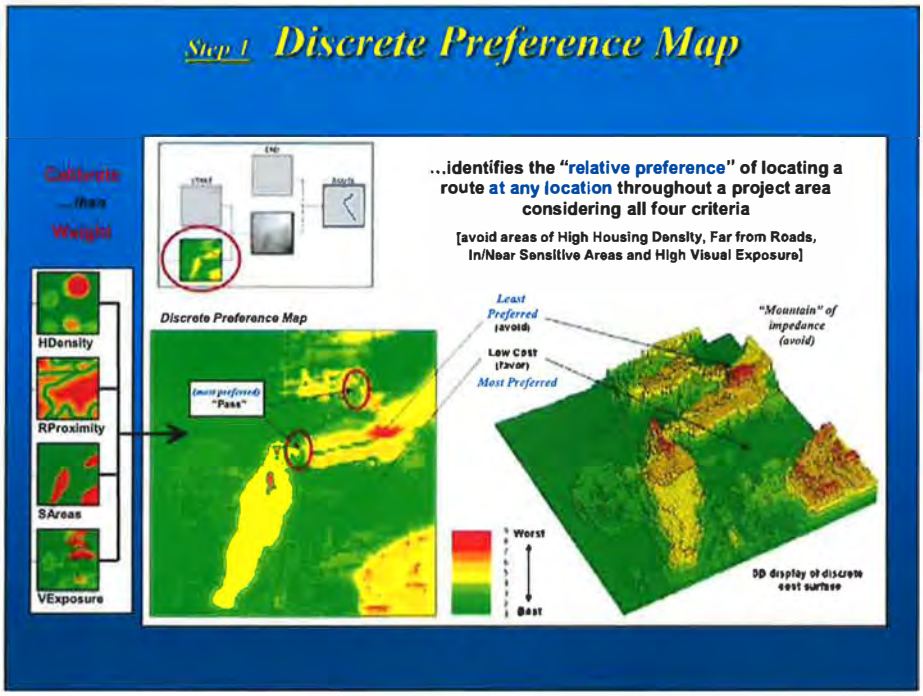
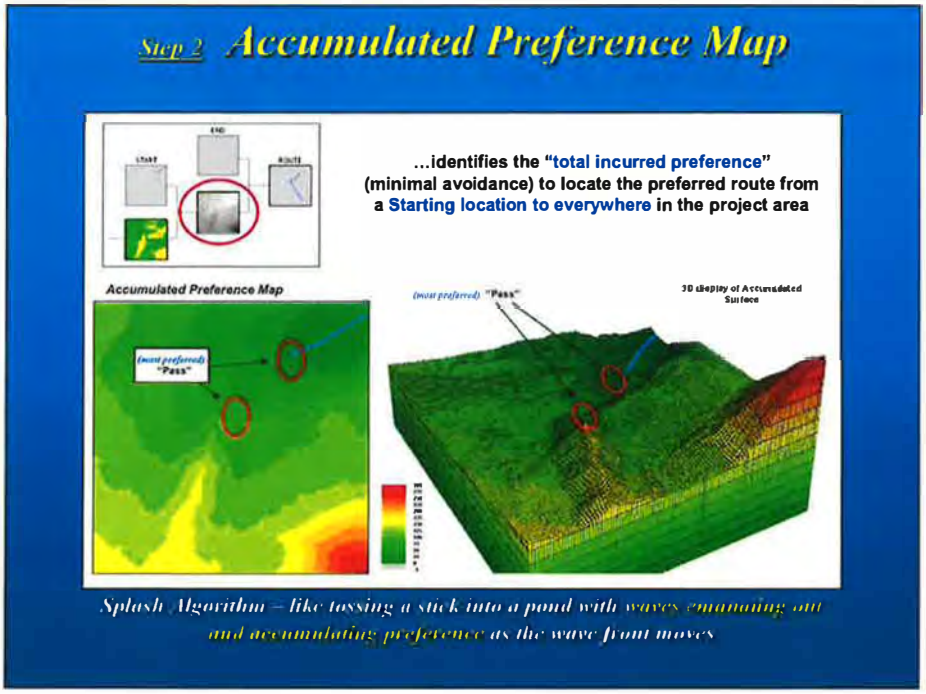

Transmission Line Siting Model (Hypothetical)
Goal – identify the best route for an electric transmission line that considers various criteria for minimizing adverse impacts.
Criteria – the transmission line route should…
✓ Avoid areas of high housing density
…prefer low housing density
✓ Avoid areas that are far from roads
…prefer close to roads
✓ Avoid areas within or near sensitive areas
…prefer far from sensitive areas
✓ Avoid areas of high visual exposure to houses
…prefer low visual exposure
Houses
Roads
Sensitive Areas
Elevation
Houses

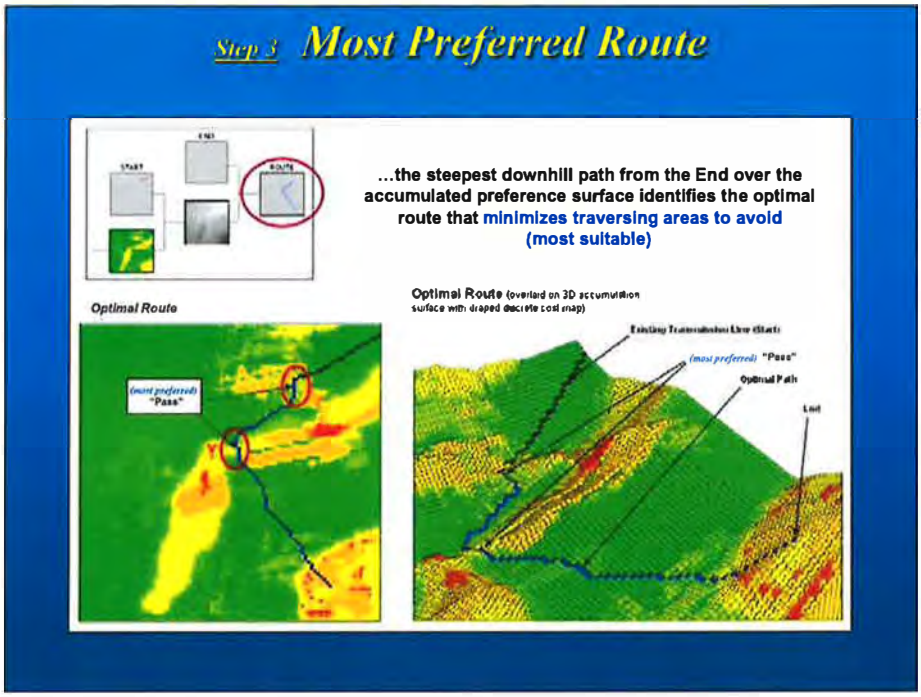

Routing and Optimal Paths (avoid high housing density)
AVOID AREAS OF HIGH HOUSING DENSITY
EXISTING POWERLINE (START)
PROPOSED SUBSTATION (END)
HOUSES
HOUSING DENSITY
DISCRETE PREFERENCE MAP
ACCUMULATED PREFERENCE SURFACE
MOST PREFERRED ROUTE
Step 1. Housing Density levels (0-8.3 houses) are translated into values indicating relative preference (1 = most preferred to 9 = least preferred) for siting a transmission line at every location in the project area.
Step 2. Accumulated Preference from the existing powerline to all other locations is generated based on the Discrete Preference map.
Step 3. The steepest downhill path from the Substation over the Accumulated Preference surface identifies the "most preferred route".

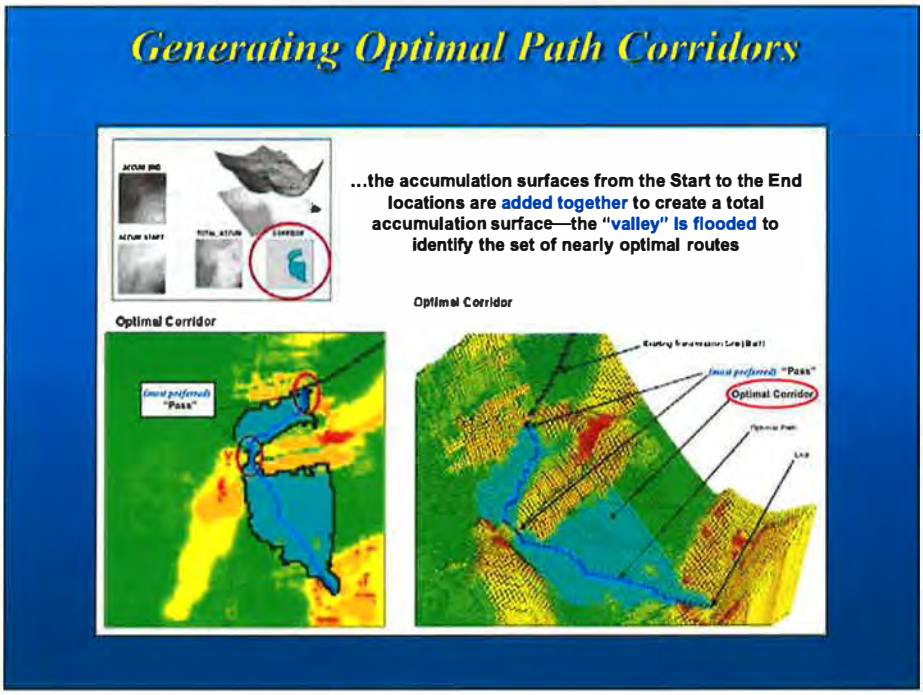

Siting Model Flowchart (Model Logic)
Model logic is captured in a flowchart where the boxes represent maps and lines identify processing steps leading to a spatial solution
Within a single map layer
Among a set of map layers
Avoid areas of...
High Housing Density
Far from Roads
In or Near Sensitive Areas
High Visual Exposure
"Algorithm"
"Calibrate"
"Weight"
HOUSES
HOUSING DENSITY
AVOID AREAS OF HIGH HOUSING DENSITY
ROADS
PROXIMITY TO ROADS
AVOID AREAS THAT ARE FAR FROM ROADS
SENSITIVE AREAS
PROXIMITY TO SENSITIVE AREAS
AVOID AREAS IN OR NEAR SENSITIVE AREAS
ELEVATION
HOUSES
VISUAL EXPOSURE TO HOUSES
AVOID AREAS OF HIGH VISUAL EXPOSURE
START
AVERAGE Preference MAP
BEST ROUTE
"Most Preferred Path"
...the individual criteria are translated into "preference maps" indicating relative preference for siting a transmission line at every location in the project area. The individual preference maps are combined into an average preference map used to calculate the "most preferred path" connecting the start and end locations of the best route for the transmission line.
Base Maps
Derived Maps
Preference Maps


Siting Model Flowchart (Model Logic)
Model logic is captured in a flowchart where the boxes represent maps and lines identify processing steps leading to a spatial solution
Within a single map layer
Among a set of map layers
Step 1
Identify overall Discrete Preference (1 Good to 9 Bad rating)
Step 2
Generate an Accumulated Preference surface from the starting location to everywhere
Step 3
Identify the Most Preferred Route from the end location
"Algorithm"
"Calibrate"
"Weight"
Start
End
Step 3
Step 2
...the individual criteria are translated into "preference maps" indicating relative preference for siting a transmission line at every location in the project area. The individual preference maps are combined into an average preference map used to calculate the "most preferred path" connecting the start and end locations of the best route for the transmission line.
Base Maps
Derived Maps
Preference Maps


Step 1 Discrete Preference Map
Criteria
Weight
HDensity
RProximity
SAreas
VExposure
...identifies the "relative preference" of locating a route at any location throughout a project area considering all four criteria
[avoid areas of High Housing Density, Far from Roads, In/Near Sensitive Areas and High Visual Exposure]
Discrete Preference Map
(most preferred) "Pass"
Least Preferred (avoid)
Low Cost (favor)
Most Preferred
"Mountain" of impedance (avoid)
Worst
Best
3D display of discrete cost surface

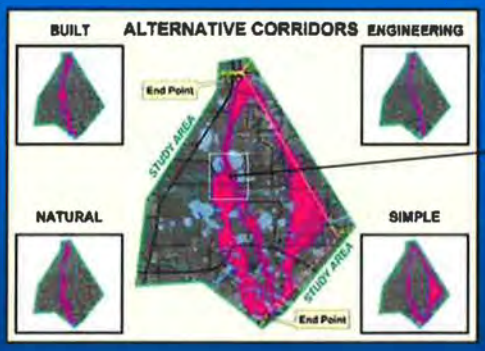

Step 2 Accumulated Preference Map
...identifies the "total incurred preference" (minimal avoidance) to locate the preferred route from a Starting location to everywhere in the project area
Accumulated Preference Map
(most preferred) "Pass"
3D display of Accumulated Surface
Splash Algorithm – like tossing a stick into a pond with waves emanating out and accumulating preference as the wave front moves

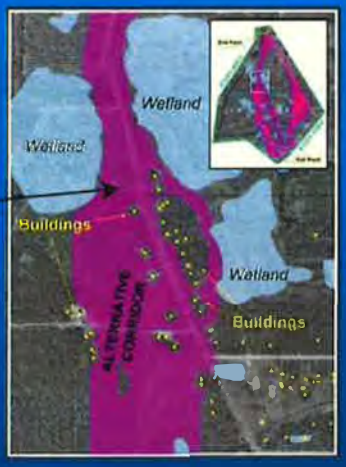

Step 3 Most Preferred Route
...the steepest downhill path from the End over the accumulated preference surface identifies the optimal route that minimizes traversing areas to avoid (most suitable)
Optimal Route
Optimal Route (overlaid on 3D accumulation surface with draped discrete cost map)
(most preferred) "Pass"
Optimal Path
End


Generating Optimal Path Corridors
...the accumulation surfaces from the Start to the End locations are added together to create a total accumulation surface—the "valley" is flooded to identify the set of nearly optimal routes
Optimal Corridor
(most preferred) "Pass"
Optimal Corridor

## Example Results *(Georgia Experience)*

*Combining alternative corridors identifies the decision space reflecting various perspectives*



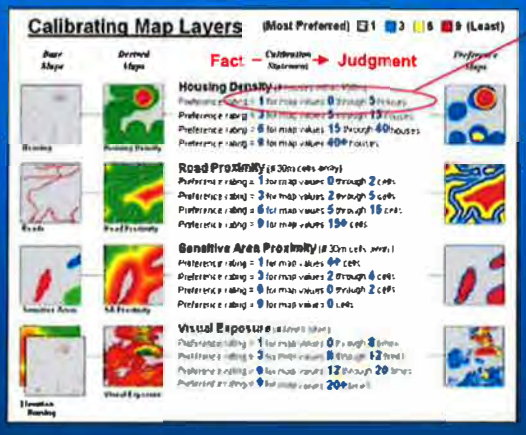




Feature Article in GeoWorld, April, 2004

A Consensus Method Finds Preferred Routing

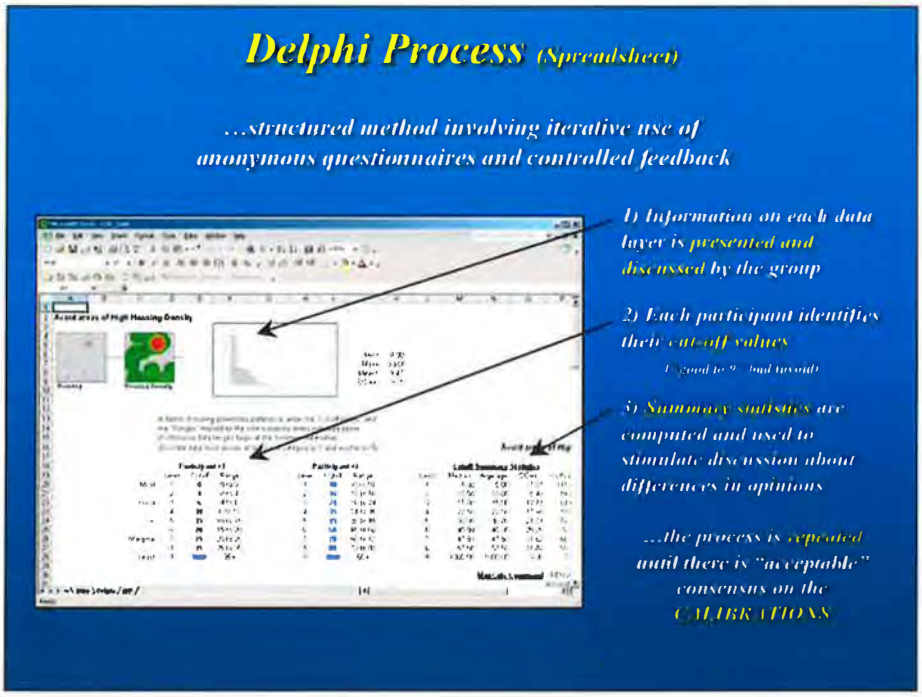
## Calibrating Map Layers *(using Delphi)*

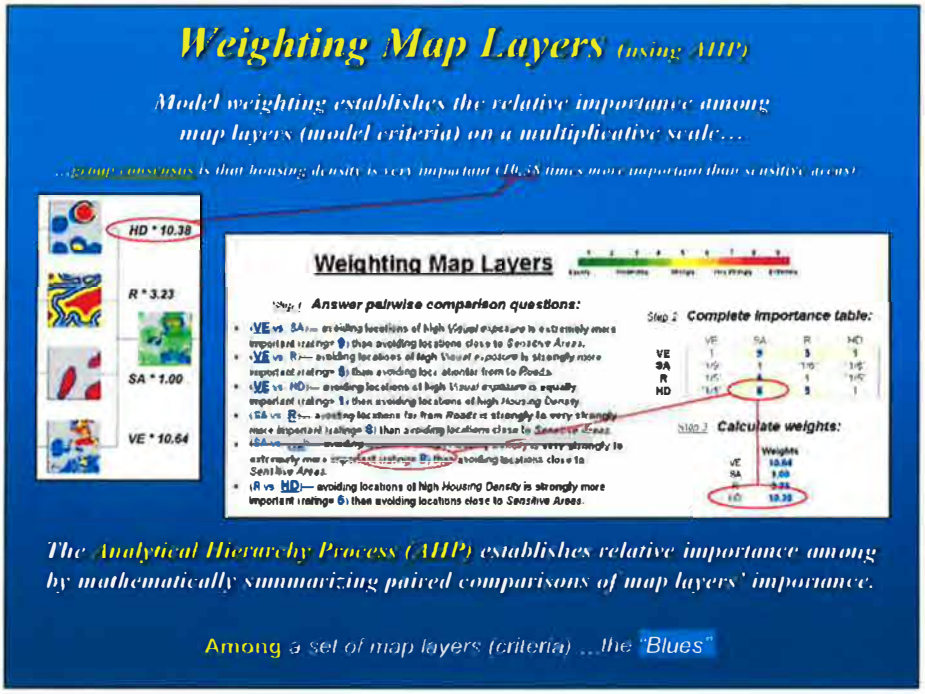
*Model calibration refers to establishing a consistent scale from 1 (most preferred) to 9 (least preferred) for rating each map layer…*

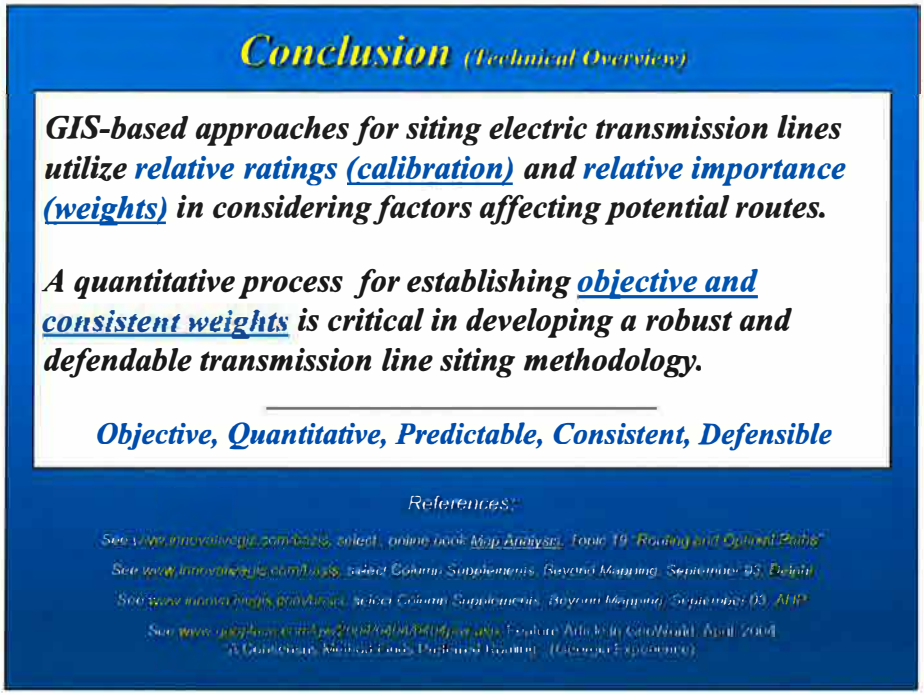



*The Delphi Process is used to achieve consensus among group participants. It is a structured method involving iterative use of anonymous questionnaires and controlled feedback with statistical aggregation of group response.*

Within a single map layer (criterion) …the "Greens"


Delphi Process (Spreadsheet)
...structured method involving iterative use of anonymous questionnaires and controlled feedback
1) Information on each data layer is presented and discussed by the group
2) Each participant identifies their cut-off values
3) Summary statistics are computed and used to stimulate discussion about differences in opinions
...the process is repeated until there is "acceptable" consensus on the CALIBRATIONS


Weighting Map Layers (using AHP)
Model weighting establishes the relative importance among map layers (model criteria) on a multiplicative scale...
...group consensus is that housing density is very important (10.38 times more important than sensitive areas)
HD * 10.38
R * 3.23
SA * 1.00
VE * 10.64
Weighting Map Layers
Step 1 Answer pairwise comparison questions:
Step 2 Complete importance table:
Step 3 Calculate weights:
The Analytical Hierarchy Process (AHP) establishes relative importance among by mathematically summarizing paired comparisons of map layers' importance.
Among a set of map layers (criteria) ...the "Blues"


Conclusion (Technical Overview)
GIS-based approaches for siting electric transmission lines utilize relative ratings (calibration) and relative importance (weights) in considering factors affecting potential routes.
A quantitative process for establishing objective and consistent weights is critical in developing a robust and defendable transmission line siting methodology.
Objective, Quantitative, Predictable, Consistent, Defensible
References:

Overview of Siting Perspectives
Presented by:

Natural: Dr. Liz Kramer
Built: Dr. Steve French
Engineering: Dr. Paul Zwick

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## Preliminary Alternative Corridor Model

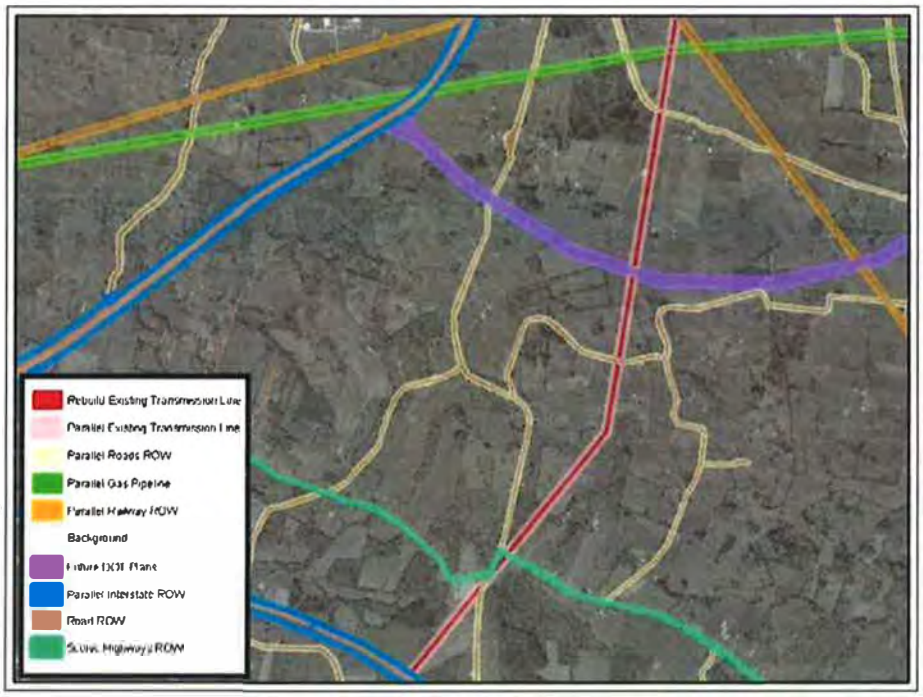
| Co-location / Engineering | Natural Environment | Built Environment |
|---|---|---|
| **Linear Infrastructure** | **Floodplain** | **Proximity to Buildings** |
| Rebuild Exising Transmission Lines | Background | Background |
| Parallel Existing Transmission Lines | 100 Year Floodplain | 800-1200 |
| Parallel Roads ROW | **Streams/Wetlands** | 400-800 |
| Parallel Gas Pipelines | Background | 200-400 |
| Parallel Railway ROW | Streams +50ft = Regulatory Buffer> | 0-200 |
| Background | Rivers/Streams + 50ft = Regulatory Buffer | **Building Density** |
| Future DOT Plans | Wetlands + 50' Buffer | 0 - 0.05 Buildings/Acre |
| Parallel Interstate ROW | **Public Lands** | 0.05 - 0.2 Building/Acre |
| Road ROW | Background | 0.2 - 1 Building/Acre |
| Scenic Highways ROW | WMA - Non-State Owned | 1 - 4 Buildings/Acre |
| **Slope** | Other Conservation Land | > 4 Buildings/Acre |
| Slope 0-15% | USFS | **Proposed Development** |
| Slope 16-30% | WMA - State Owned | Background |
| Slope >30% | **Land Cover** | Proposed Development |
| **AVOIDANCE AREAS** | Agriculture | **Spannable Lakes and Ponds** |
| Non-Spannable Waterbodies | Silviculture (agriculture of trees) | Background |
| Mines and Quarries (Active) | Natural Forests | Spannable Lakes and Ponds |
| Buildings | Developed Land | **Land Use** |
| Airports | **Wildlife Habitat** | Residential |
| Military Facilities | Background | Commercial/Industrial |
| | Species of Concern Habitat | Agriculture (crops & livestock) |
| | **AVOIDANCE AREAS** | Other (forest) |
| | EPA Superfund Sites | **AVOIDANCE AREAS** |
| | State and National Parks | Listed Archaeology Sites |
| | USES Wilderness Area | Listed NRHP Districts and Buildings |
| | Wild/Scenic Rivers | City and County Parks |
| | Wildlife Refuge | Day Care Parcels |
| | | Cemetery Parcels |
| | | School Parcels (K-11) |
| | | Church Parcels |

## Co-location / Engineering

| Linear Infrastructure |
|---|
| Rebuild Existing Transmission Lines |
| Parallel Existing Transmission Lines |
| Parallel Roads ROW |
| Parallel Gas Pipelines |
| Parallel Railway ROW |
| Background |
| Future DOT Plans |
| Parallel Interstates ROW |
| Road ROW |
| Scenic Highways ROW |
| **Slope** |
| Slope 0-15% |
| Slope 15-30% |
| Slope >30% |

## Co-location / Engineering

| Linear Infrastructure | |
|---|---|
| Rebuild Existing Transmission Lines | Background |
| Parallel Existing Transmission Lines | Future DOT Plans |
| Parallel Roads ROW | Parallel Interstates ROW |
| Parallel Gas Pipelines | Road ROW |
| Parallel Railway ROW | Scenic Highways ROW |




## Co-location / Engineering

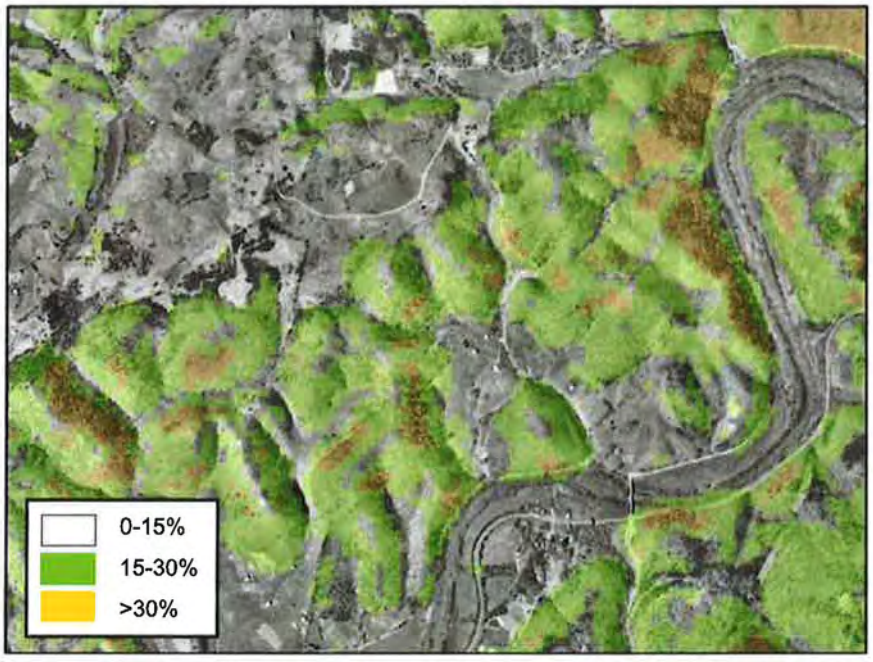
| Slope |
| --- |
| Slope 0-15% |
| Slope 15-30% |
| Slope >30% |

## Slope

Slope is derived from USGS 30 meter Digital Elevation Models (DEMs) using the Slope algorithm from ESRI's Spatial Analyst.

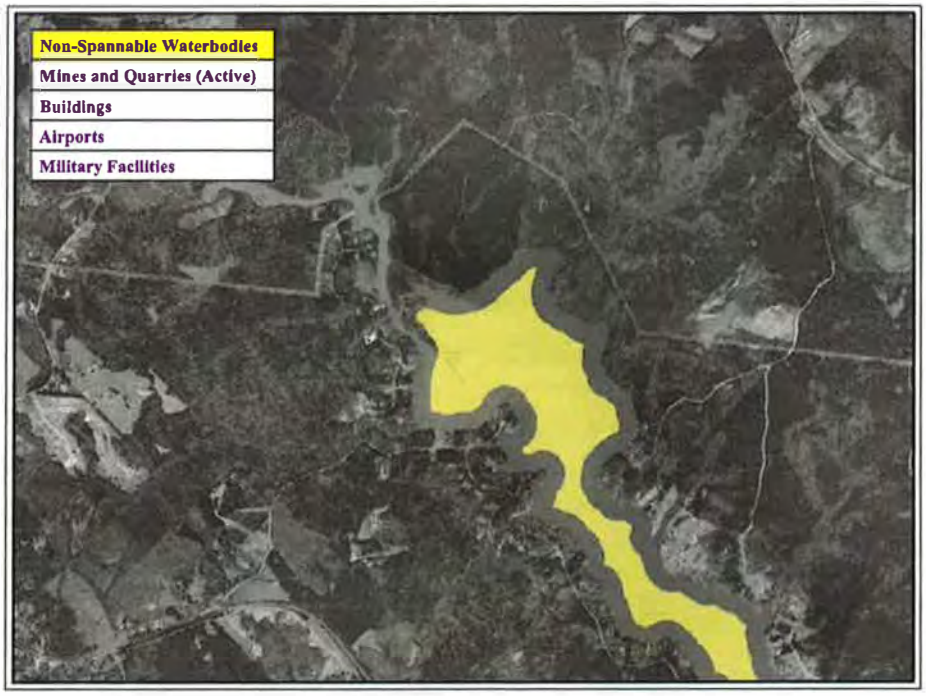
The slope is then classified into three categories (0-15%, 15%-30%, and >30%).

USGS DEMs are created from elevation data from USGS 7.5 minute Quadrangles (Topo Maps).



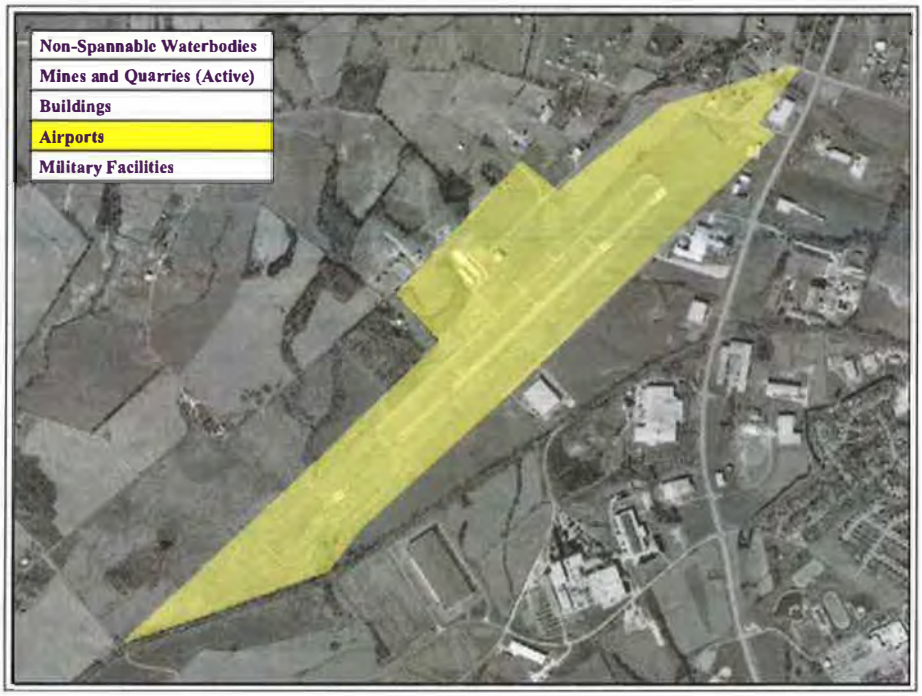
# Co-location / Engineering

| AVOIDANCE AREAS |
| --- |
| Non-Spannable Waterbodies |
| Mines and Quarries (Active) |
| Buildings |
| Airports |
| Military Facilities |




Non-Spannable Waterbodies
Mines and Quarries (Active)
Buildings
Airports
Military Facilities


Non-Spannable Waterbodies
Mines and Quarries (Active)
Buildings
Airports
Military Facilities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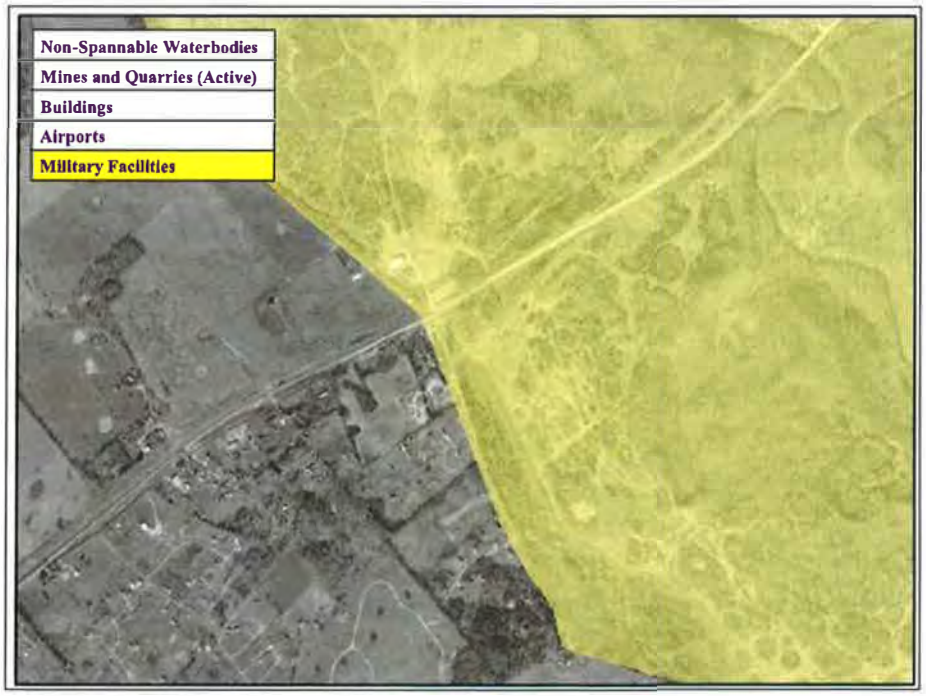
Mines and Quarries (Active)
Buildings
Airports
Military Facilities

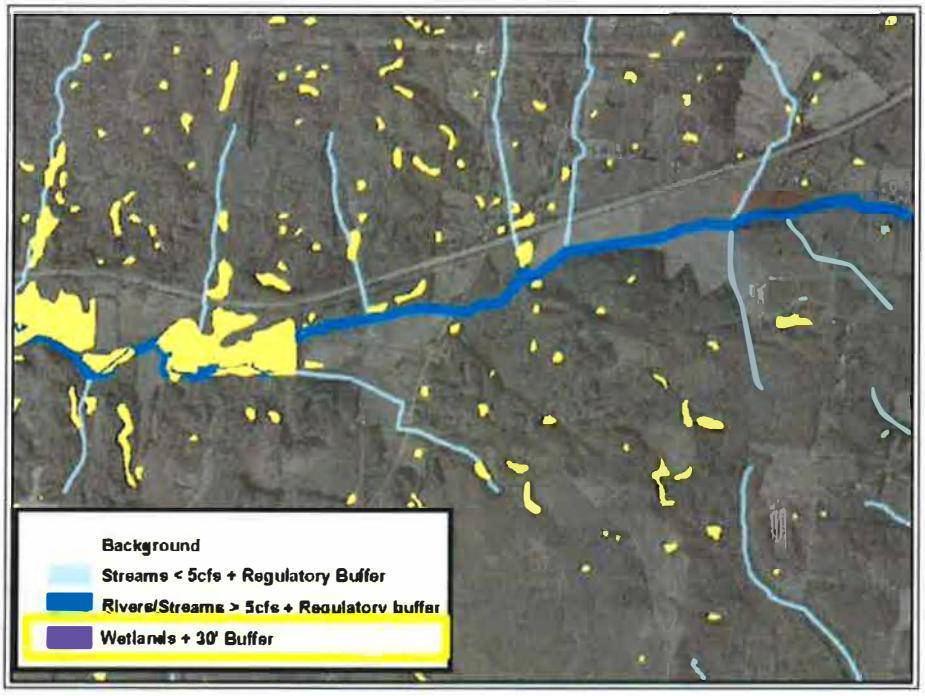

Non-Spannable Waterbodies
Mines and Quarries (Active)
Buildings
Airports
Military Facilities

# Natural Environment

| Floodplain | Land Cover |
|---|---|
| Background | Agriculture |
| 100 Year Floodplain | Silviculture (agriculture of trees) |
| **Streams/Wetlands** | Natural Forests |
| Background | Developed Land |
| Streams < 5cfs+ Regulatory Buffer | **Wildlife Habitat** |
| Rivers/Streams > 5cfs+ Regulatory Buffer | Background |
| Wetlands + 30' Buffer | Species of Concern Habitat |
| **Public Lands** | |
| Background | |
| Other Conservation Land | |
| USFS | |
| WMA - State Owned | |

# Natural Environment

| Streams/Wetlands |
| --- |
| Background |
| Streams < 5cfs+ Regulatory Buffer |
| Rivers/Streams > 5cfs Regulatory Buffer |
| Wetlands + 30' Buffer |



# Natural Environment

## Public Lands

- Background
- WMA – Non-State Owned
- Other Conservation Land
- USFS
- WMA –State Owned

# Natural Environment

| Land Cover |
| --- |
| Agriculture |
| Silviculture (agriculture of trees) |
| Natural Forest |
| Developed Land |

# Natural Environment

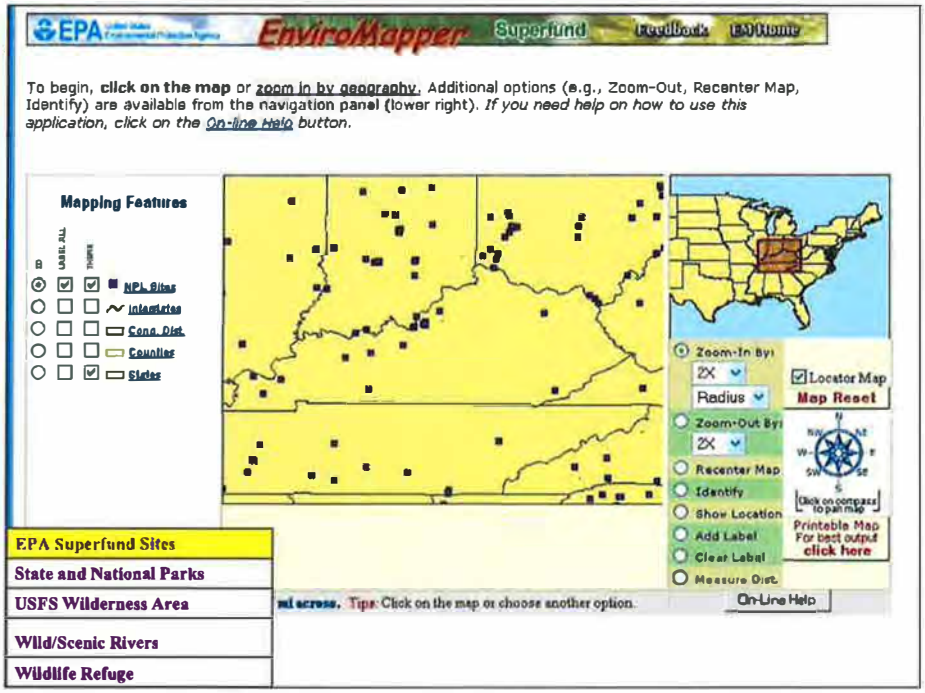
**Wildlife Habitat**

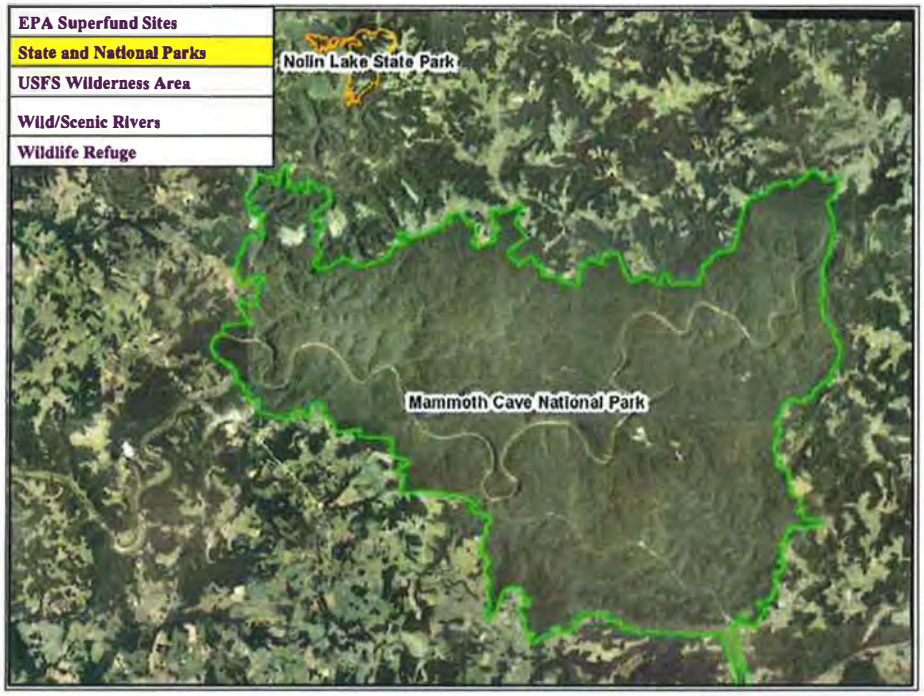
**Background**

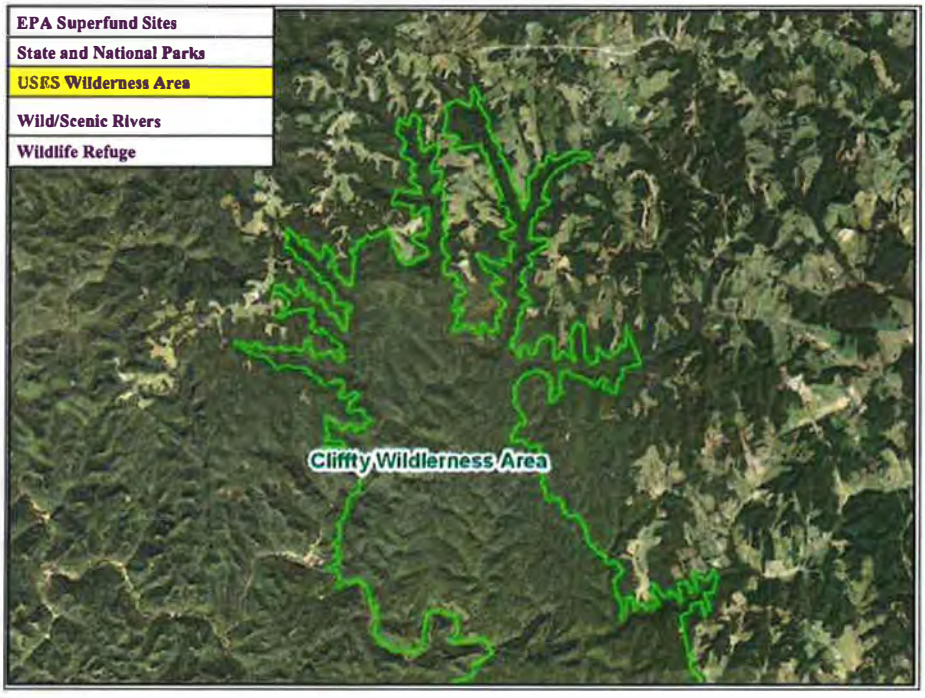
**Species of Concern Habitat**

# Natural Environment

| AVOIDANCE AREAS |
| --- |
| EPA Superfund Sites |
| State and National Parks |
| USFS Wilderness Area |
| Wild/Scenic Rivers |
| Wildlife Refuge |




EPA Superfund Sites
State and National Parks
USFS Wilderness Area
Wild/Scenic Rivers
Wildlife Refuge
Nolin Lake State Park
Mammoth Cave National Park


EPA Superfund Sites
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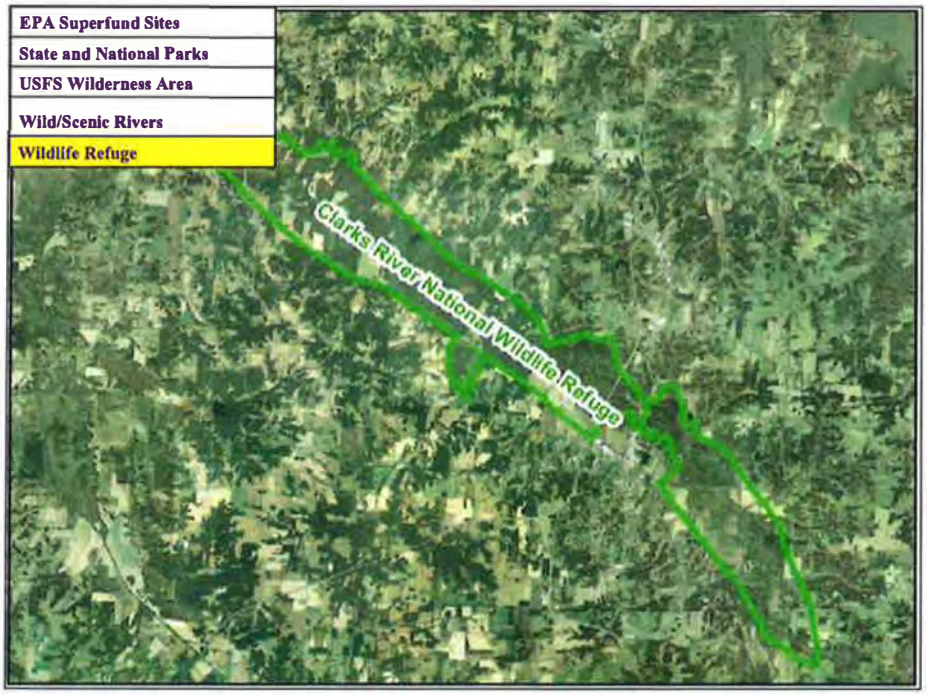
USFS Wilderness Area
Wild/Scenic Rivers
Wildlife Refuge
Cliffty Wildlerness Area


EPA Superfund Sites
State and National Parks
USFS Wilderness Area
Wild/Scenic Rivers
Wildlife Refuge
RED RIVER

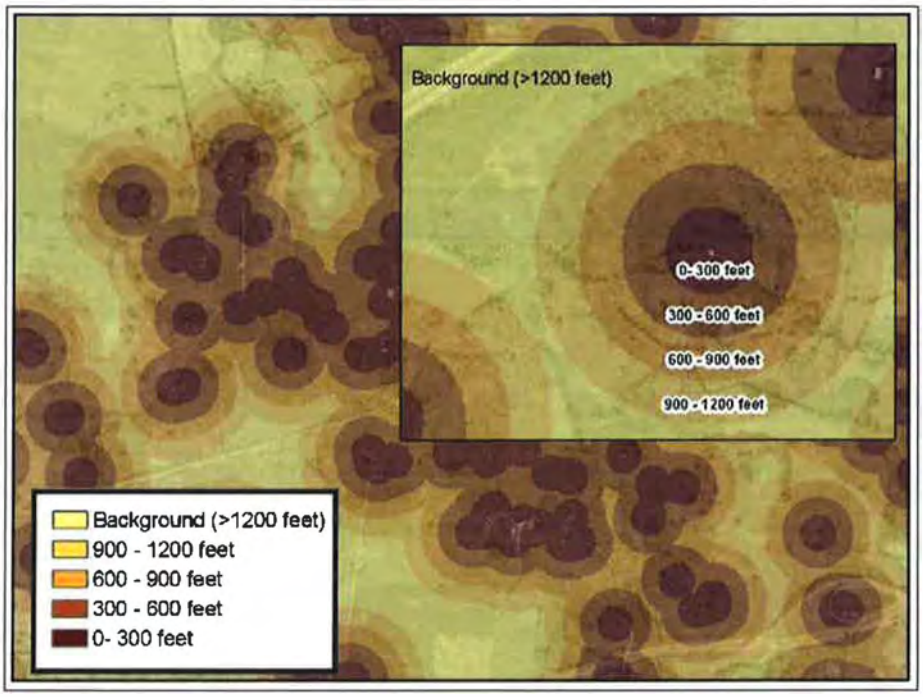

EPA Superfund Sites
State and National Parks
USFS Wilderness Area
Wild/Scenic Rivers
Wildlife Refuge
Clarks River National Wildlife Refuge

## Built Environment

| Proximity to Buildings | Proposed Development |
|---|---|
| Background | Background |
| 900-1200 | Proposed Development |
| 600-900 | Spannable Lakes and Ponds |
| 300-600 | Background |
| 0-300 | Spannable Lakes and Ponds |
| **Building Density** | **Land Use** |
| 0 - 0.05 Buildings/Acre | Residential |
| 0.05 - 0.2 Buildings/Acre | Commercial/Industrial |
| 0.2 - 1 Buildings/Acre | Agriculture (crops & livestock) |
| 1 - 4 Buildings/Acre | Other (forest) |
| > 4 Buildings/Acre | |

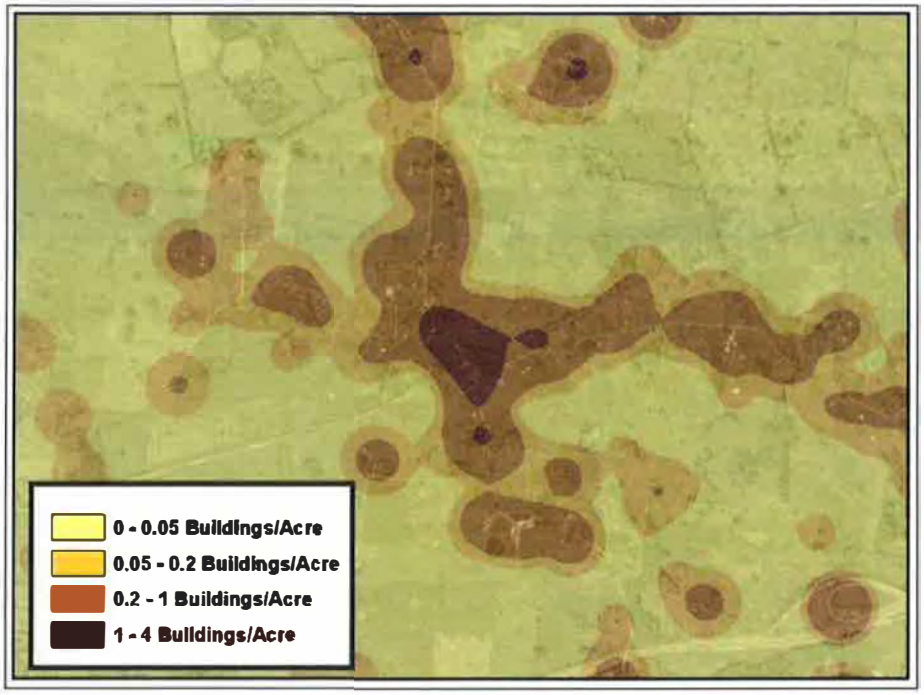
## Built Environment

| Proximity to Buildings |
|---|
| Background |
| 900 – 1200 feet |
| 600 – 900 feet |
| 300 – 600 feet |
| 0 – 300 feet |




## Built Environment

| Building Density |
| --- |
| 0 - 0.05 Buildings/Acre |
| 0.05 - 0.2 Buildings/Acre |
| 0.2 - 1 Buildings/Acre |
| 1 - 4 Buildings/Acre |
| 4 - 25 Buildings/Acre |




# Built Environment

**Proposed Development**

**Background**

**Proposed Development**

# Built Environment

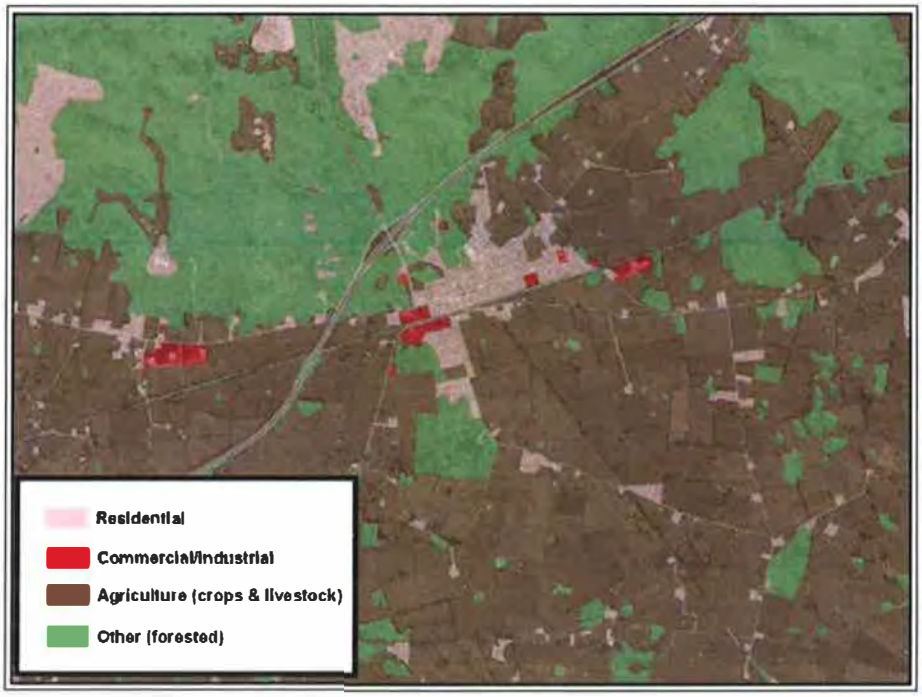
## Spannable Lakes and Ponds

**Background**

**Spannable Lakes and Ponds**

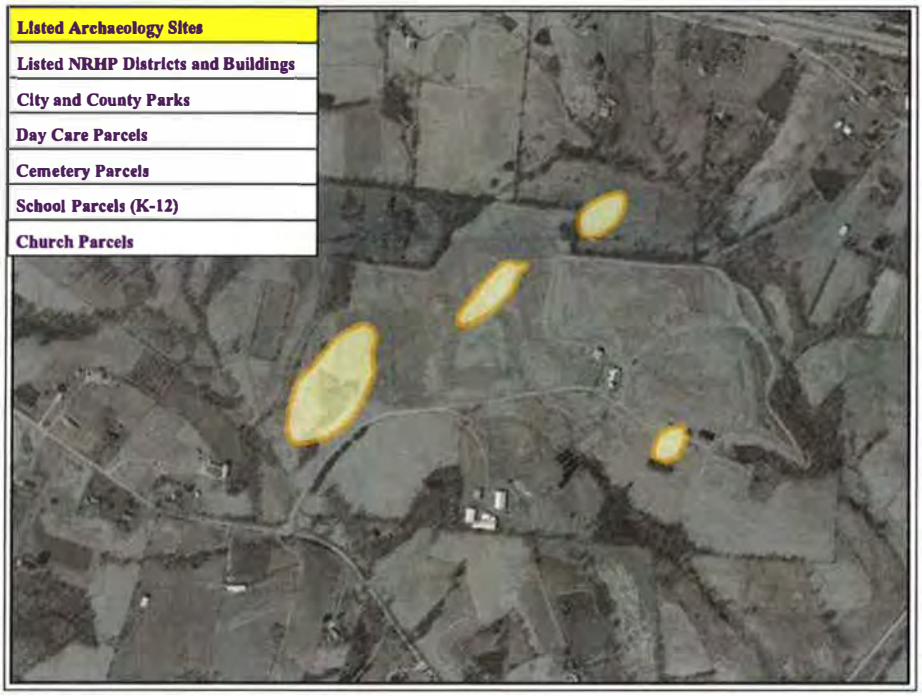
## Built Environment

| Land Use |
| --- |
| Residential |
| Commercial/Industrial |
| Agriculture (crops & livestock) |
| Other |




## Built Environment

| AVOIDANCE AREAS |
| --- |
| Listed Archaeology Sites |
| Listed NRHP Districts and Buildings |
| City and County Parks |
| Day Care Parcels |
| Cemetery Parcels |
| School Parcels (K-12) |
| Church Parcels |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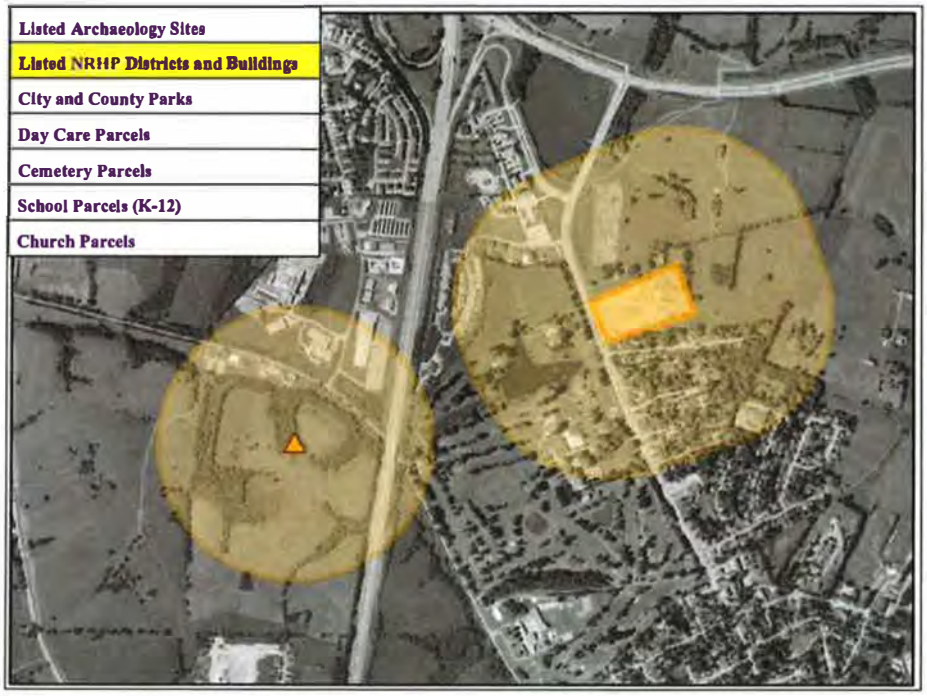
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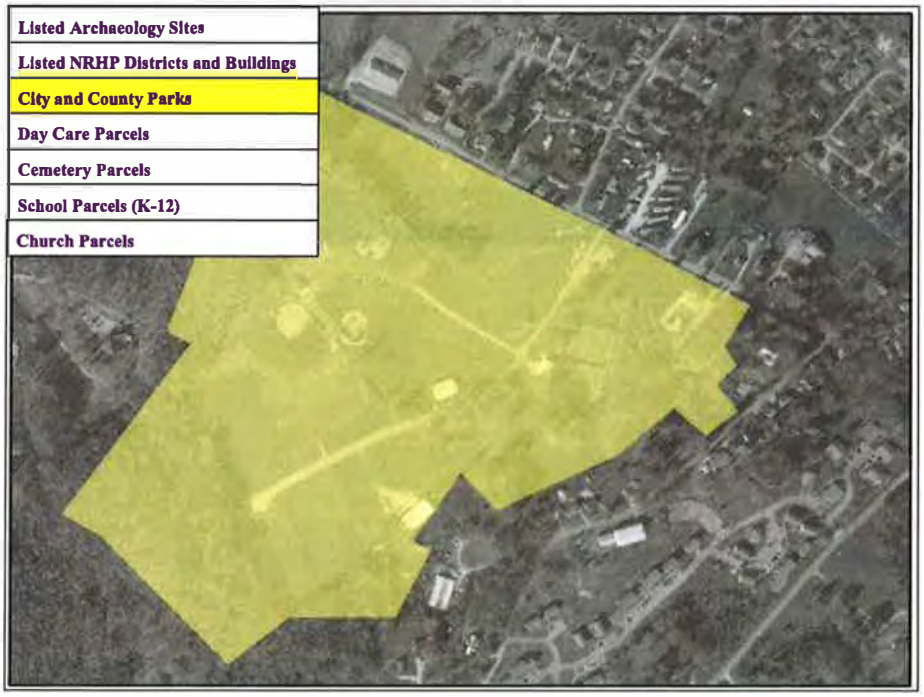
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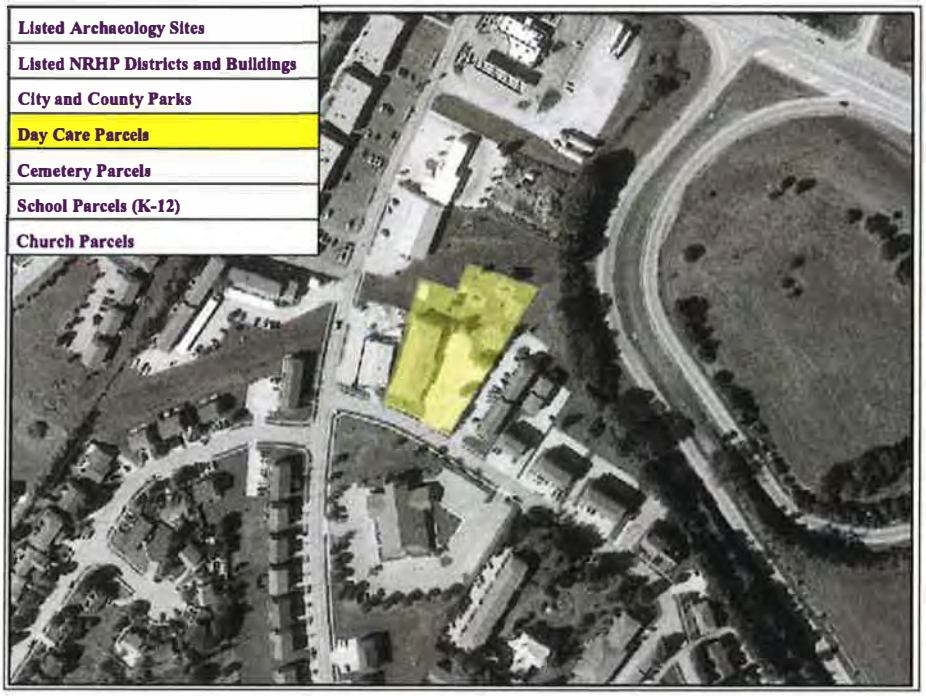
School Parcels (K-12)
Church Parcels


Listed Archaeology Sites
Listed NRHP Districts and Buildings
City and County Parks
Day Care Parcels
Cemetery Parcels
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Overview of Breakout Sessions
Presented by Steve Richardson

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# Workshop Agenda

**Breakout Sessions**

**10:50 A.M.** **Review Siting Criteria**
**12:00 P.M.** **Lunch (served in breakout rooms)**
**12:45 P.M.** **Calibrate Criteria**
**2:15 P.M.** **Break**
**2:30 P.M.** **Weight Layers**

**General Session**

**4:00 P.M.** **Overview of Workshop Preliminary Results**
Built Environment: Dr. Steve French, Georgia Tech
Natural Environment: Dr. Liz Kramer, University of Georgia
Engineering / Co-location: Dr. Paul Zwick, University of Florida
**4:45 P.M.** **Participant Survey / Wrap Up**
Steve Richardson, Van Ness Feldman

# G
# KENTUCKY TRANSMISSION LINE SITING MODEL

| Engineering (Co-location) | |
|---|---|
| Linear Infrastructure | [illegible] |
| 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 | 5.8 |
| Parallel Railway ROW | 6.1 |
| Road ROW | 7.2 |
| Rebuild Existing Transmission Lines (bad) | 8.8 |
| Scenic Highways ROW | 9 |
| Slope | [illegible] |
| Slope 0-15% | 1 |
| Slope 15-30% | 4 |
| Slope 30-40% | 6.7 |
| Slope >40% | 9 |
| AVOIDANCE AREAS | |
| Non Spannable Waterbodies | |
| Mines and Quarries (Active) | |
| Buildings | |
| Airports | |
| Military Facilities | |
| Center Pivot Irrigation | |

| Natural Environment | |
|---|---|
| Floodplain | [illegible] |
| Background | 1 |
| 100 Year Floodplain | 9 |
| Streams/Wetlands | [illegible] |
| 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 | [illegible] |
| 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 | [illegible] |
| Developed Land | 1 |
| Agriculture | 4.6 |
| Forests | 9 |
| Wildlife Habitat | [illegible] |
| Background | 1 |
| Species of Concern Habitat | 9 |
| AVOIDANCE AREAS | |
| EPA Superfund Sites | |
| State and National Parks | |
| USFS Wilderness Area | |
| Wild/Scenic Rivers | |
| Wildlife Refuge | |
| State Nature Preserves | |
| Designated Critical Habitat | |

| Built Environment | |
|---|---|
| Proximity to Buildings | [illegible] |
| Background | 1 |
| 900-1200 | 3.4 |
| 600-900 | 5.7 |
| 300-600 | 8 |
| 0-300 | 9 |
| Building Density | [illegible] |
| 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 | [illegible] |
| Background | 1 |
| Proposed Development | 9 |
| Spannable Lakes and Ponds | [illegible] |
| Background | 1 |
| Spannable Lakes and Ponds | 9 |
| Land Use | [illegible] |
| 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 | [illegible] |
| Background | 1 |
| 900-1200 | 4.6 |
| 600-900 | 7.9 |
| 0-300 | 8.6 |
| 300-600 | 9 |
| AVOIDANCE AREAS | |
| Listed Archaeology Sites & Dist. | |
| Listed NRHP Districts and Buildings | |
| City and County Parks | |
| Day Care Parcels | |
| Cemetery Parcels | |
| School Parcels (K-12) | |
| Church Parcels | |

# H
# DISCUSSION WITH KENTUCKY HERITAGE COUNCIL

Notes of research contributor Clay Doherty:

"Spoke with Dave Pollack of the KY Heritage Council this afternoon. We discussed the whole eligibility/potentially eligible issue. Dave said that about 33,000 of his database resources are NRHP-listed resources, another 33,000 or so are 50 years old or older (NRHP threshold requires at least 50 years or age or older- a necessary condition but not a sufficient condition for NRHP eligibility) but haven't been evaluated, and only about 1,600 or so have been evaluated and recommended as eligible but not listed.

Using unevaluated structures which are simply 50 years of age or older is not going to be useful for our purposes. Maurie van Buren of Historic Preservation Consulting evaluated 38 resources within the Area of Potential Effect for the Ft. Knox easement survey (these would be structures - mostly houses - 50 years of age or older), and the only eligible resource was Ft Duffield, which is already listed on the NRHP. Maurie says, based on her experience, of all structures 50 years of age or older in any given study area, only about ten-fifteen percent is eligible (although if you get into an historic district, that figure can go up).

The +/- 1,600 structures in the KY SHPO database which have been evaluated and recommended eligible are the ones I recommend factoring into the model as eligible structures and/or districts. Assuming unevaluated structures are in fact eligible steers alternate corridors away from areas which should have no special significance."

# I
# EQUINE AGRI-TOURISM RESEARCH

Notes of research contributor Clay Doherty:

"We began looking for information on which KY horse farms are important to the KY economy in general and to KY tourism in particular. I spoke with Bill Roth at the KY Dept of Tourism who referred me to the KY Horse Council (800-459-4677) and the KY Horse Park (800-678-8813).

"I spoke next with Lynn Oliver of the KY Horse Council who also referred me to the KY Horse Park as well as the Property Valuation Administrator for Fayette County KY (859-246-2722) and the Chamber of Commerce (aka Commerce Lexington Inc.; 859-254-4447).

"I then spoke with Greg Richardson of the Fayette County Property Valuation Administrator's office who stated that the PVA has no special designation for horse farms in their valuation and said that any land use information that is considered in setting property valuations is supplied by the planning & zoning department.

"The KY Horse Park referred me to the Lexington Convention and Visitors Bureau (CVB;

800-845-3959). Ms. Gill Pilate of the Lexington CVB told me they have a horse farm managers club manual and referred me to a website (www.ktfmc.org) and a phone number (859-873-5461). This is the Kentucky Thoroughbred Farm Managers' Club, P.O. Box 1539, Versailles, KY 40383 (859.873.5461). Founded in 1948, the KTFMC currently has 564 members.

"The KTFMC website links to the Kentucky Equine Education Project (KEEP), 4047 Iron Works Parkway, Lexington, KY 40511 (866-771-5337). I spoke with Jason at KEEP, who referred me back to KTFMC.

"I followed up the tip from the Fayette County Property Valuation Administrator's office and called the Planning Division of the Lexington-Fayette Urban County Government (859-258-3160), speaking to Tom Barton. Mr. Barton verified that there is no specific land use identified as "horse farm" in the zoning regs; horse farms would simply be considered under the Agricultural land use classification.

"Mr. Barton referred me to their GIS group (859-258-3386) to determine whether there is any GIS mapping of horse farms for Fayette County. I spoke with Rob Johnson who said that they have received a list of horse farms and that they intend to develop a GIS data layer for them in the county, but that they haven't started yet. He offered to locate the list and send it to me or let me know from where they got it.

"Rob called me back, but when I returned his call, he was gone. However, I spoke with Scott Dickison who was familiar with my information request. Mr. Dickison identified the "list" as the KTFMC book. They will be using the Fayette Co PVA data set to pull together parcels of Fayette County thoroughbred farms, and they should have the dataset finished soon.

"In 2001, the Kentucky Agri-Tourism Working Group, charged with facilitating "an inclusive process supporting the development of agri-tourism in Kentucky," (Mission Statement, page 9) issued a White Paper entitled Establishment of an Agri-tourism Industry in Kentucky. The Working Group (Appendix A, page 30) conducted a survey in the Fall of 2001 to inventory agri-tourism offerings in Kentucky. In that paper, they identified the following thirteen Horse Riding, Training, and Breeding facilities as being responsive to their survey.

- Shelby Creek Farm, Lexington
- Lear Farms-Green Sentinel Farm, Inc., Lexington (future)
- Pleasant Green Farm, Lexington
- Constancia Farm, Lexington
- Watermark Farm LLC, Lexington
- Gainesway Farm, Lexington
- Maplecrest Farm of Lexington, LLC, Lexington
- Cleveland Branch Farm, Lexington
- Juddmonte Farms, Lexington (private)
- Bel-Mar, Lexington
- Brookledge Horse Transportation, Lexington
- Manly Farm, LLC, Lexington
- Hope Springs Farm, Lexington

"A copy of the Agri-Tourism Working Group White Paper can be downloaded at (http://www.kyagr.com/mkt_promo/agritourism/documents/whitepaper.doc).

"Conclusion. That certain horse farms are important to KY's economy and tourism industry was the reason for requesting horse farms be included in the model. However, the KTFMC member roster constitutes far too broad a listing of horse farms for the purposes cited in the KY Stakeholders' meeting. While the list cited in the Agri-Tourism Working Group White Paper may be too restrictive (some important horse farms may not have responded to the survey), this is a reasonable list acknowledged by the Kentucky Agri-Tourism Working Group as having some level of importance in State and local economies.

"Any list of equine agri-tourism properties will always be susceptible to change, as horse farm properties are sold for development, properties change ownership with a resulting de-emphasis on agri-tourism, and new properties are developed.

"Information regarding the Advisory Council for Kentucky Agri-tourism is available at http://www.kyagr.com/mkt_promo/agritourism/advisorycouncil.htm."

# J

# MODELING SPECIES OF CONCERN HABITAT IN THE EPRI ROUTING METHODOLOGY: ALTERNATIVE CORRIDOR GENERATION PHASE

Jesse Glasgow
June 7, 2004
Edited by Donald Enderle
April 12, 2006

The stakeholders identified the habitat of species of concern as an important component of the Natural Environment emphasis within alternate corridor generation. Prior to full implementation of this layer within the methodology, a consensus is required to define the level of concern to include an individual species for consideration. For the state of Kentucky, each species has been classified at the federal and state level in terms of status (endangered, threatened, etc.). It is essential, therefore, to delineate at what point does an individual species become a species of concern. At a minimum, federal status of endangered or threatened should be reason to include a particular species. State status of endangered or threatened may need to be considered for those species not designated as federally threatened or endangered. A list of species of concern will need to be compiled for the entire state of Kentucky, perhaps using the list kept by KDFW as a starting point, which will be used in all future projects utilizing the EPRI methodology.

The goal is to minimize impact to species of concern when generating alternative corridors. The USFWS regulates construction in the ***habitat*** of T&E species. The Kentucky Department of Fish and Wildlife (KDFW) does not. Therefore, the Companies should be able to demonstrate how they methodically attempt to avoid ***federally*** listed T&E habitat. The stakeholders consider T&E habitat a less suitable place to build and maintain a transmission line than other places - assuming all other criteria are equal. In keeping with the goals of the EPRI Methodology – to efficiently consider the appropriate information at the appropriate phase – it is prudent to map the habitat of species of concern, in the alternative corridor generation phase.

The EPRI methodology calls for the mapping and classifying of a wide array of habitat such as streams, wetlands, open water, open fields, natural forest, etc. The USFWS maintains a list of T&E species. The Kentucky Department of Fish and Wildlife (KDFW) maintains a database of T&E occurrences in the state of Kentucky by county and quadrangle. The Kentucky State Nature Preserves Commission (KSNPC) also maintains a database of T&E occurrences in the state. The KSNPC database contains the location coordinates of known occurrences associated with the species name.

The USFWS determines T&E habitat based on known occurrences. Therefore, the Companies are regulated based on known occurrences and their habitat within certain proximity of their

occurrence. Photo Science should map the habitat of the known occurrences within, and in close proximity to, the macro corridors, which are the study area for alternative corridor generation. The following methodology may be utilized to map habitat within project study areas.

1. The appropriate expert (i.e. ecologist) cross references the species of concern list with the following standard habitat maps currently utilized for alternative corridor generation: aerial photography derived land cover map, the national wetlands inventory, the USGS "blue-line" streams, and others which Photo Science maps. The product of this cross reference exercise (see figure J-1) is a table which includes all species of concern, a list of the features, which Photo Science routinely maps, that are considered the listed species habitat, and the range of occurrence for the listed species. This exercise is completed once up front and the resulting table is used on every project. It is not necessary to complete step one on a project by project basis.
2. On a project by project basis, Photo Science obtains the KSNPC occurrence database within, and in close proximity to, the project study area.
3. If listed species of concern have occurred in the study area, then the GIS Analyst uses the look-up table (created in step 1 above) to identify and map the species habitat in the project study area by querying the GIS database which is created for the project. ***If there are no listed species of concern occurrences in the project study area then species of concern are considered a non-issue in this phase of the route selection methodology.***
4. The features of the Wildlife Habitat layer (species of concern habitat, and background) are valued 1-9. The Wildlife Habitat layer (see figure J-2) is considered within the Natural Environment Preference surface.

See Figures J-1 and J-2 for a conceptual example of the approach.

| Listed Species | Mapped Habitat | Range of Occurrence |
|---|---|---|
| Red-cockaded Woodpecker | coniferous forest | 5 miles |
| Flatwoods Salamander | streams and wetlands | 2 miles |

**Figure J-1**
**Hypothetical example of a species/Photo Science mapped habitat look-up table**

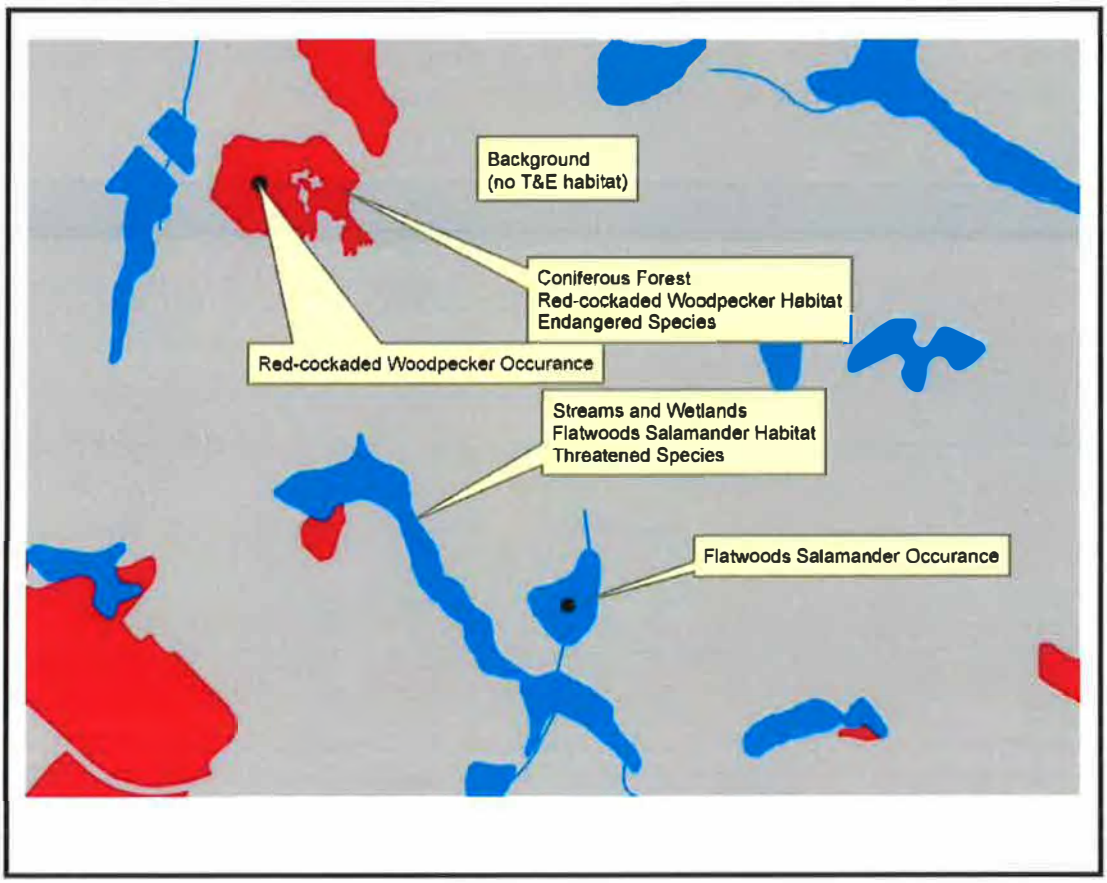


**Figure J-2**
**Wildlife Habitat Layer**

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