Exhibit 19

Siting Report

Marion County Industrial

161 kV Tap Line Loop-In

Electric Transmission Route Selection Technical Report

Mett's 161kv Transmission Line

Feb 16, 2024

Prepared BY:

NV5
421 SW 6th Ave, Suite 800
Portland, OR 97204

Prepared for:

East Kentucky Power Cooperative
4775 Lexington Rd,
Winchester, KY 40392

TABLE OF CONTENTS

List of Figures

List of Tables

List of Acronyms

EPA	Environmental Protection Agency
EPRI	Electric Power Research Institute
EKPC	East Kentucky Power Cooperative
DEM	Digital Elevation Model
DOT	Department of Transportation
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
GIS	Geographic Information System
GTC	Georgia Transmission Corporation
NAIP	National Agriculture Imagery Program
NHD	National Hydrography Dataset
NRHP	National Register of Historic Places
OSRW	Outstanding State Resource Waters
PVA	Property Valuation Administrator
NV5	NV5 Geospatial
ROW	Right of Way
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WMA	Wildlife Management Area

List of Units

cf/s	cubic feet per second
m	meter
kV	kilovolt

PART I: INTRODUCTION

East Kentucky Power Cooperative (EKPC) is an electric generation and transmission cooperative based in Winchester, Kentucky. EKPC is owned and governed by a 16 member-owned cooperative which provide service to over 1.1 million Kentuckians in 87 counties. Founded in 1941, EKPC operates base load power plants in Mason, Clark, Oldham and Pulaski Counties and landfill gas to electric facilities located in Boone, Laurel, Greenup, Pendleton, and Hardin Counties. EKPC also provides peaking generation with its combustion turbines in Clark County.m So e generation for the system is provided through hydroelectric plaants nd alfe e lectricityded throughm ore alm 2,800 miles of transmission lines.

EKPC elected to conduct a suitability study to determine the routing of a 161kV line between the existing South Marion Industrial Substation and a Proposed Substation site option in Marion County, Kentucky. The route for the proposed transmission line considers many diverse factors, including existing land uses and habitats, special geographic classifications (e.g. National or State Parks, military sites, floodplains, wetlands), existing infrastructure co-building opportunities, impact to local human communities, previously-confirmed cultural resources, and threatened or endangered species.

The first step in the methodology was the development of Macro Corridors, which defined an area for more detailed study between the proposed endpoints. A 0.5-meter NAIP imagery dataset was used to provide context for the Macro Corridors. The land cover dataset utilized was the latest the National Land Cover Dataset from 2023 per the standard Kentucky Transmission Line Siting methodology. Slope data was derived from the latest 2023 USGS 5-meter DEM available from the KYAPED domain. Road features were compiled from the latest US TIGER line files.

Once Macro Corridor data was compiled and prepped, the Macro Corridors were used to develop a study area of approximately 2.17 square miles, with a straight line distance of approximately .87 miles from existing South Marion Industrial Substation and a Proposed Substation site option in Marion County.

Once the study area was identified, detailed dataset layers were developed for siting purposes. Using these detailed layers, Alternate Corridors were generated. For the purposes of this study, the study area represents a larger land area between the end points of the project, and through which corridors might be logically and practically identified. “Corridors” are defined as the most suitable areas for routing a transmission line within the study area. Corridors may vary greatly depending upon the resourcesn countered in the study area. “Routes” describe the potential centerline path of a transmission line, whereas a “corridor” is a more general area of sufficient width to contain the eventual right-of-way (ROW).

Per the Electric Power Research Institute-Kentucky (EPRI-KY) methodology described in Part III, four corridors (Built Natural, Engineering, and Simple Average) are produced that represent different perspectives for routing transmission facilities with respect to the dataset layers. The Built Corridor seeks to avoid impacts to human development and historical/ cultural resources. The Natural Corridor emphasizes protection of natural resources and avoiding impacts to natural plant and animal species. The Engineering Corridor maximizes co-location opportunities and avoids areas in which it would be geographically difficult to construct a new transmission line. Finally, the Simple Average Corridor weighs all criteria equally with no emphasis on any one group of criteria.

EKPC developed alternate route possibilities using the corridors identified through the above methodology. The possible alternate routes were evaluated and ranked, and analytical decisions were made based on the best practices of the EPRI model and EKPC stakeholders. The purpose of this report is to document the objective process for selecting a Preferred Route between the existing EKPC start and end locations.

PART II: PROJECT DESCRIPTION

EKPC utilized the EPRI-KY methodology to identify the preferred route for construction of a new 161 kV line from the existing South Marion Industrial Substation and a Proposed Substation site option. The new transmission line would serve identified load growth and would provide increased system reliability for the area.

Figure 1 Typical land cover within the project AOI (NV5 Field Photo)

PART III: OVERVIEW OF SUITABILITY ANALYSIS

EPRI-KY Methodology

The EPRI-KY methodology is a quantitative, computer-based methodology developed by EPRI and the commonwealth of Kentucky for use as a tool to evaluate the suitability of individual grid cells (15 feet by 15 feet) within a large area for locating transmission facilities. A study area was developed based on analysis of the geography between the endpoints of the proposed transmission line. Then, using more-detailed information for the grid cells within the study area, Alternate Corridors were developed for further evaluation. Within the Alternate Corridors, Alternate Routes were developed and analyzed to determine a Preferred Route.

The EPRI-KY methodology is an objective, comprehensive and consistent approach for routing a proposed transmission line. The EPRI-KY methodology provides a structured approach to apply quantitative stakeholder input and organize a vast amount of data. Figure 2 represents the EPRI-KY methodology.

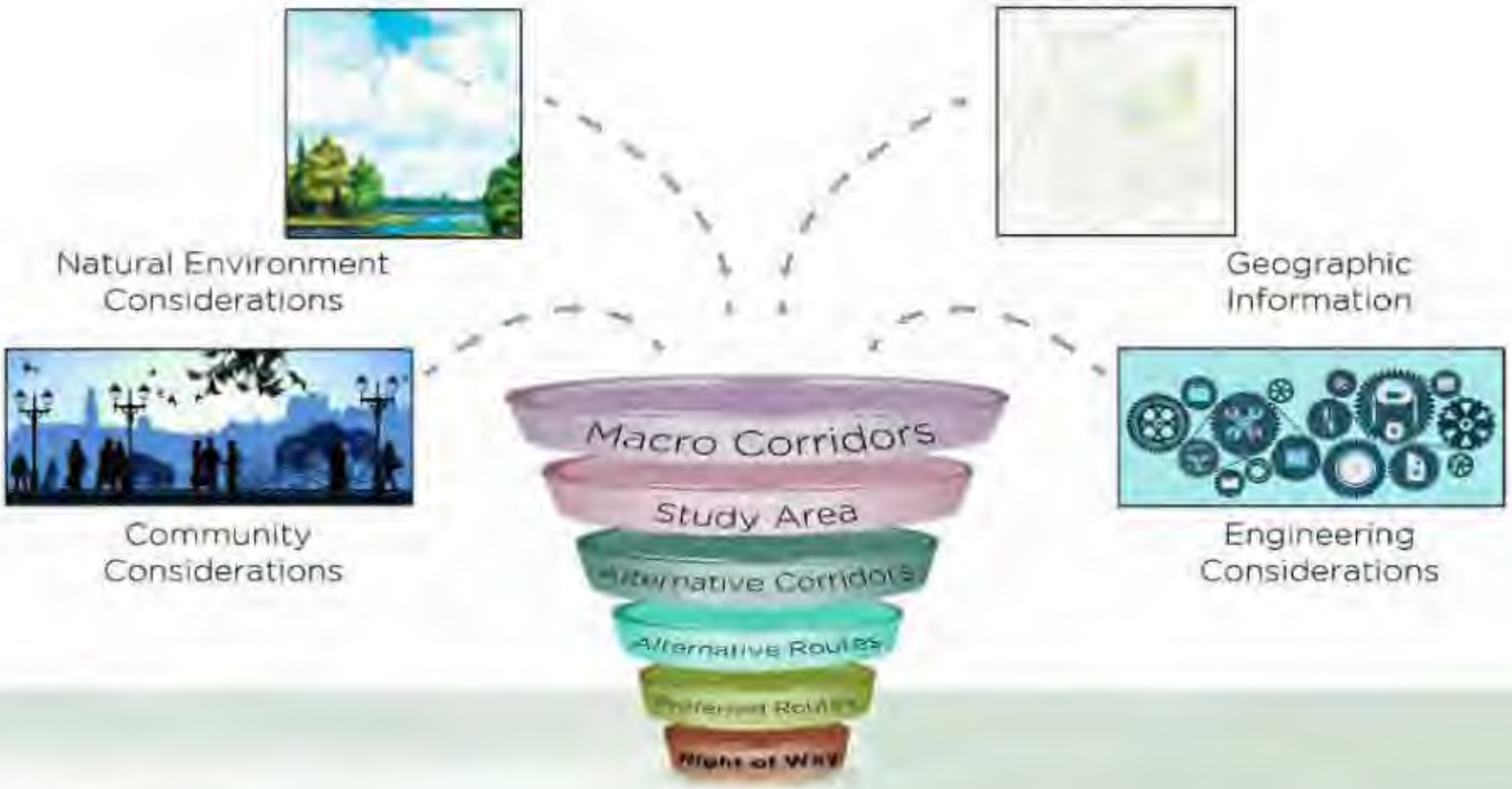


Figure 2: EPRI-KY Siting Methodology

The EPRI-KY methodology approaches corridor development by considering four broad environments:

- Built Environment minimizes the impact on people, places and cultural resources
- Natural Environment minimizes impacts to water resources, plants and animals
- Engineering Environment minimizes terrain restraints and construction variables
- Simple Average of Environments weighs each environment equally

Features within each of the environments were identified and evaluated to map the suitability of grid cells and develop Alternate Corridors. Simple Average Alternate Corridors were developed to consider all three environments equally. The environments are discussed in detail in the following sections.

The Siting Model

The siting model was developed using data collected during a stakeholder workshop in February 2006 in Lexington, Kentucky. The model was developed and tested by a project team of independent experts during the workshops. Stakeholders at the workshops represented a range of interests, such as environmental interest, historic preservation, homeowners' associations, agricultural groups, government agencies, and representatives of utility companies. The resulting model (shown in Table 1) includes data layers, features, layer weights and suitability values that were used for siting transmission lines. More information concerning these workshops is available in the Kentucky Transmission Line Siting Methodology (published by EPRI in 2007). Some minor adjustments can be made to this model for site specific and data availability reasons.

Co-location / Engineering		Natural Environment		Built Environment			
Linear Infrastructure	**86.2%**	**Floodplain**	**4.6%**	**Proximity to Buildings**	**16.8%**	**Proximity to Eligible Historic and Archeological Sites**	**31.0%**
Parallel Existing Transmission Lines	1	Background	1	Background	1	Background	1
Rebuild Existing Transmission Lines (good)	2.2	100 Year Floodplain	9	900-1200'	3.4	900-1200'	4.6
Background	4.4	**Streams/Wetlands**	**29.2%**	600-900'	5.7	600-900'	7.9
Parallel Interstates ROW	4.7	Background	1	300-600'	8	0-300'	8.6
Parallel Roads ROW	5.4	Streams < 5cfs+ Regulatory Buffer	6.2	0-300'	9	300-600'	9
Parallel Pipelines	5.6	Rivers/Streams > 5cfs+ Regulatory Buffer	7.1	**Building Density**	**8.4%**	**AVOIDANCE AREAS**	
Future DOT Plans	5.6	Wetlands + 30' Buffer	8.7	0 - 0.05 Buildings/Acre	1	Listed Archaeology Sites & Dist.	
Parallel Railway ROW	6.1	Outstanding State Resource Waters	9	0.05 - 0.2 Buildings/Acre	3	Listed NRHP Districts and Buildings	
Road ROW	7.2	**Public Lands**	**17.7%**	0.2 - 1 Buildings/Acre	5.6	City and County Parks	
Rebuild Existing Transmission Lines (bad)	8.6	Background	1	1 - 4 Buildings/Acre	8.5	Day Care Parcels	
Scenic Highways ROW	9	WMA - Not State Owned	5.1	> 4 Buildings/Acre	9	Cemetery Parcels	
Slope	**13.8%**	USFS (proclamation area)	6.2	**Proposed Development**	**3.9%**	School Parcels	
Slope 0-15%	1	Other Conservation Land	7.8	Background	1	Church Parcels	
Slope 15-30%	4	USFS (actually owned)	9	Proposed Development	9		
Slope 30-40%	6.7	State Owned Conservation Land	9	**Spannable Lakes and Ponds**	**4.0%**		
Slope >40%	9	**Land Cover**	**19.8%**	Background	1		
AVOIDANCE AREAS		Developed Land	1	Spannable Lakes and Ponds	9		
Non-Spannable Waterbodies		Agriculture	4.6	**Land Use**	**35.9%**		
Mines and Quarries (Active)		Forests	9	Commercial/Industrial	1		
Buildings		**Wildlife Habitat**	**28.7%**	Agriculture (crops)	3.5		
Airports		Background	1	Agriculture (other livestock)	4.6		
Military Facilities		Species of Concern Habitat	9	Silviculture	6		
Center Pivot Irrigation		**AVOIDANCE AREAS**		Other (forest)	6.7		
		EPA Superfund Sites		Equine Agri - Tourism	8		
		State and National Parks		Residential	9		
		USFS Wilderness Area					
		Wild/Scenic Rivers					
		Wildlife Refuge					
		State Nature Preserves					
		Designated Critical Habitat					

Table 1: KY EPRI Full Weighted Model

Data layers (green cells): Percentages represent relative importance, or weighting, of each layer in the siting process, as determined by stakeholders.

Features (yellow cells): Numbers between one and nine represent degrees of suitability, as determined by stakeholders, with one being most suitable for locating a transmission line and nine being least suitable for locating a line.

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

Each stakeholder was assigned to a breakout group for one of the three environments based on their interest (Built, Natural or Engineering Environments). Guided by an independent expert from the project team, each of these groups developed a set of data layers (shown in green in Table 1) with component features (shown in yellow), as well as avoidance areas (shown as 'areas of least preference' at the bottom of each of the environment columns). For example, one of the data layers in the Natural Environment is floodplains, which has two component features: background and 100-year floodplain.

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

> Areas that have High Suitability for an Overhead Electric Transmission Line (1, 2, 3)
> - These are areas that do not contain known sensitive resources or physical constraints, and therefore should be considered as suitable areas for the development of corridors.
>
> Moderate Suitability for an Overhead Electric Transmission Line (4, 5, 6) - These are areas that contain resources or land uses that are moderately sensitive to disturbance or that present a moderate physical constraint to overhead electric transmission line construction and operation. Resource conflicts or physical constraints in these areas can generally be reduced or avoided using standard mitigation measures.
>
> Low Suitability for an Overhead Electric Transmission Line (7, 8, 9) - These are areas that contain resources or land uses that present a potential for significant impacts that cannot be readily mitigated. Locating a transmission line in these areas would require careful siting or special design measures. It is important to note that these areas can be crossed but it is not desirable to do so if other alternatives are available.

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

One of the first steps in implementing the EPRI-KY methodology is identifying local areas of least preference within the study area where, if possible, the project area avoids locating facilities (i.e., state boundary waterbodies, sensitive areas, permitting delays, unique considerations etc.). Once these local areas are determined, suitability mapping of macro corridors can begin.

Suitability Mapping

The methodology began with the proposed starting and ending locations as the basis for creating Macro Corridors. The area in this vicinity was divided into grid cells 98.45 feet by 98.45 feet in size.

Data from aerial photography, geographic information systems (GIS), publicly available datasets and other sources were used to identify features within each grid cell. Based on these features and the values of data layer weights determined in the EPRI-KY Siting Model, a suitability value was assigned to each cell. The suitability is constrained in resolution by the input raster cell size of 98.45 feet.

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

Figure 3 through Figure 5 demonstrate the development of a sample optimal path using information from a hypothetical situation.

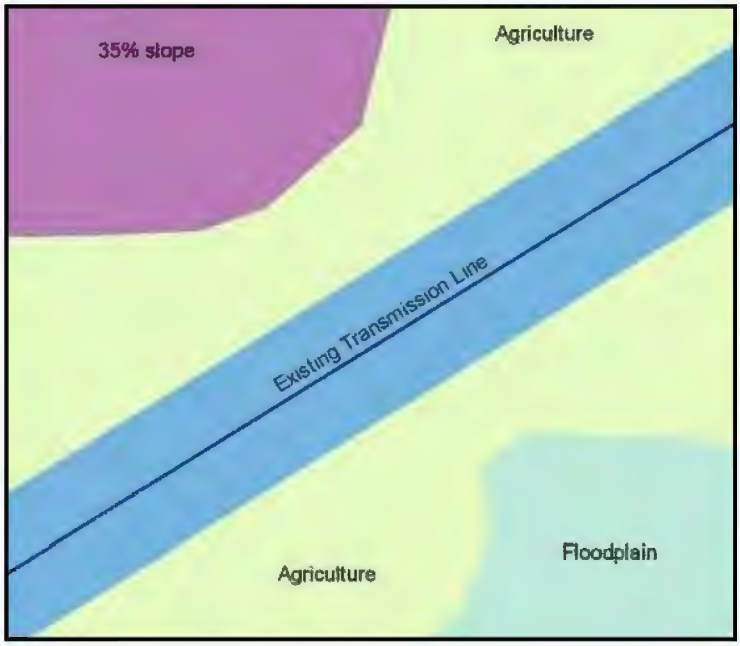


Figure 3 (Above): Feature Map of Example Area

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

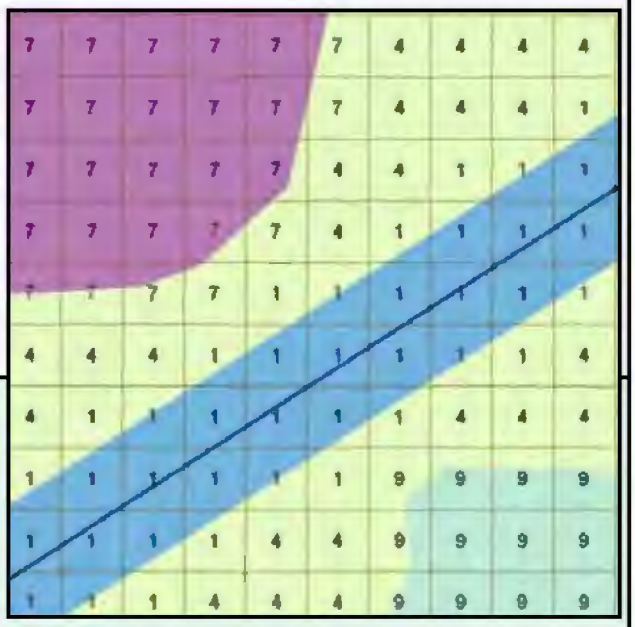


Figure 4 (Above): Grid Cell of Example Area with Suitability Values

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

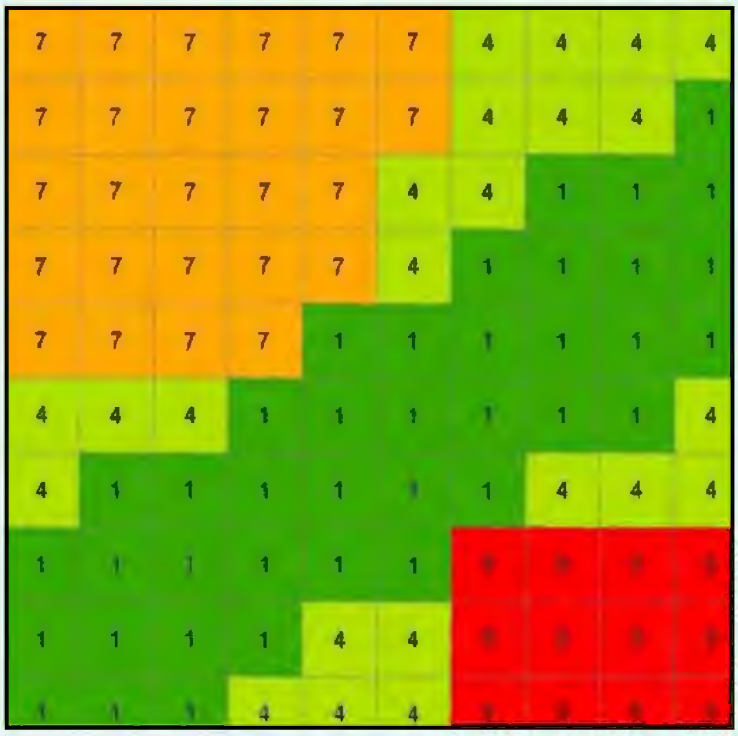


Figure 5: Suitability Map of Example Area

Finally, Figure 5 shows in green the most suitable corridor through the area for locating a transmission line. Light green areas are moderately suitable. The orange area has a moderate suitability value, and the red area is highly unsuitable. The most suitable corridor from East to West in this example was the one that follows the existing transmission line.

Developing Macro Corridors

As described above, the EPRI-KY methodology analyzed land tracts, or "grid cells," within the area to develop Macro Corridors. The analysis was based on GIS information that is readily available from public sources as well as data extracted from aerial photo interpretation. The data was then used to develop the grid cells. The numbers that were applied to the grid cells were taken from the siting model. The Macro Corridors developed from the model were the most suitable five percent of possible routes within the study area. Macro Corridors were then generated for each of the three environments (Built, Natural, and Engineering).

It should be noted that when generating Macro Corridors for each environment, data layers from the other two environments were taken into account. While the target environment was weighted much more heavily (five times so), values and weights from the other environments can affect Alternate Corridors generated for that respective environment. For example, when creating the engineering corridor, the engineering grid is given five times more weight than the built and natural grids when the three are added together. The equation would appear similar to ((Engineering Grid * 0.72) + (Built Grid * 0.14) + (Natural Grid * 0.14)) where 0.72 is five times greater than 0.14 and these three values add up to 1.

The final step in generating Macro Corridors was to equally weigh the three environments and generate a Simple Average Alternate Corridor. The equation for the Simple Average Corridor would look similar to ((Engineering Grid * 0.333) + (Built Gird * 0.333) + (Natural Grid * 0.333)). Once corridors are created, the top ten percent scores of the overall corridors are extracted to a vector format and buffered for a final Phase 1 study area.

The macro corridors present a larger 10,000 ft view of the suitability process. These corridors are fairly generic, do not take in much of the project specific nuances, and solely serve as the inputs to create the Phase 1 study area. To create a more detailed view and apply the EPRI-KY model, the next step in the process is to compile vector or raster data per the model at a much finer level of precision than the macro corridors. Whereas the macro corridors have cell resolution of 98.43 ft x 98.43 ft, the cell resolution of the Alternate corridors are much more detailed at a 15 ft x 15 ft resolution.

The following sections of this report provide information about features that were found within the study area, the creation and compilation of inputs to the EPRI-KY model for this specific project, suitability maps, Alternate Corridors, Alternate Routes geographies and score and the selection of a Preferred Route for construction of the proposed line.

PART IV: STUDY AREA DESCRIPTION

Study Area Location

The project study area located in central Marion County Kentucky.

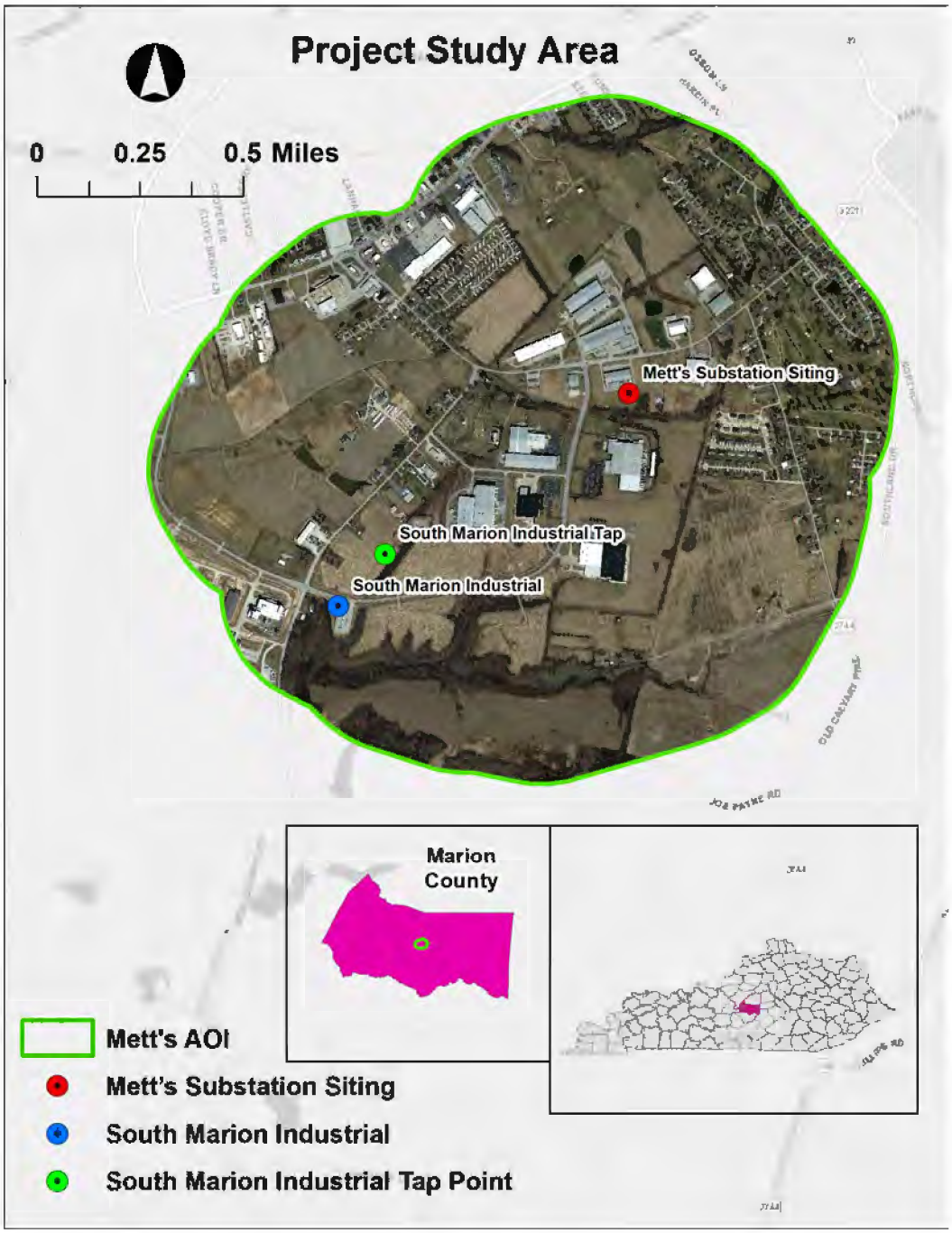


Figure 6: Project Study Area: Marion County Kentucky

Study Area Characteristics

Ecological Region

The project area crosses multiple ecological regions. The Knobs-Normal Upland (71c), and the Outer Bluegrass (71d) regions of the state which is an EPA- defined geographic and ecological region shown in Figure 7 below.

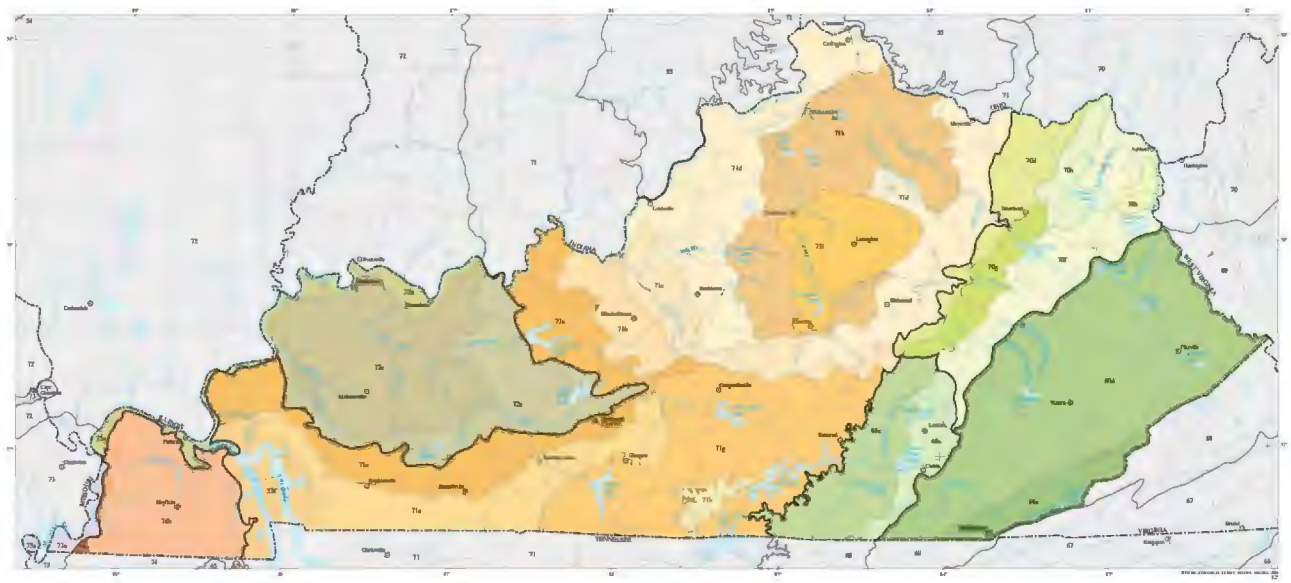


Figure 7 Ecological Regions of Kentucky. Source: http://ecologicalregions.info/data/ky/ky_front.pdf

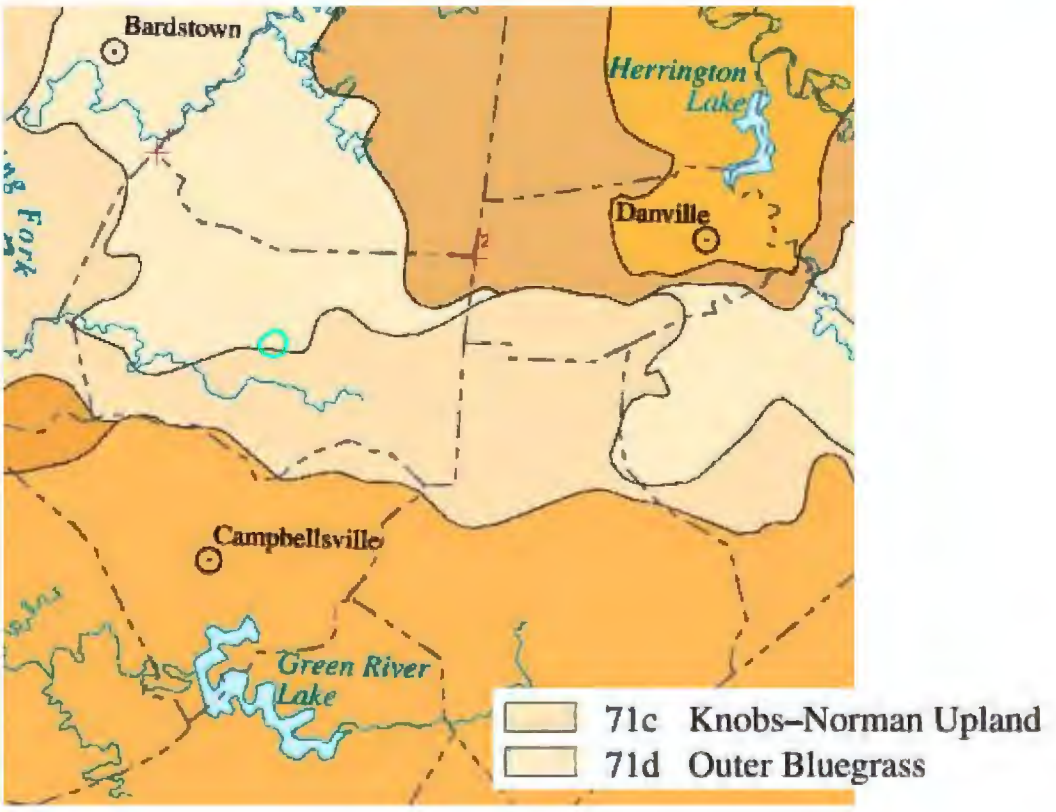


Figure 8: AOI Detail of Western Allegheny Plateau Ecoregion

The Knobs–Norman Upland is underlain by Pennsylvanian-age through Silurian-age sedimentary rocks. Its rounded hills and ridges are mostly forested and divide the Bluegrass (Ecoregions 71d, 71k, and 71l) from the rest of the Interior Plateau (71). Inceptisols and Ultisols occur on slopes and support mixed deciduous forests. Narrow, high gradient valleys are also common. In addition, a few wide, locally swampy valley floors occur and are used for livestock farming, general farming, and woodland. Ecoregion 71c is characterized by large amounts of geological, topographical, and ecological diversity. Overall, however, physiography, soils, lithology, and land use are distinct from the limestone- and Alfisol-dominated agricultural plains of Ecoregions 71b, 71d, 71e, and 71l. The density of perennial upland streams is far greater than on nearby limestone plains. Nutrient and ionic concentrations are much lower in streams that originate in Ecoregion 71d than outside it in heavily populated, agricultural ecoregions underlain by limestone. Fish and macroinvertebrate diversity is in between that of the Bluegrass (Ecoregions 71d, 71k, and 71l) and that of Ecoregions 71b, 71g, and 70g. The rolling to hilly Outer Bluegrass contains sinkholes, springs, entrenched rivers, and intermittent and perennial streams. Local relief is variable but is usually less than in the geomorphically distinct Knobs–Norman Upland (71c). Discontinuous glacial outwash and leached, pre-Wisconsinan till deposits occur in the north from Louisville to Covington. Glacial deposits do not occur elsewhere in Kentucky. Ecoregion 71d is mostly underlain by Upper Ordovician limestone and shale. Natural soil fertility is higher than in the shale-dominated Hills of the Bluegrass (71k). Today, pastureland and cropland are widespread and dissected areas are wooded. At the time of settlement, open savanna woodlands were found on most uplands. On less fertile, more acidic soils derived from Silurian dolomite, white oak stands occurred and had barren openings. Cane grew along streams and was especially common in the east. Distinct vegetation grew in areas underlain by glacial drift (see summary table). Upland streams have moderate to high gradients and cobble, boulder, or bedrock substrates. Mean stream density is greater than in Ecoregion 71l but less than in Ecoregion 71k. Mean summer stream temperatures are much warmer than in Ecoregions 71b, 71c, and 71e. Concentrations of suspended sediment and nutrients can be high. Source: http://ecologicalregions.info/data/ky/ky_front.pdf

Socioeconomics

According to the US Census, the Commonwealth of Kentucky's population growth from 2010 to 2020 was a 3.8% increase. Marion County experienced an 1.% increase in population between 2020 and 2022, with a total 2022 population of 19,775 people. Lebanon is the county seat and largest city in the area, with a population of 6,436. The 2022 Median household income was $49,627 with a 18.6% poverty level.

Transportation

The AOI is intersected by U.S. Highway 68 which is designated as a scenic highway and part to the heritage corridor. Also the Kentucky DOT has planned to improve connectivity and congestion between U.S. 68 and KY 55 on the East side of Lebanon.

Figure 9: Transportation Features intersecting AOI. (Google Earth Imagery)

Water Resources

No major waterbodies are found within the AOI.

PART V: ENGINEERING ENVIRONMENT

Table 2 shows the Engineering Environment sub-model of the Kentucky tailored EPRI siting model. The sub-model incorporates those features whose presence or absence should be considered from the perspective of constructing a transmission line.

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

Table 2: Engineering Environment Layers and Weights (Model Values)

Weights (Project-Adjusted Values)

Not all features are present within every study area. Each model and sub-model must be adjusted based on the contents of the study area for a particular project. When a feature or layer is absent, the weights are adjusted accordingly and evenly across the remaining features or layers. The Engineering Environment data layers and their relative weights for the Big Hill project are summarized in Table 3 Below. Items highlighted in gray are not present in the study area unless otherwise discussed below.

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

Table 3: Engineering Environment Adjusted Layers and Weights

Engineering Perspective Features

Parallel Existing Transmission Lines - An area that is a buffer half the distance to the existing ROW of transmission lines with the AOI. For this study, all lines were used for paralleling with a 50' buffer on each side of the ROW.

Rebuild Existing Transmission Lines (Good) – No "Good" Rebuild opportunities are those existing transmission lines and easements that are suitable for reconstruction as double-circuited.

Background – Any area within the AOI that is not listed as a specified engineering features.

Parallel Interstates – No parallel Interstates were present in the study area for this project.

Parallel Roads ROW – Parallel Roads ROW were considered for this perspective.

Parallel Pipelines - No Parallel Pipelines were present in the study area for this project.

Future DOT Plans – There are future DOT plans to improve connectivity and congestion between U.S. 68 and KY 55 on the East side of Lebanon.

Parallel Railway ROW – No Parallel Railways were present in the study area for this project.

Road ROW - there are highways, business lanes, and residential roads within the AOI. Road data was extracted from the US Census Bureau Tigerline Network.

Rebuild Existing Transmission lines (Bad)- Existing Transmission lines (Bad) were present in the study area for this project.

Scenic Highways ROW - Highway 68 is considered a Scenic Highways and the ROW were present in the study area for this project.

Avoidances

Non-Spannable Water Bodies – No Non-Spannable Waterbodies were present within the study area

Mines and Quarries – No Mines or Quarries were present within the study area.

Buildings - Numerous residential, government, business and agricultural buildings were found within the study area.

Airports- None present in the AOI.

Military Facilities - No military facilities were found within the study area.

Center Pivot Irrigation – Aerial photography interpretation was used to determine that there were no center pivots used for agriculture within the project study area.

Linear Infrastructure Features

High Suitability: Parallel Existing Transmission Lines

Opportunities for co-location that parallel existing transmission lines are the most desirable locations for routing new transmission lines. NV5 worked with EKPC to determine what the existing ROW for the transmission lines within the AOI are, as well as what the future ROW would be for the new line. The future EKPC line will have a 100' ROW therefore all parallel features will have an outside buffer half the ROW distance for 50'. Figure 11 displays the suitable ROW paralleling opportunities found within the study area, which were lines owned by EKPC and LGE & KU.

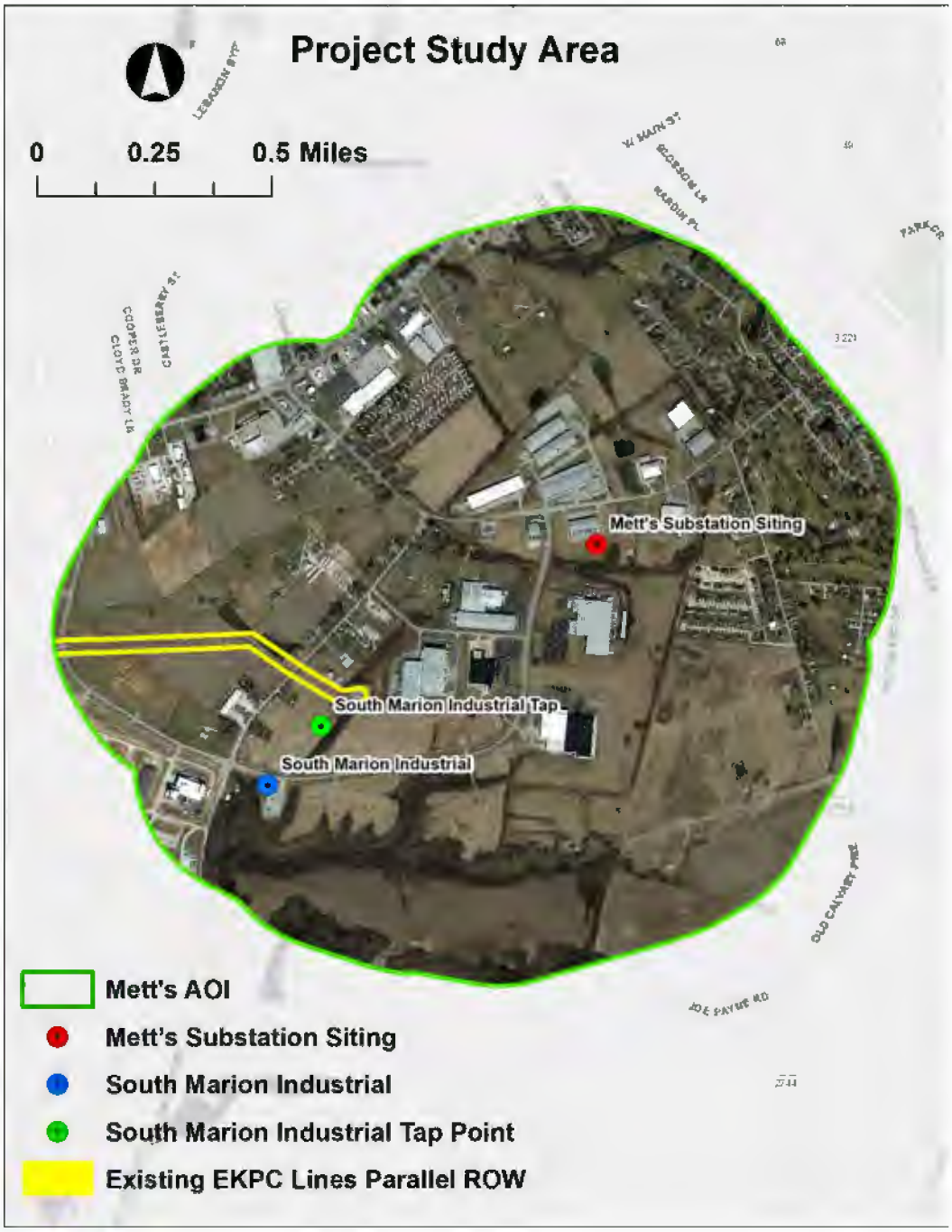


Figure 10: Parallel Existing Transmission Lines

Moderate Suitability: Parallel Road Right-of-Ways

Paralleling road ROW (50' buffer outside road ROW) are given a moderate suitability in the Engineering Environment. Within the study area, there were many roads that provided paralleling opportunities. Roads that were residential in nature and did not provide any connectivity were not considered. Figure 13 displays the suitable road ROW paralleling opportunities found within the study area. The road right-of-way data used in this analysis was created from US Census TIGER lines.

Figure 11: Parallel Road Right-of-Ways

Upcoming Department of Transportation projects are moderately suitable within the EPRI model. Within this project, there is one proposed by the DOT to improve connectivity and congestion between U.S. 68 and KY 55 on the East side of Lebanon. Data was referenced from the Kentucky Department of Transportation and transcribed into existing road features.

Figure 12: Future DOT

Lower Suitability: Road Right-of-Ways

Road ROWs are given a lower suitability in the Engineering Environment. The ROW feature is the area inside of the parallel roads feature and is derived from the same dataset (US Census Tiger Lines). Though it is often necessary to cross over existing road ROWs, the centerline of the transmission line should not travel directly down the center of an existing roadway. Figure 15 highlights existing road right of ways.

Figure 13: Road Right-of-Ways

The EPRI Model distinguishes between “good” and “bad” rebuild opportunities present in existing transmission lines. “Bad” rebuild opportunities represent transmission line easements with existing infrastructure that have been determined to be unsuitable to rebuild as a double-circuited transmission line. It could be feasible in some circumstances to rebuild an existing transmission line (Good) and use the existing easement, while purchasing only a minimal amount of additional ROW. For this project EKPC determined that All EKPC lines would be desirable to rebuild (Bad).

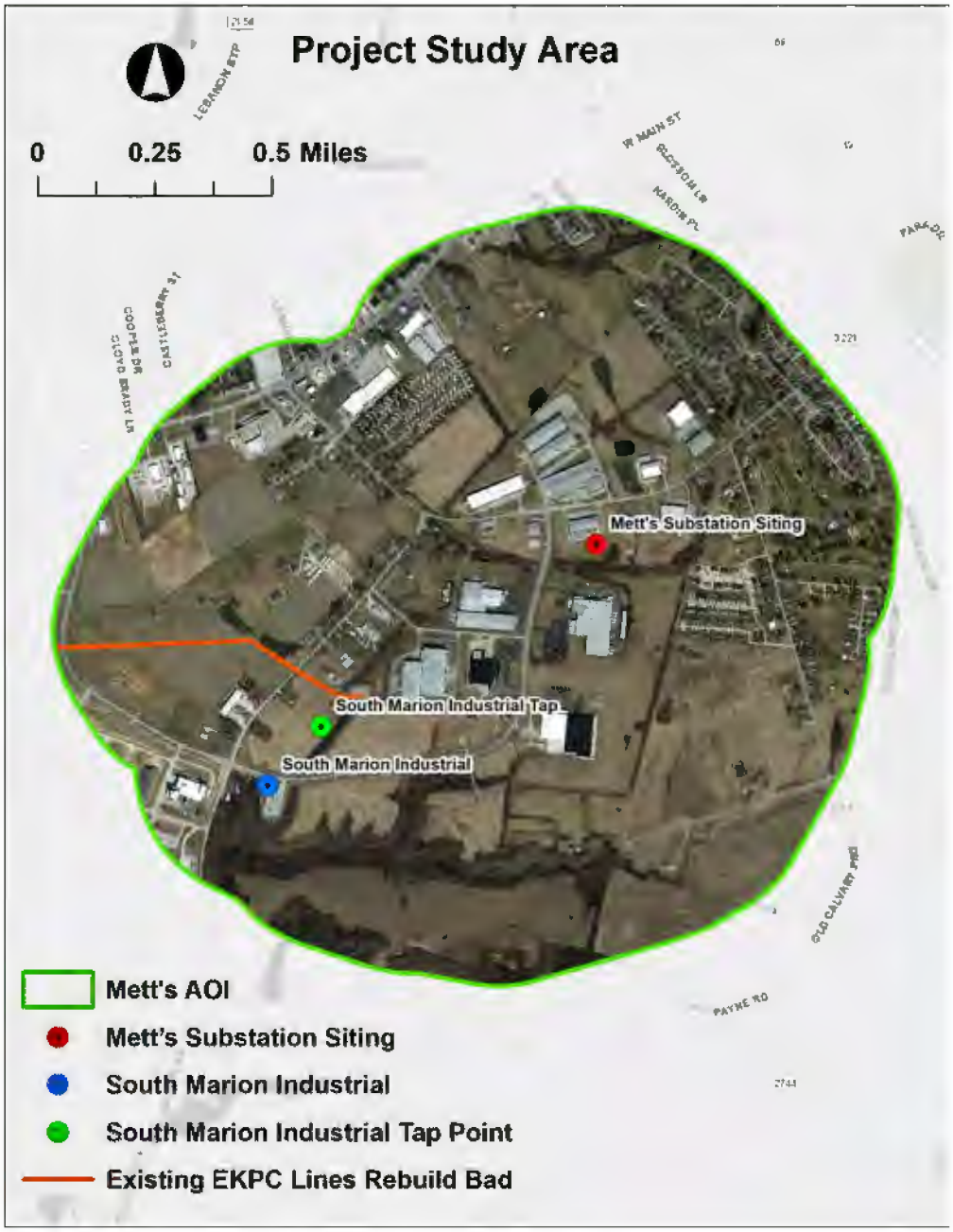


Figure 14: Rebuild (Bad) Existing Transmission Lines

Lower Suitability: Scenic Highways

Scenic Highways ROW are given a lower suitability in the Engineering Environment. The ROW feature is the area inside of the scenic highway feature and is derived from the KYTC road centerlines that reflect roadsides and viewsheds selected by the Kentucky Transportation Cabinet, Office of Local Programs for their scenic, natural, cultural, historical, archaeological, and/or recreational value worthy of preservation, restoration, protection, and enhancement.

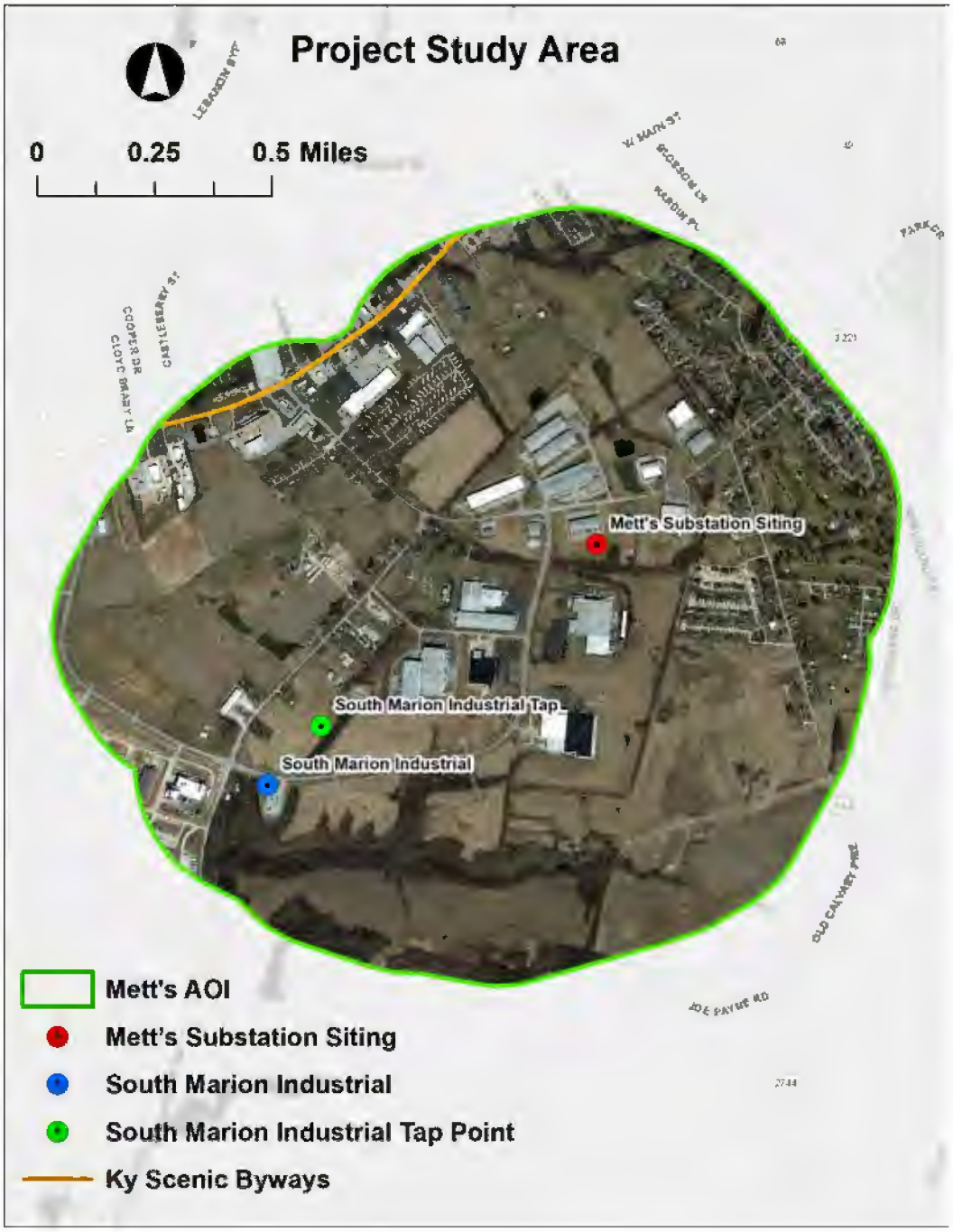


Figure 15: Scenic Highways ROW

Slope

The slope of the terrain can play a significant role in routing and constructing a transmission line. Using Digital Elevation Model (DEM) data for the commonwealth of Kentucky, percent slope is extracted and used in the model. Figure 16 details the locations and percentages of the slopes found within the study area. The steepest and least desirable areas in the project are found along the area where the forested plateau escarpments drop into narrow valleys and ravines. Slope percent breakdowns are set by the KY EPRI model at 0-15%, 15-30%, 30-40% and >40%.

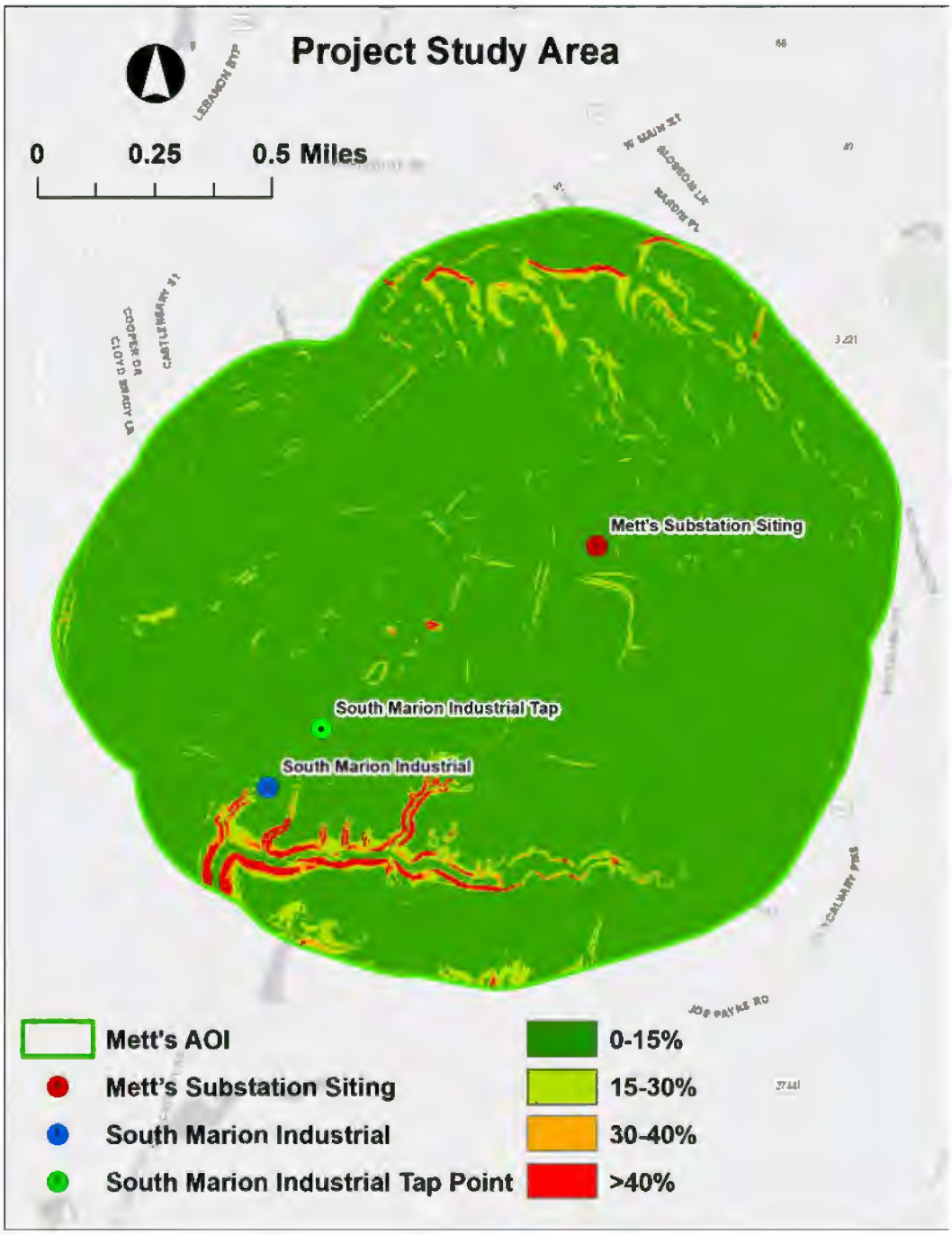


Figure 16: Slope

Parallel interstates, parallel pipelines, parallel railroad ROW, and Rebuild existing transmission lines (Good), were not present within the area of interest.

Avoidance Areas

Buildings, mines, quarries, airports, military facilities, and non-spannable water bodies are designated as areas of least preference in the Engineering Environment of the siting model. Within the study area, buildings were the only avoidance feature found to be present.

Buildings

Buildings are designated as areas of least preference within the Engineering Environment. NV5 Geospatial used basemap imagery to extract the footprints of buildings. The most prominent buildings within the AOI were residential, accounting for the highest percentage of the structure types in the AOI.

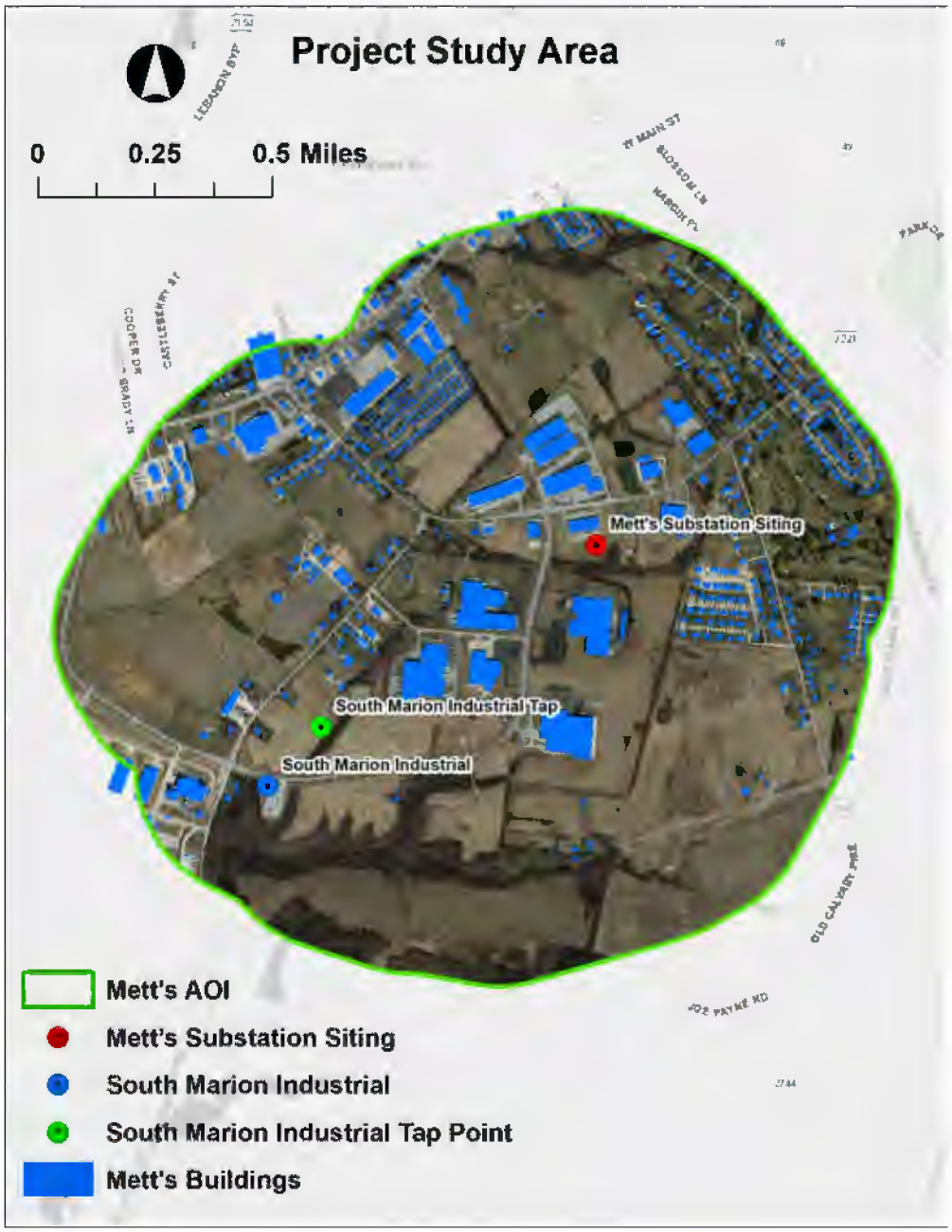


Figure 17: Avoidance Areas; Buildings

Figure 18: Building within the AOI (NV5 Field Photo)

Engineering Environment Features not present within the AOI

Parallel Interstates ROW

No parallel Interstates ROW were found to be present within the AOI.

Parallel Pipelines

No parallel Pipelines were found to be present within the AOI.

Parallel Railway ROW

No parallel Railways ROW were found to be present within the AOI.

Rebuild Existing Transmission Lines (Good)

No Rebuild Existing Transmission Lines (Good) were found to be present within the AOI.

PART VI: NATURAL ENVIRONMENT

Table 4 is the Natural Environment sub-model of the Kentucky tailored EPRI siting model. The sub-model incorporates those features whose presence or absence should be considered from the perspective of protecting the natural environment when constructing a transmission line.

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

Table 4: Natural Environment Layers and Weights (Model Values)

Natural Environment Data Layer Weights (Project-Adjusted Values)

Not all features are present within every study area. Each model and sub-model must be adjusted based on the contents of the study area for a particular project. When a feature or layer is absent, the weights are adjusted accordingly and evenly across the remaining features or layers. The Natural Environment data layers and their relative weights for the Big Hill project are summarized in Table 5 below. Items highlighted in gray are not present in the study area unless otherwise discussed below.

Natural Environment	
Floodplain	8.6%
Background	1
100 Year Floodplain	9
Streams/Wetlands	54.5%
Background	1
Streams < 5cfs+ Regulatory Buffer	6.4
Rivers/Streams > 5cfs+ Regulatory	7.3
Wetlands + 30' Buffer	9
~~Outstanding State Resource Wate~~	-
Public Lands	0.0%
~~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	36.9%
Developed Land	1
Agriculture	4.6
Forests	9
Wildlife Habitat	0.0%
~~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~~	

Table 5: Natural Environment Adjusted Data Layers and Weights

Natural Perspective Features

100 Year Floodplain- Federal Emergency Management Agency (FEMA) designated Federal 100-year floodplain. Approximately 14.43 acres of floodplain exist within the project study area, which is about 1% of the study area.

Streams/Rivers cf/s+ Regulatory Buffer – USGS National Map geospatial products delineate flowline features that have quantified cubic feet per second within their home watershed. These features were parsed out for the two features within the Natural Environment.

Wetlands + 30ft' Buffer – No wetlands were present in the study area for this project.
Outstanding State Resource Waters – There are no listings of State Resource Waters within the AOI
WMA – Not State Owned – There are no Wildlife Management Areas that are not owned by the state within the AOI.
Other Conservation Land – There are no conservation lands owned by Berea College within the AOI.
USFS (proclamation area) – There are no USFS Proclamation within the AOI

USFS (actually owned) – No USFS lands that are owned by the agency were present within the AOI.
State Owned Conservation Land – No State Conservation Lands exist within the AOI.
Land Use – Developed Land, Agriculture, Forest, are all present within the AOI.
Species of Concern Habitat – No species of concern habitat is present in the study area.

Avoidances

State & National Parks – Analysis of the tax parcel information obtained from the Marion County PVA and national records finds no areas that are federal or state owned parks within the AOI.

EPA Superfund Site – The EPA lists no current superfund sites in the study area.
USFS Wilderness Area – No Wilderness areas exist within the AOI.
Wild / Scenic Rivers – The National Wild & Scenic Rivers System lists no wild / scenic rivers within the AOI.

State Nature Preserves – Data from the Kentucky State Nature Preserve Commission indicates that there are no state nature preserves in the study area.
Wildlife Refuge – The Kentucky State Nature Preserve lists no wildlife refuges in the study area.
Designated Critical Habitat– No designated critical habitat is found in the study area.

Floodplain

Low Suitability: 100 Year Floodplain

The Natural Environment places a low desirability to build transmission within floodplains. The model utilizes the FEMA 100 Year Flood via the National Flood Hazard Map.

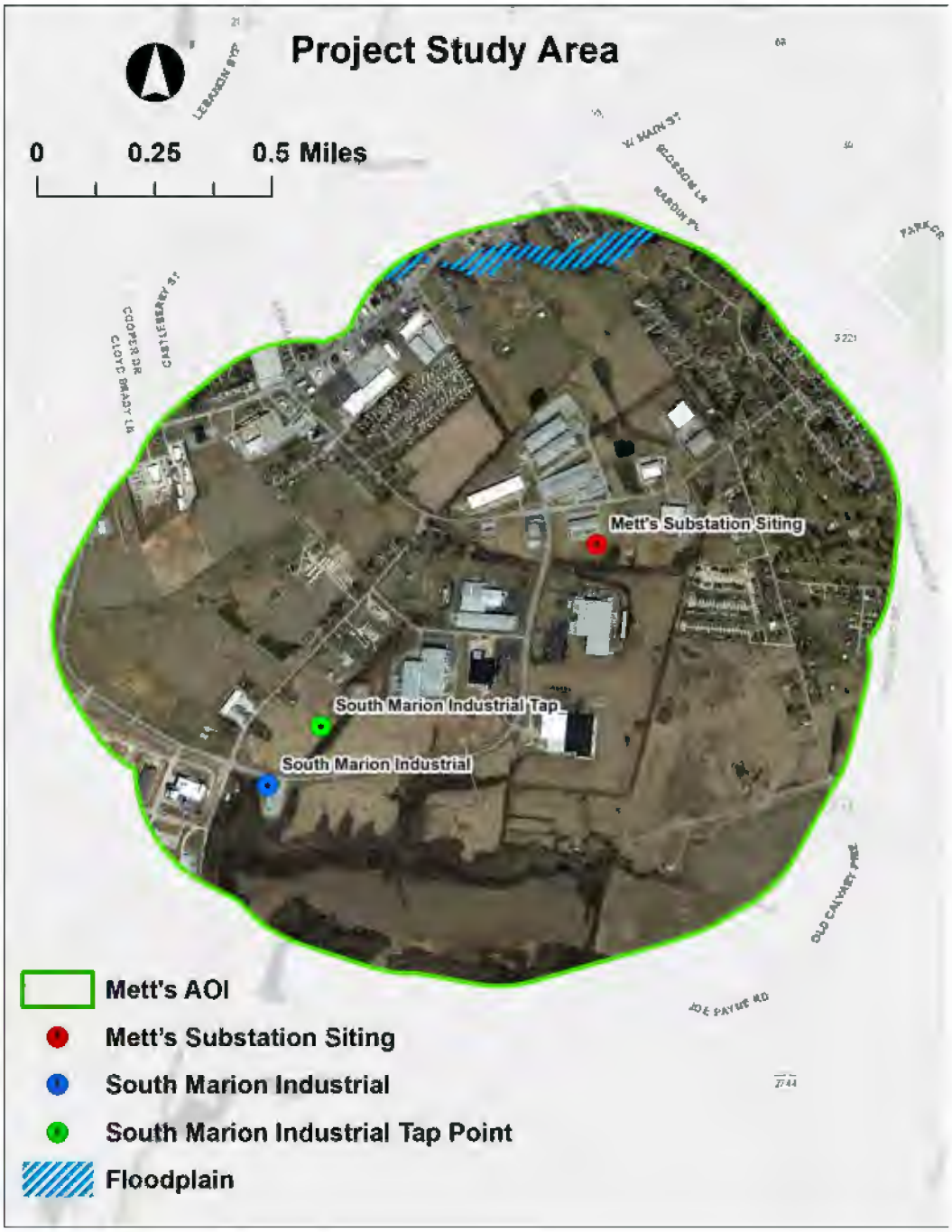


Figure 19: 100 Year Floodplain

Streams and Wetlands

Moderate to Low Suitability: Streams & Rivers

There are two categories for streams & rivers: those with a flow greater than five cubic feet per second (cf/s) and those whose flow is less than five cf/s. It is moderately suitable to cross a stream with a flow that is less than five cf/s and low suitability to crossing a stream with a flow greater than five cf/s. Figure 20 illustrates these river features.

No Wetlands were present within the study area.

Figure 20: Streams and Rivers

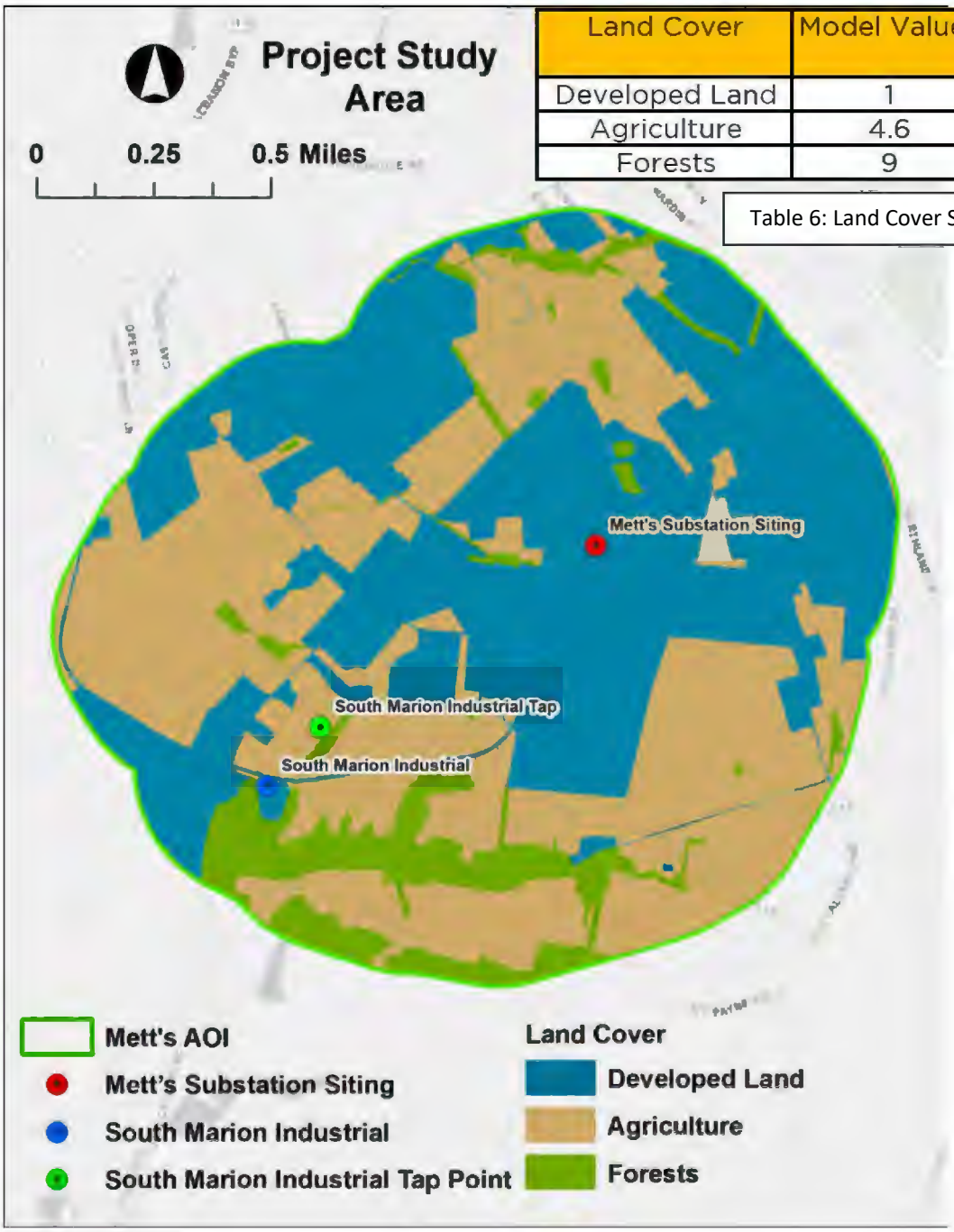
Public Lands

No WMA – Not State Owned, Other Conservation Land, USFS (proclamation area), USFS (actually owned), or State Owned Conservation Land were found within the study area.

Figure 21: Open Land (NV5 Field Photo)

Land Cover

In the Natural Environment, the sub-model finds developed land most suitable for transmission lines. Open and agricultural lands have moderate suitability for the construction of transmission lines. Naturally forested lands and hydrological features have the lowest suitability with respect to the Natural Environment. This layer was created by NV5 Geospatial through aerial photo interpretation of the most recent NAIP imagery as seen in Figure 22.



Land Cover	Model Value	Suitability
Developed Land	1	High
Agriculture	4.6	Moderate
Forests	9	Low

Table 6: Land Cover Suitability

Figure 22: Land Cover

Wildlife Habitat

Lowest Suitability: Species of Concern Habitat

No species of concern habitat was found within the study area.

Figure 23: Open Land (NV5 Field Photo)

Avoidance Areas

EPA Superfund Sites, State and National Parks, USFS Wilderness Area, Wild/Scenic Rivers, Wildlife Refuge, and State Nature Preserves are designated as areas of least preference in the Environmental Environment of the siting model. Within the study area none of these features were found to be present.

Natural Environment features not present within the AOI

Outstanding State Resource Waters

There are no Outstanding State Resource Waters within the AOI.

Wetlands

No wetlands were found to be present within the AOI.

WMA

No Wilderness Management Areas were found to be present within the AOI

State Owned Conservation Land

No State owned Conservation areas were found to be present within the AOI

USFS (Proclamation area)

No USFS (Proclamation area) was found to be present within the AOI

Other Conservation Land

No other Conservation land was found to be present within the study area.

USFS (actually owned)

No USFS land was found to be present within the study area.

State Owned Conservation Land

No State owned conservation land was found to be present within the study area.

Species of Concern Habitat

No Species of concern habitat was found to be present within the study area.

PART VII: BUILT ENVIRONMENT

Table 7 is the Built Environment sub-model of the Kentucky tailored EPRI Siting Model. The sub-model incorporates those features whose presence or absence should be considered from the perspective of preserving human development and activities, including view shed, when constructing a transmission line.

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

Table 7: Built Environment Data Layers and Weights

Built Environment Data Layer Weights (Project-Adjusted Values)

Not all features are present within every study area. Each model and sub-model must be adjusted based on the contents of the study area for a particular project. When a feature or layer is absent (greyed out), the weights are adjusted evenly across the remaining features or layers. The Built Environment data layers and their relative weights for the BIG HILL project are summarized in Table 8.

Built Environment			
Proximity to Buildings	**24.3%**	**Proximity to Eligible Historic and Archeological Sites**	**0.0%**
Background	1	~~Background~~	~~1~~
900-1200	3.4	~~900-1200~~	~~4.6~~
600-900	5.7	~~600-900~~	~~7.9~~
300-600	8	~~0-300~~	~~8.6~~
0-300	9	~~300-600~~	~~9~~
Building Density	**12.2%**	***AVOIDANCE AREAS***	
0 - 0.05 Buildings/Acre	1	~~Listed Archaeology Sites & Dist.~~	
0.05 - 0.2 Buildings/Acre	3.1	Listed NRHP Districts and Buildings	
0.2 - 1 Buildings/Acre	5.9	~~City and County Parks~~	
1 - 4 Buildings/Acre	9	Day Care Parcels	
~~> 4 Buildings/Acre~~	-	Cemetery Parcels	
Proposed Development	**5.7%**	~~School Parcels~~	
Background	1	~~Church Parcels~~	
Proposed Development	9		
Spannable Lakes and Ponds	**5.8%**		
Background	1		
Spannable Lakes and Ponds	9		
Land Use	**52.0%**		
Commercial/Industrial	1		
Agriculture (crops)	3.5		
Agriculture (other livestock)	4.6		
~~Silviculture~~	-		
Other (forest)	6.7		
~~Equine Agri - Tounsm~~	-		
Residential	9		

Table 8: Built Environment Adjusted Data Layers and Weights

Built Perspective Features

Proximity to Buildings- Building footprints are delineated from aerial photography with progressive 300' buffers applied to them to create the proximity feature. See Figure 25 for further details.

Building Density – Each building is given a centroid point and point densities are created with the EPRI contained area for calculated areas. See Figure 26 for further details.

Proposed Developments- Data from County sources revealed a proposed development within the AOI. See Figure 27 for further details.

Spannable Lakes and Ponds–Open waters, such as lakes, ponds, and rivers, are designated as less suitable for locating transmission lines. A number of small isolated water bodies exist in the study area. These areas are small enough to allow the construction of a transmission line, however, they still present challenges to the routing process. Therefore, according to the model, they should be circumnavigated where appropriate. Figure 28 depicts the location of water bodies distributed within the study area.

Land Use–Within the Built Perspective there are seven categories of land classification. Within this project five of them were found within the AOI and are detailed in Figure 29.

Proximity To Eligible Historic and Archaeological Sites- Utilizing University of Kentucky and national data sources, no eligible archaeological site were found within the AOI.

Avoidances

Listed Archaeology Sites and Districts–The UK Department of Archaeology has no listed sites or districts within the AOI.

National Register of Districts and Buildings– US National Register of Historic Places shows one feature, the Lebanon National Cemetery, within the AOI.

City and County Parks- Marion County PVA lists no parks within the AOI.

Day Care Parcels- Marion County PVA does list one day care parcels within the AOI.

Cemetery Parcels- Marion County PVA does list one cemetery parcel within the AOI.

School Parcels- Marion County PVA does not list school parcels within the AOI.

Church Parcels- Marion County PVA does list Church parcels within the AOI.

Figure 24: Built Avoidances within the Project AOI (NV5 Field Survey)

Proximity to Buildings

In the Built Environment, it is more suitable to locate a transmission line away from buildings. The model has five categories to rank the proximity to buildings layer for suitability at 300 ft increments. The background category constitutes all areas that are farther than 1,200 ft from any building. This data was derived and complied by NV5 from analysis from aerial photography. It is displayed in Figure 25. Building proximity was determined by buffering half the distance to the ROW (50ft from building footprints), and then applying the 300 ft incremental buffer zones.

Proximity to Buildings	Model Value	Suitability
Background	1	High
900-1200'	3.4	Moderate
600-900'	5.7	Moderate
300-600'	8	Low
0-300'	9	Low

Table 9: Building Proximity Suitability

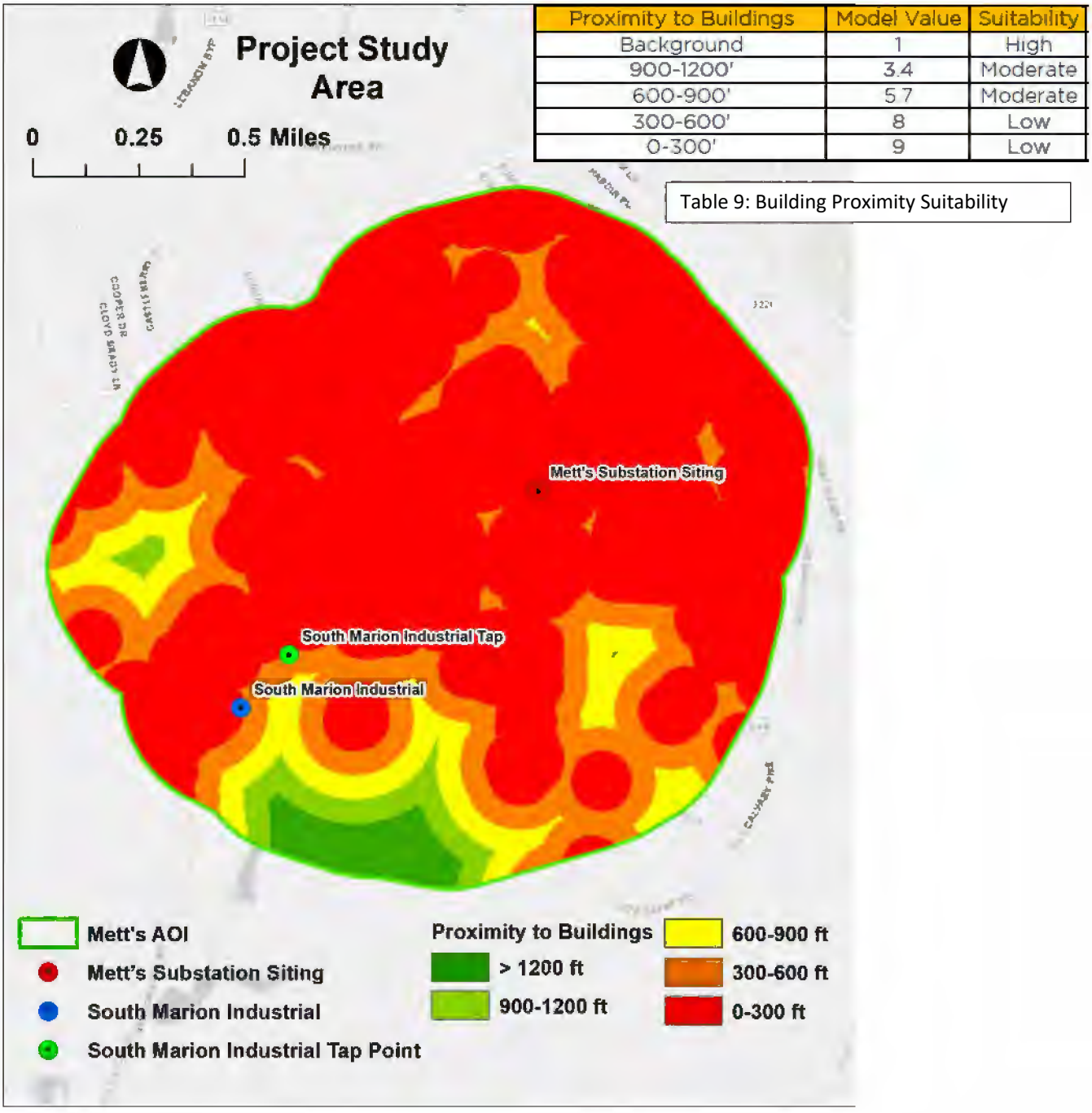


Figure 25: Proximity to Buildings

Building Density

Areas of lower building density are considered more suitable to locate a transmission line within the Built Environment. The density metric is broken down into four classifications which can be viewed in table below. Building centroid information was derived by NV5 from analysis of the same building centroids and footprints as the building proximity layer. Areas of building density of greater than 4 buildings per acre are not present within this AOI.

Building Density	Model Value	Suitability
0 - 0.05 Buildings/Acre	1	High
0.05 - 0.2 Buildings/Acre	3.1	Moderate
0.2 - 1 Buildings/Acre	5.9	Moderate
1 - 4 Buildings/Acre	9	Low

Table 10: Building Density Suitability

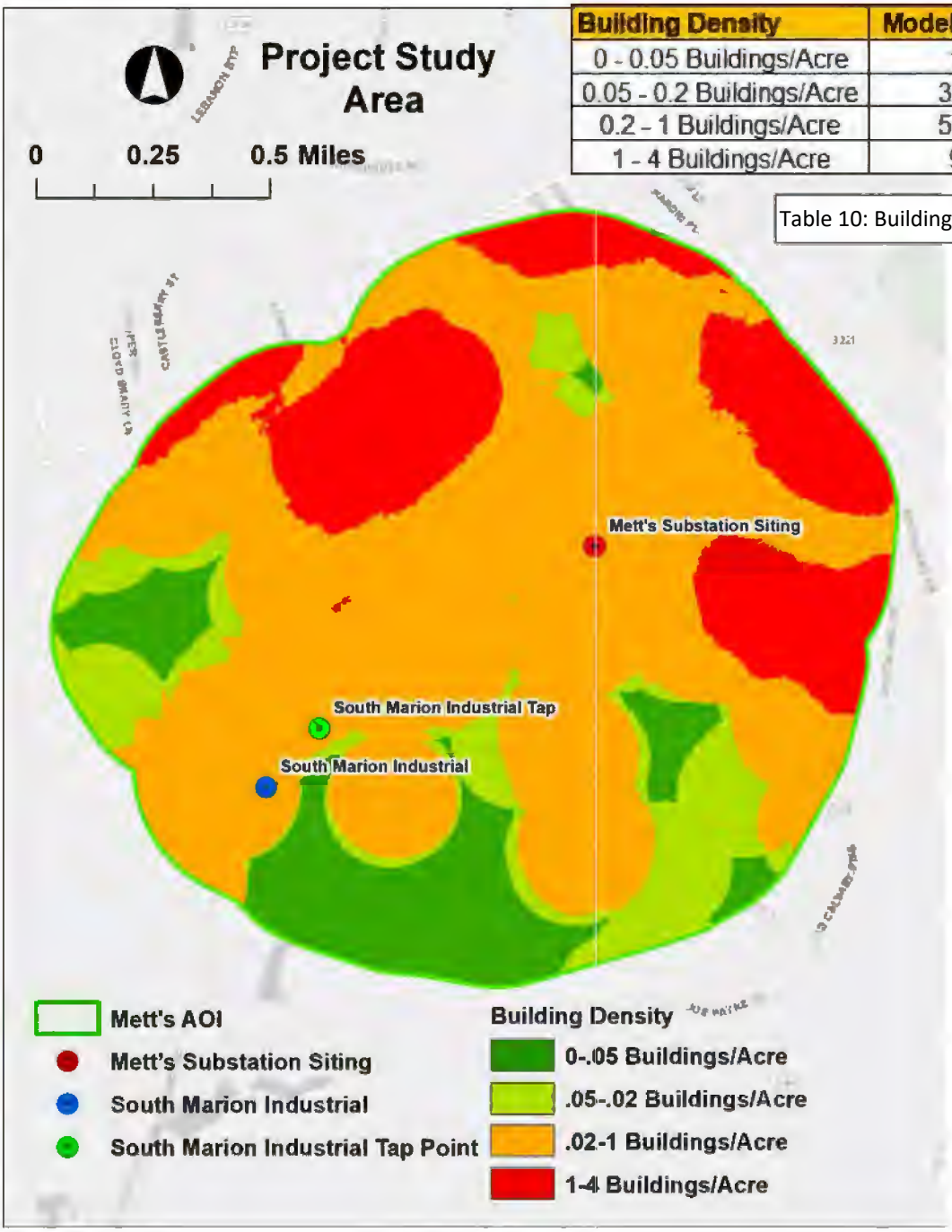


Figure 26: Building Density

Proposed Development

Low Suitability: Proposed Development

Within the EPRI model, areas for proposed development are found to be low suitability for building a new transmission line. For the Marion project,one proposed development was within the AOI. The parcel owned by Diageo Americas Supply INC. is developing a new distillery. Construction of much of the project has already been completed, however Diageo is in the process of building additional warehouses.

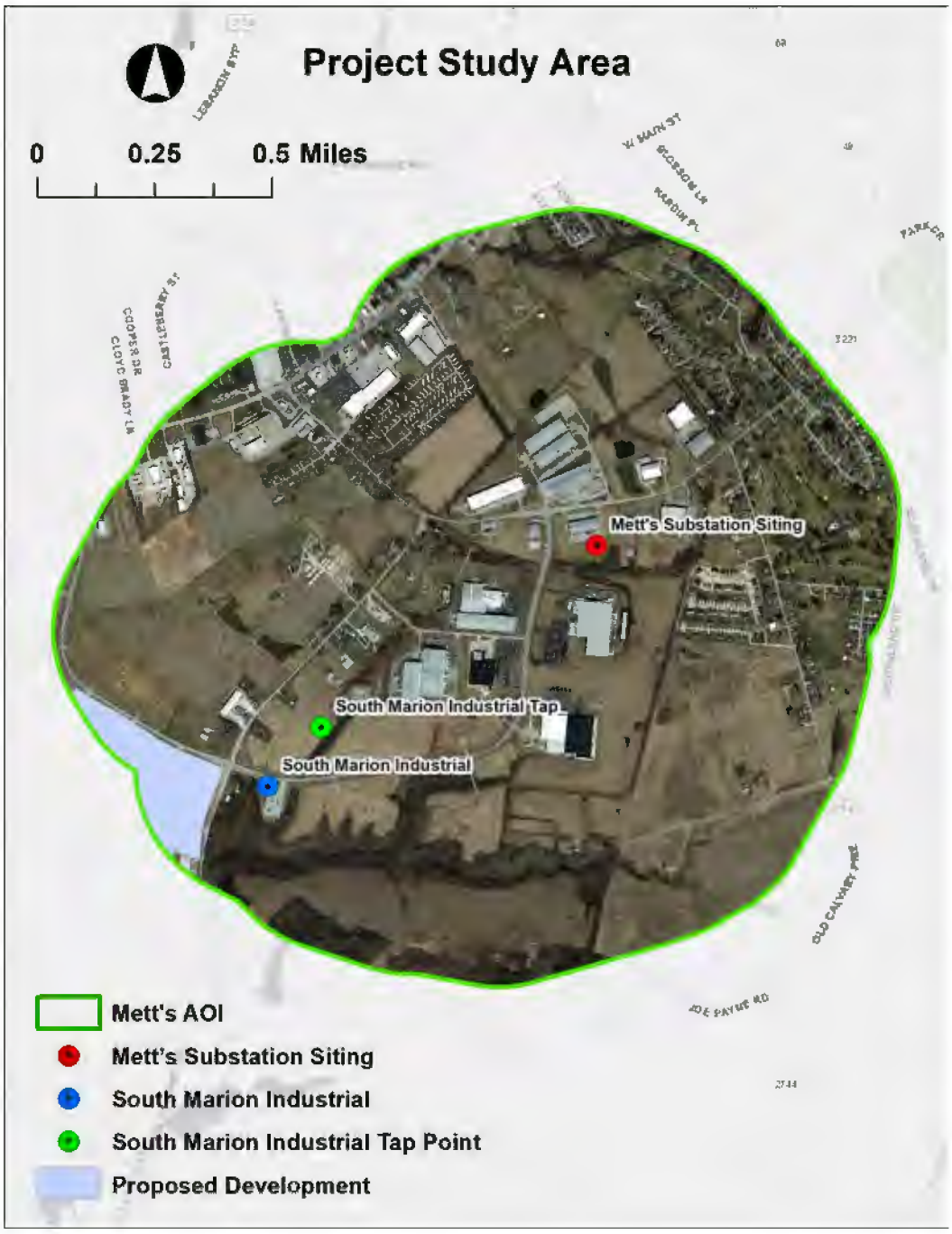


Figure 27: Proposed Development

Waterbodies

Low Suitability: Spannable Lakes and Ponds

Open waters, such as lakes, ponds, and rivers, are designated as less suitable for locating transmission lines. Several small, isolated water bodies exist in the study area. These areas are small enough to allow the construction of a transmission line, however, they still present challenges to the routing process. Figure 28 depicts the location of water bodies distributed within the study area.

The hydrologic features were extracted from aerial photography interpretation andsupplemented by the NHD of water bodies in the study area.

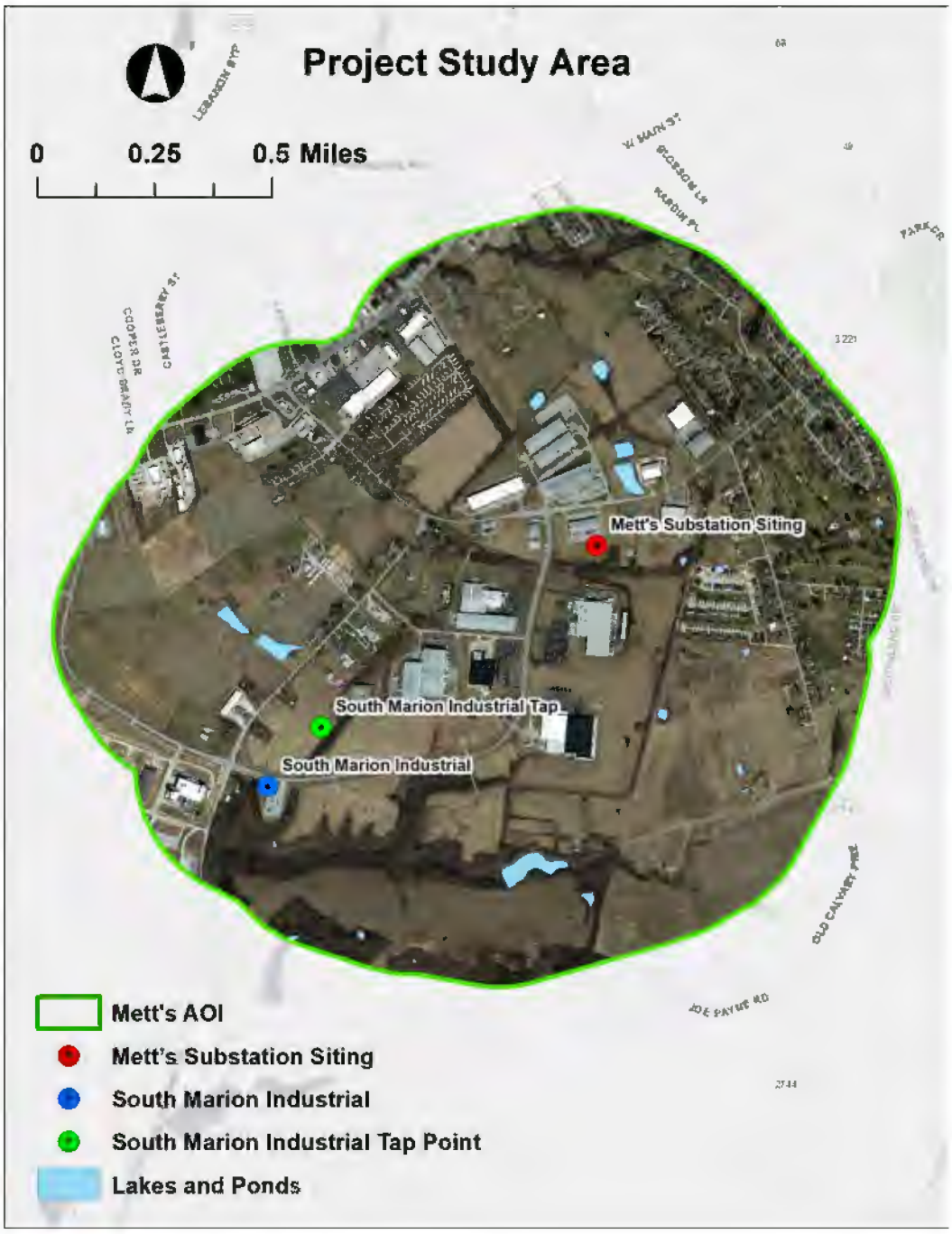


Figure 28: Spannable Lakes and Ponds

Land Use

Land use within the build environment considers commercial or industrial land to be the most suitable for locating transmission lines. Figure 29 shows the existing land use patterns within the study area. Table 11 shows the land use classifications considered by the model. Silviculture and equine agri-tourism classifications were not present in the project AOI. The land use data was extracted using aerial imagery by NG5 and cross-referenced with County PVA parcel data.

Land Use	Model Value	Suitability
Commercial/Industrial	1	High
Agriculture (crops)	3.5	Moderate
Agriculture (livestock)	4.6	Moderate
Other (forest/river)	6.7	Low
Residential	9	Low

Table 11: Land Use Suitability

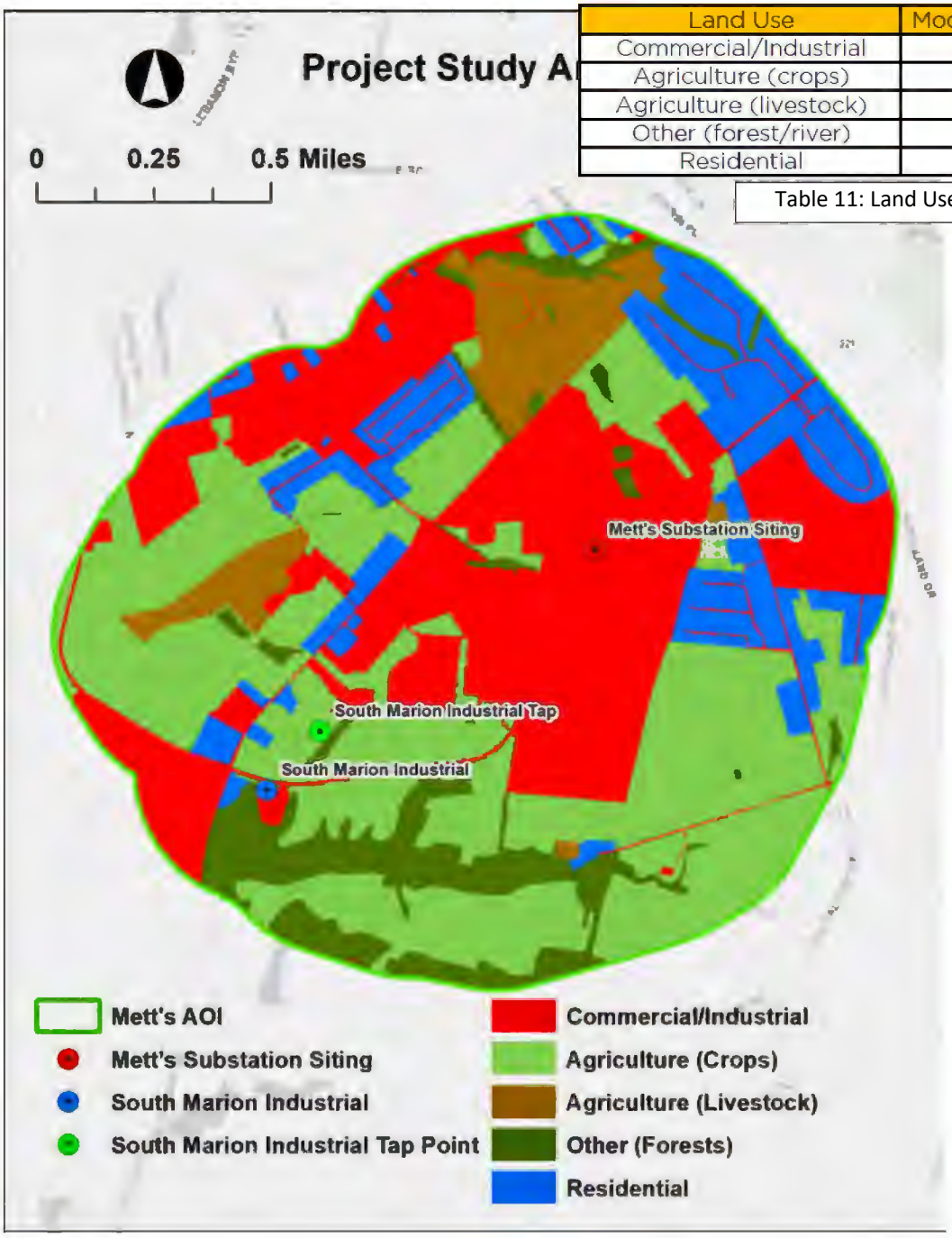


Figure 29: Land Use

Built Environment features not present within the AOI

Building Density

Areas of building density greater than 4 buildings per acre are not present within the AOI

Silviculture

Using aerial imagery, it was determined that no silviculture was found to be present within the AOI

Equine Agri - Tourism

The AOI was cross referenced with the Kentucky Thoroughbred Farm Managers' Club and no Equine Agri - Tourism areas were found to be present within the AOI

Avoidance Areas

Listed Archaeology Sites & Districts- After reviewing UK, State, and National data sources no listed archaeology features were found within the AOI.

Listed NRHP Districts and Buildings- there is one National Historical Registered place, the Lebanon National Cemetery was found within the AOI.

City and County Parks- No parks were found within the AOI.

Day Care Parcels- One day-care parcel was found within the AOI.

Cemetery Parcels - In the project study area one cemetery was found.

School Parcels- No school parcels were found within the AOI.

Church Parcels- No religious parcels were found within the AOI.

Present features can be seen in Figure 30 on the next page.

Avoidance Areas

Listed Archaeological sites, Listed NHRP, City and County parks, Daycare Parcels, Cemeteries, School parcels, and church parcels are designated as areas of least preference in the Built Environment of the siting model. Within the study area, a National Registered Histroric cemetery and a Daycare are the only avoidance features found to be present.

Cemetery and Daycare Parcels

Cemeteries are designated as areas of least preference within the Built Environment. NV5 Geospatial used basemap imagery and parcel to extract the Cemeteries. The only cemetery found within the AOI is also a listed national registered and historic place, The Lebanon National Cemetery.
One active Daycare was also found within the AOI.

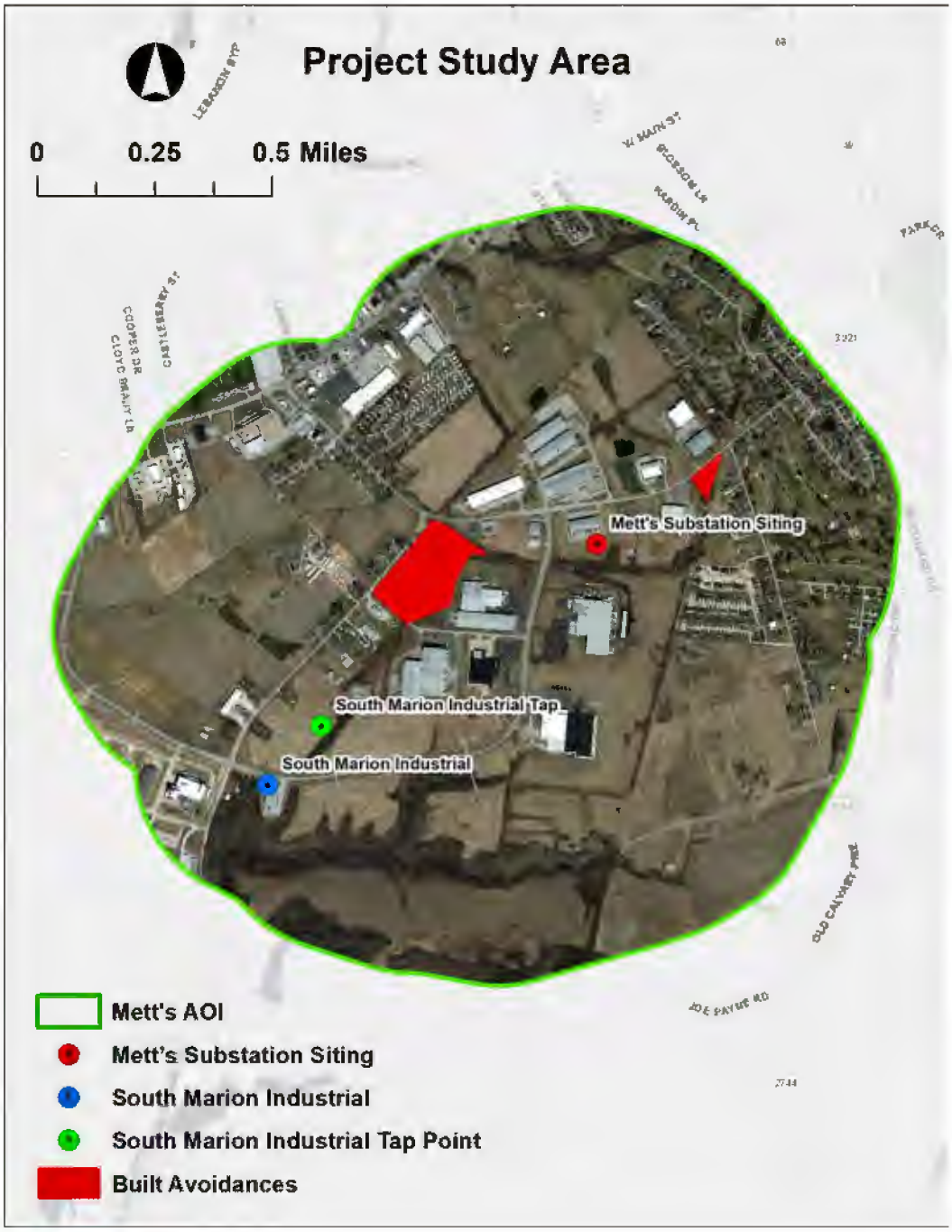


Figure 30: Built Avoidance Areas

PART VIII: SUITABILITY SURFACES

Once all inputs for the environments were researched and created, values and weights were redistributed for each feature and perspective. The normalizing of missing values follows a min-max routine that is part of the standard EPRI methodology. For example, within the Natural perspective, Outstanding State Resource Waters are the least desirable location (score of 9) of Streams/Wetlands to build a transmission line. Since there are no Outstanding State Resource Waters within the Marion study area, that value of 9 is re-assigned to the next least desirable feature (Road ROW), and every other feature's score is increased proportionally.

See pages 24 and 25 regarding Tables 4 and 5 for specific reallocation of weighted percentages within this example.

The next step in the analysis is to take all the avoidance features and create an avoidance area that is removed from the suitability mapping. This is done to limit the prospective corridors from being created over features that have been identified within the model.

Once model weights and avoidance features have been completed, the next step in the methodology is to create Suitability Surfaces by combining the three sub-model inputs (Engineering, Natural, and Built) described in the preceding sections. Each Suitability Surface represents a weighted combination of the three sub-models. This means that for the Engineering Suitability, its features are weighted 5x the amount of the Built and Natural perspectives. By utilizing this approach, each perspective has a higher weight, but is still slightly influenced by the other features within other perspectives. There is finally a Simple Suitability Surface that is the equal distribution of weight from each perspective, to create four total surfaces.

The Suitability Surfaces are shown in Figure 31 through Figure 34. The optimal path algorithm was then applied to each surface to develop the four Alternate Corridors with the top ten percent extracted and displayed in Figures 35 through 38.

Engineering Suitability Surface

The data layers from the Engineering Environment are given five times (72%) the emphasis of the Built (14%) and Natural (14%) groups, as shown in Figure 31.

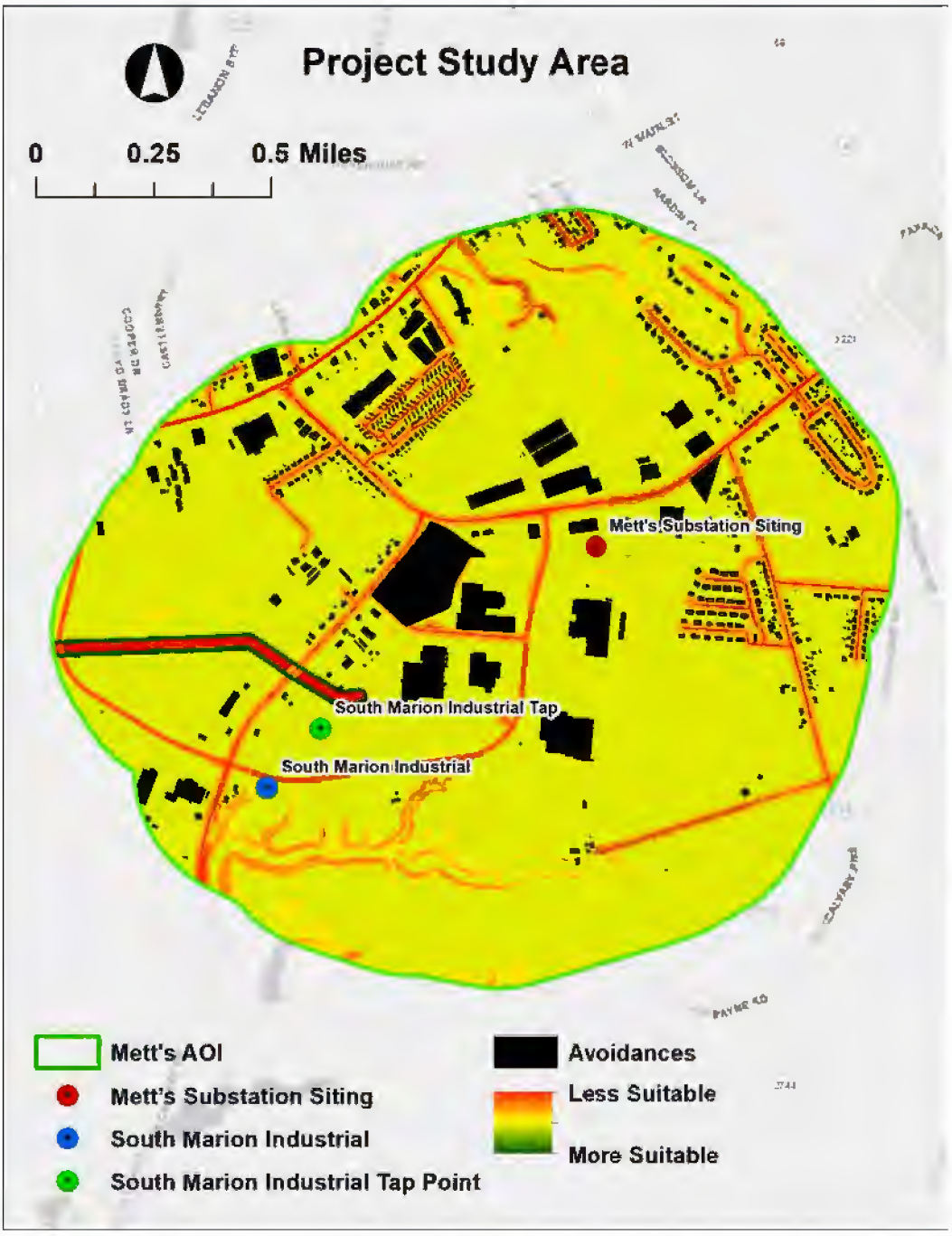


Figure 31: Engineering Suitability Surface

Natural Suitability Surface

The data layers from the Natural Environment are given five times (72%) the emphasis of the Engineering (14%) and Built (14%) groups, as shown in Figure 32.

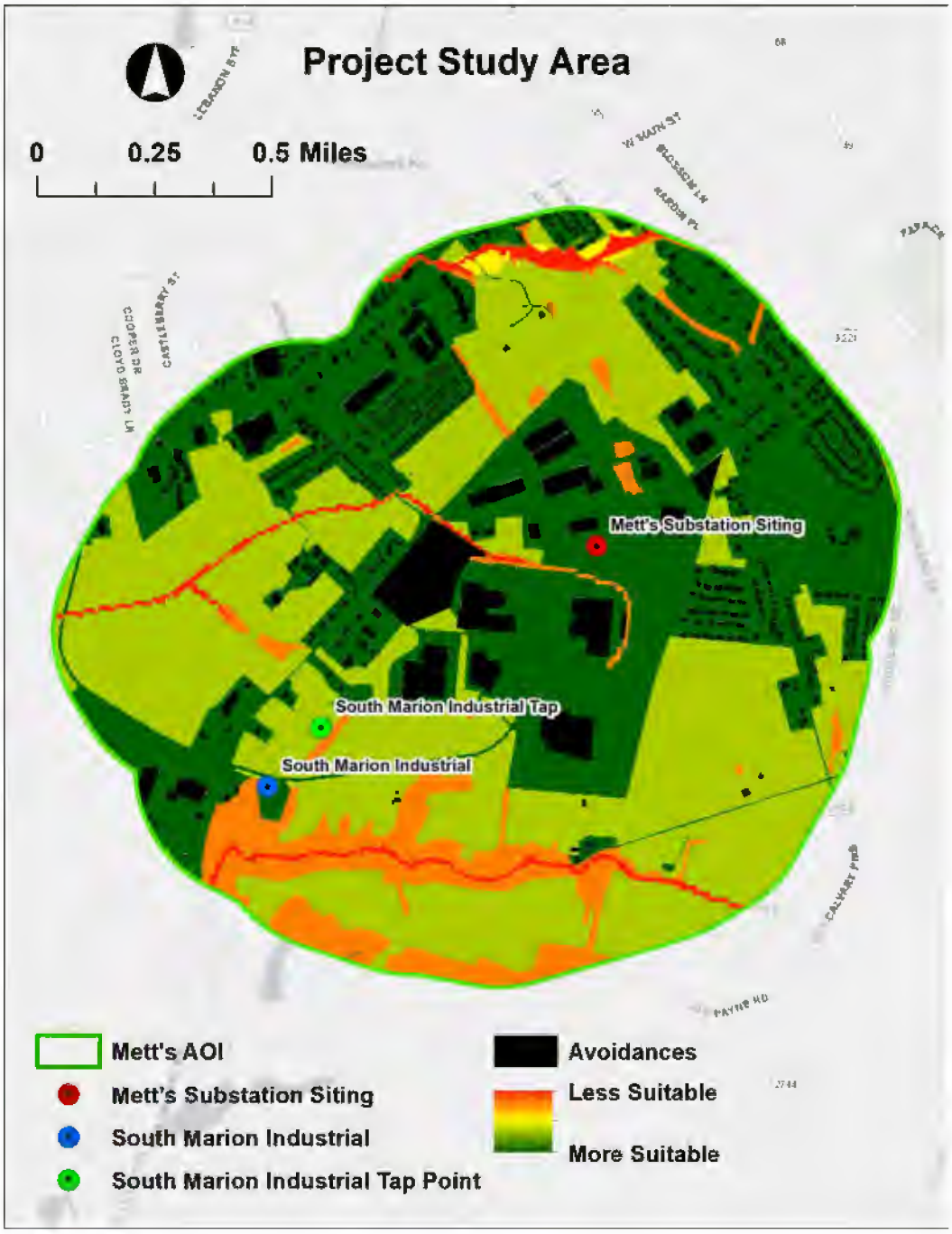


Figure 32: Natural Suitability Surface

Built Suitability Surface

The data layers from the Built Environment are given five times (72%) the emphasis of the Engineering (14%) and Natural (14%) groups, as shown in Figure 33.

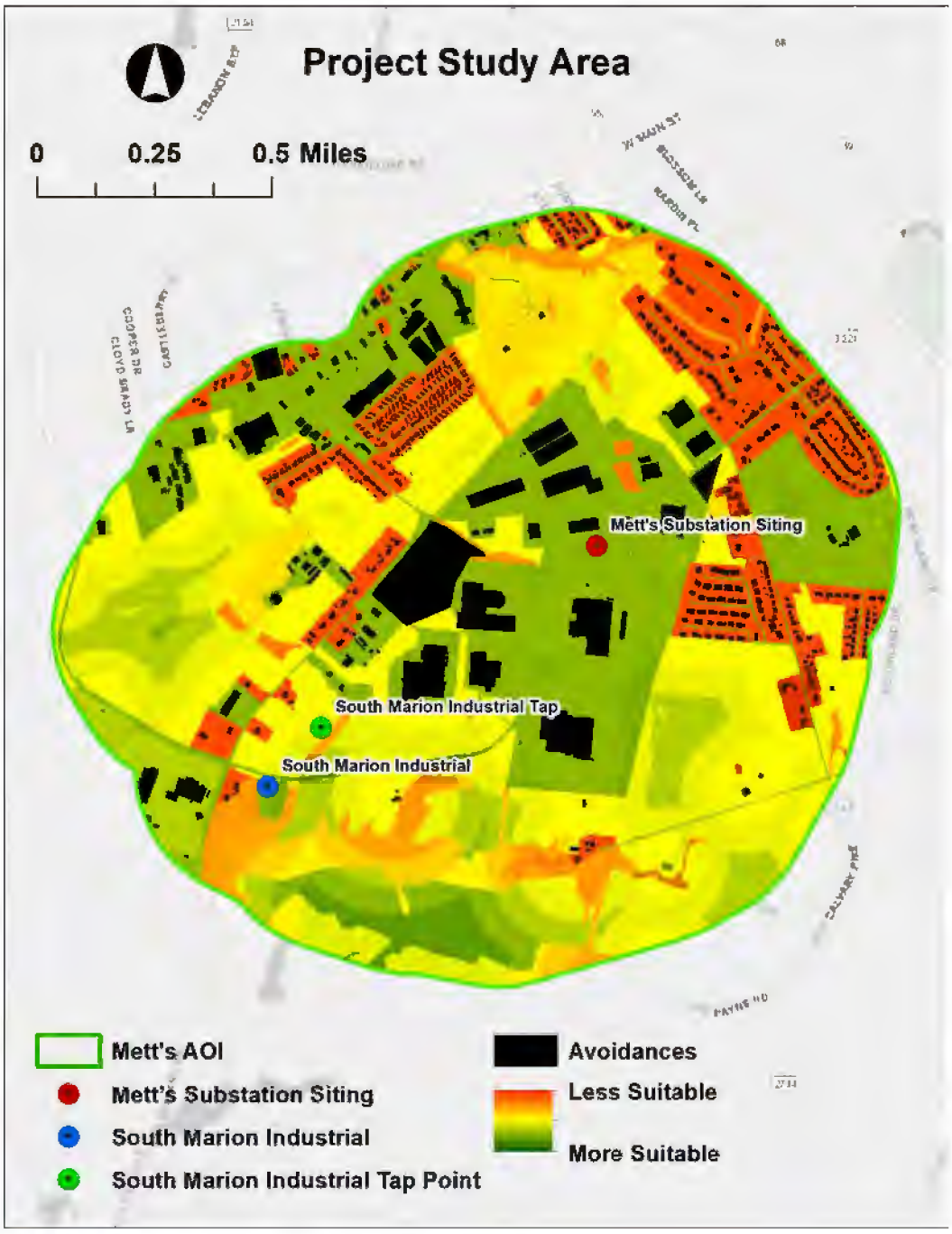


Figure 33: Built Suitability Surface

Simple Suitability Surface

The data layers from all the perspectives are given equal weights to create the Simple Suitability Surface. The breakdown of the weights are Natural (33.3%), Engineering (33.3%) and Built (33.3%) as shown in Figure 34.

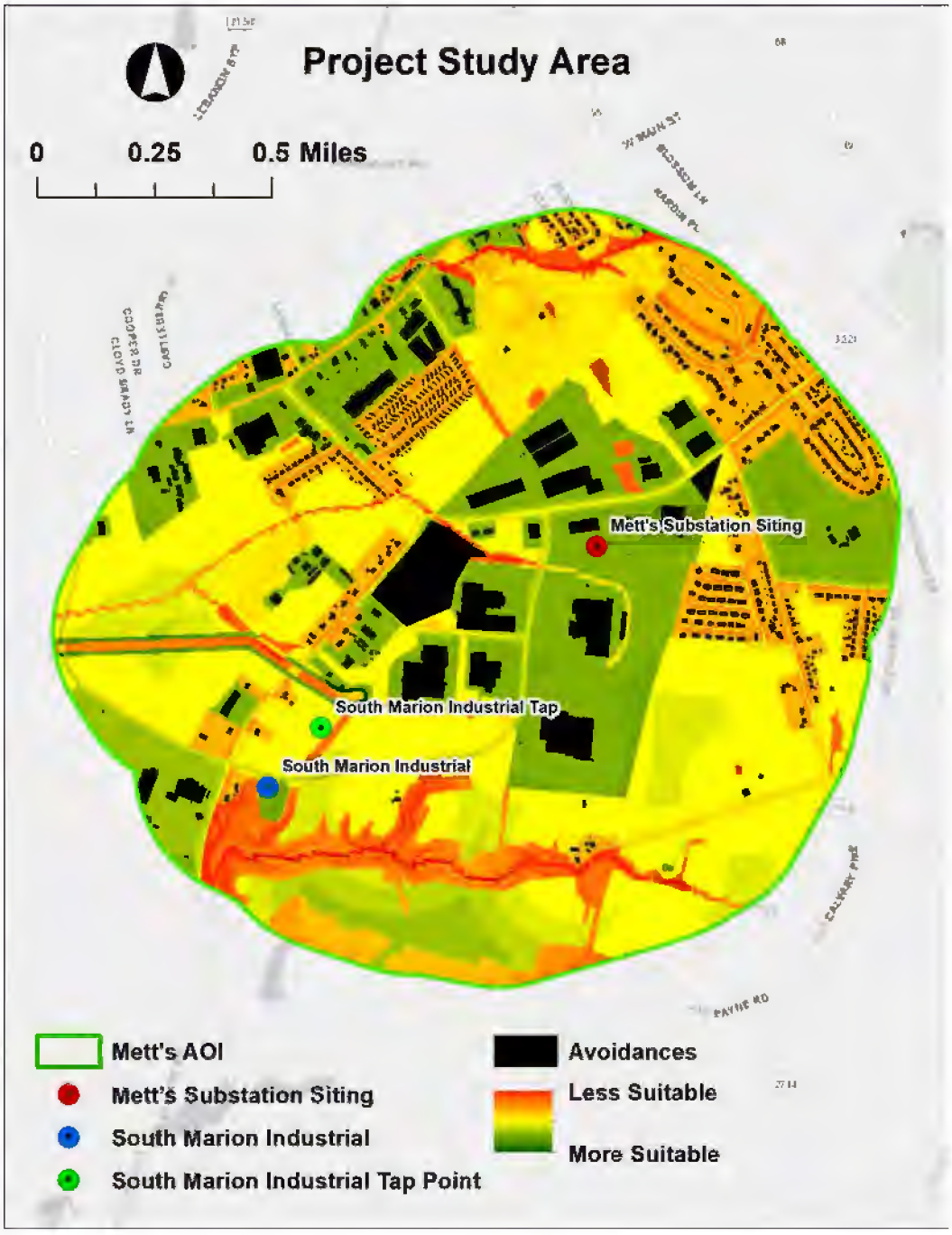
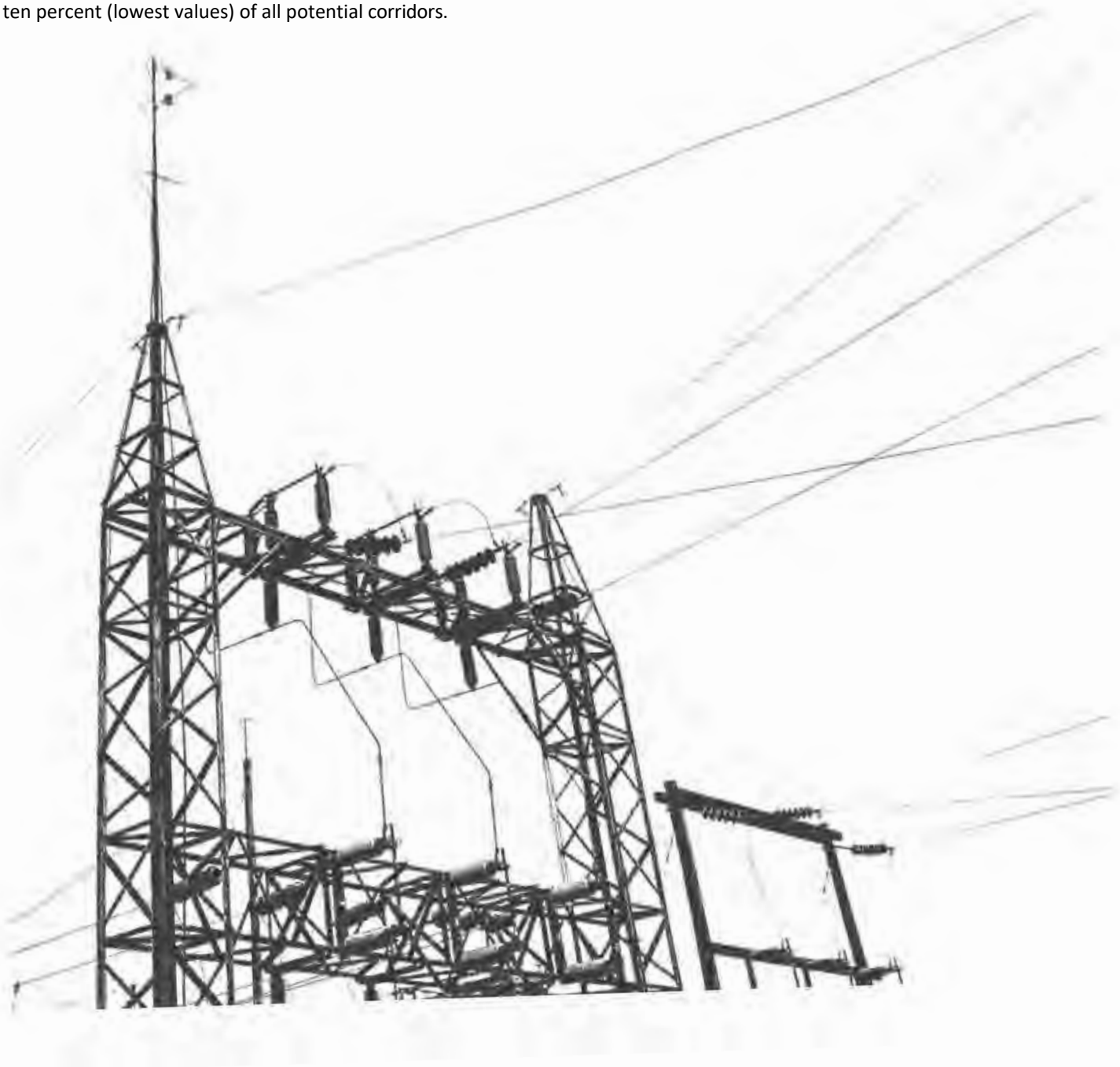


Figure 34: Simple Suitability Surface

PART IX: ALTERNATE CORRIDOR GENERATION

Each Suitability Surface was used in the next phase of the analysis. This phase is called Alternate Route Analysis, and involves the creation of "least cost paths." An algorithm is used to find the cost of every possible path (corridor) between the two end points. A corridor is any continuous string of grid cells, 15 by 15 feet in size, connecting the end point and start point. The cost is the accrual of values of those cumulative grid cells, and the value of each cell varies depending on the features that the cell represents by virtue of their weighted suitability environment. Lower summed values indicate relatively suitable corridors, whereas higher summed values indicate relatively unsuitable corridors. The Alternate Corridor for each perspective (Engineering, Built, Natural, and Simple Average) is the total area representing the top ten percent (lowest values) of all potential corridors.



Engineering Environment Alternate Corridor

The Engineering Corridor of the siting model is heavily weighted toward co-location and with good rebuild opportunities for existing transmission lines. NV5 received and confirmed the existence of all transmission lines within the study area. Starting from the South Marion Industrial Tap, this corridor seeks out the existing 161 kV line for paralleling and rebuilding opportunities. Because of this, the corridor opens up an area along the existing transmission line in the east and then heads west, to connect with the planned site option.

Figure 35: Engineering Environment Alternate Corridor

Natural Environment Alternate Corridor

The Natural Corridor of the model seeks to protect the natural environment, favoring developed land classification over wetlands, streams, rivers, FEMA floodplain areas, or protected species. The Natural Corridor looks to minimize stream crossings, forested land, while seeking out developed land. Starting from the South Marion Industrial Tap, it has a cross-country path avoiding existing buildings and avoidance parcels and as it heads west to the Site Option.

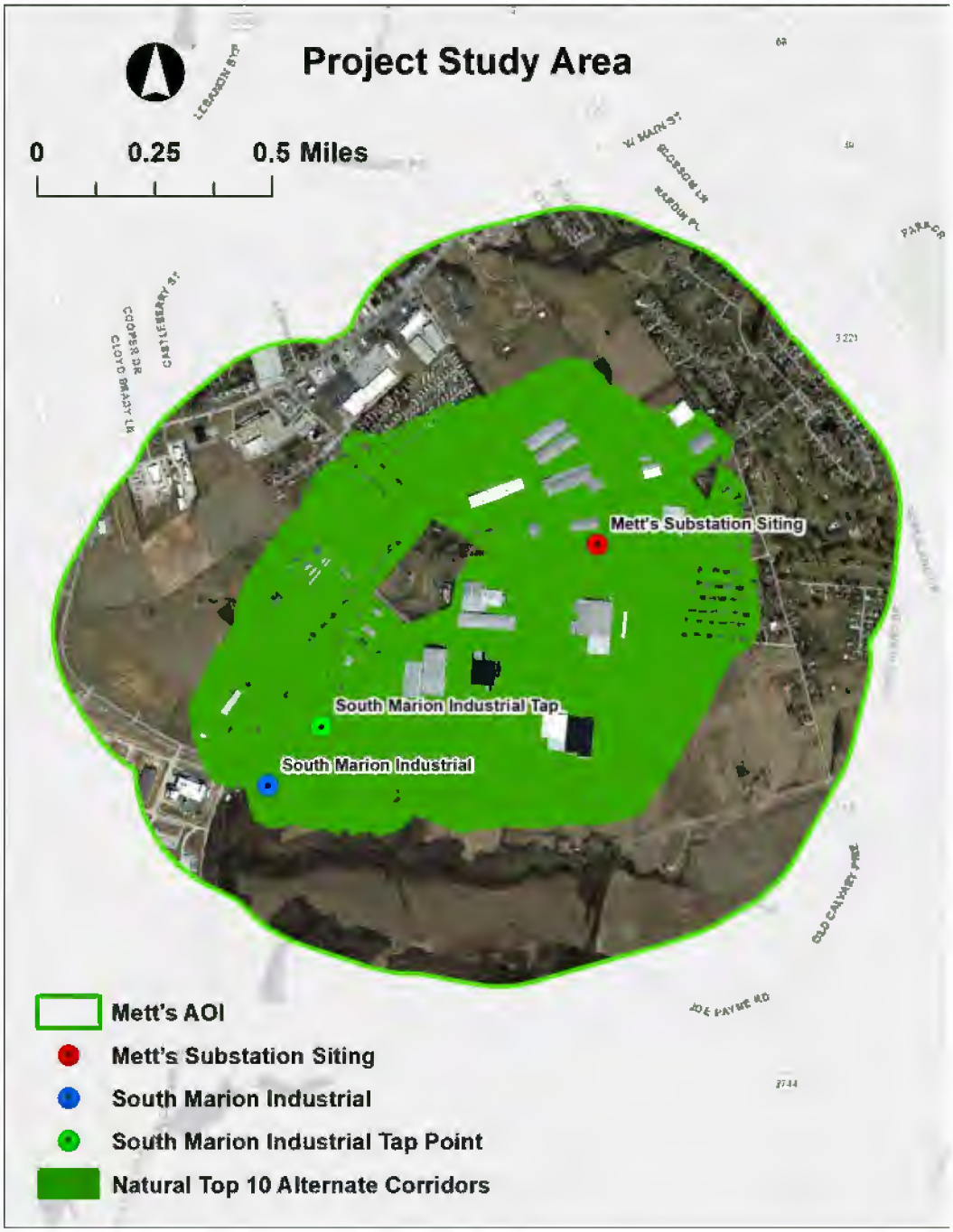


Figure 36: Natural Environment Alternate Corridor

Built Environment Alternate Corridor

The Built Corridor seeks out developed land use that isn't near existing structures, that isn't close to densely populated areas of the study area and is as far as possible from historic and archaeological sites as possible. Starting from the South Marion Industrial Tap, the Built Corridor avoids the densely populated areas and proximity to structures, heading west towards open spaces around the Site Option.

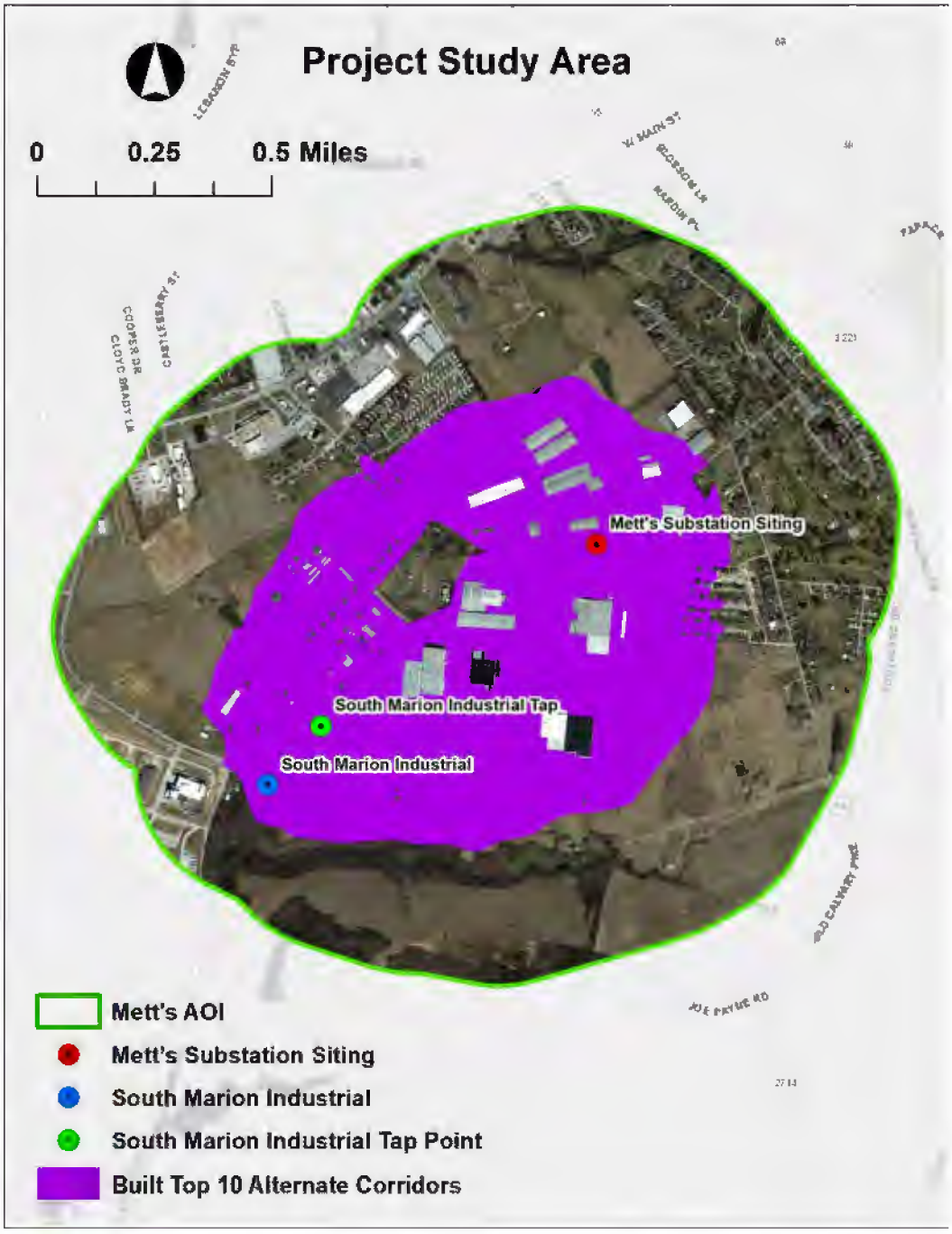


Figure 37: Built Environment Alternate Corridor

Simple Average Alternate Corridor

The Simple Average Corridor will resemble elements of the previous perspectives' corridors, since each features contributes to the corridor equally. The greatest variation between the simple and the other corridors has to do with how the algorithm looks to optimize the balance between avoiding natural features (streams, floodplain, wetlands, species of concern), avoiding built features (developed land), and utilizing existing electrical infrastructure (parallel and rebuild of transmission lines).

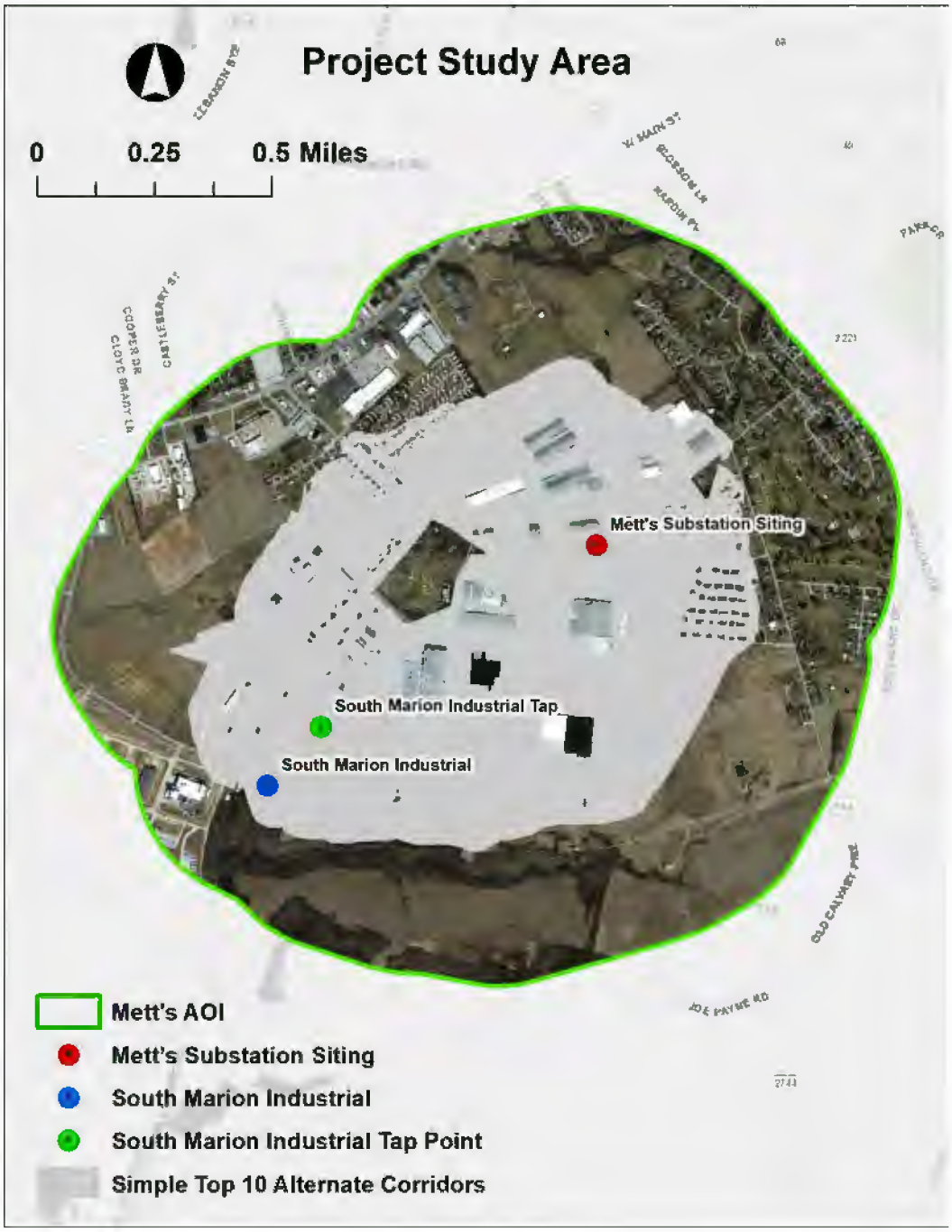


Figure 38: Simple Average Alternate Corridor

When comparing corridors, it is useful to the siting team to compare corridors with each other to ensure the model accurately captures each perspective's features. Ideal locations for Engineering perspective are parallel opportunities for existing transmission lines and low angle sloped terrain. Ideal locations from the Natural perspective avoid floodplains and wetlands and prefer developed land. Ideal locations from the Built perspective avoid existing human impacts and seek developed areas. The four corridors are shown below in Figure 39.

Figure 39: Alternate Corridors

Composite of Alternate Corridors

A composite of all four Alternate Corridors is shown in Figure 40. The Composite Corridor is simply the combination of all four Alternate Corridors. The area that is represented by the Composite Corridor serves as the main area for route creation, with the best practice in siting to chart a route within the Composite Corridor. To ensure all pertinent data is captured in the field and given the potential real-world constraints of the Composite Corridor, there is a 1,500 ft buffer area which is added to the Composite Corridor to create the Phase 2 field work AOI. Whereas the Phase I study area was examined almost exclusively using aerial photography, the features in the Phase 2 were reviewed by NV5 staff members sent into the field to verify the data. This buffer captures all possible features if there are routes that extend beyond the composite corridor. The Phase 2 field AOI is below in Figure 40.

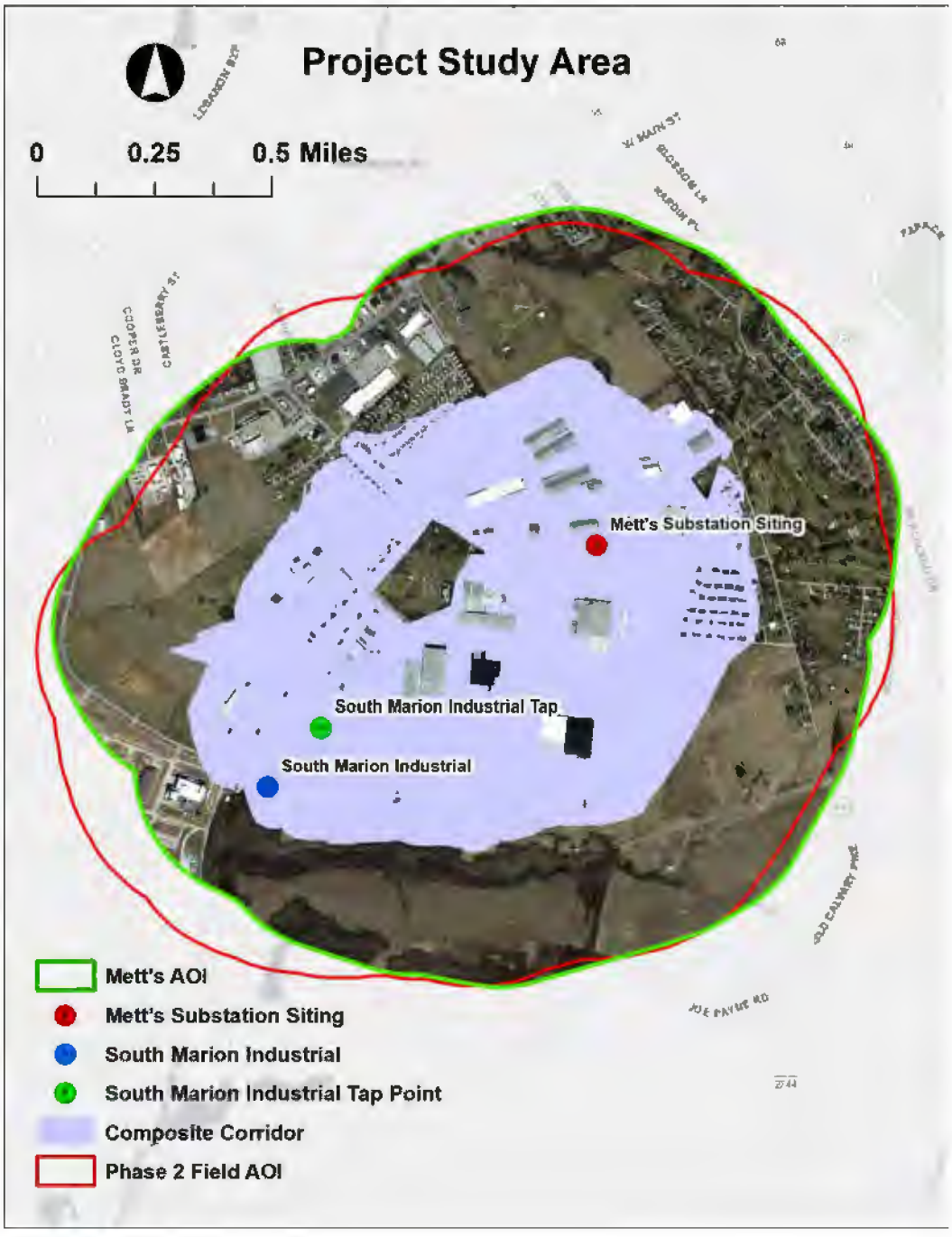


Figure 40: Composite Corridors

PART X: ALTERNATE ROUTES

Alternate Route Inputs

After reviewing and analyzing the Alternate & Composite Corridors, the EKPC project team developed possible centerline routes that were located within the corridors. Within the context of this study, these potential centerline routes are referred to as Alternate Routes. Each individual route is then scored using the EPRI KY Scoring Methodology. Once routes are scored, perspective weights are applied for final route scores. Like the Alternate Corridors, each perspective is given five times the weight of the other two perspective, with a final simple equal weight applied as well. These routes followed the EPRI standards for all being unique, and not backtracking in direction between towers while connecting substation to substation. These six routes are displayed in Figure 41.

The inputs to complete route scoring fall into two categories, EKPC provided or NV5 provided.

EKPC provided:

- Centerline route geometry
- Proposed ROW width
- Substation locations
- Project costs of construction and clearing

NV5 provided

- Buildings
- Proposed developments
- Schools, Day-cares, Churches, Cemeteries, Parks
- NRHP listed or eligible structures
- Forested area
- Stream crossings
- Wetlands
- Floodplains
- Line length
- Location of other utilities in the proximity
- Parcel data
- Hi angle (>30 degree) structure location
- Scoring Matrix

Figure 41: Alternate Routes

Alternate Route Evaluation

Statistics were collected for the six Alternate Routes and divided into three categories that are like the Alternate Corridor perspectives of the Built, Natural, and Engineering layers. The statistics were then normalized and assigned weights based on standardized EPRI weights. Also like the Alternate Corridor model, features or layers not found within the project study area were removed from consideration, and their weight distributed proportionally among the remaining feature layers. The raw statistics for the six routes are shown below in Table 12. Grayed out cells represent features that are listed in the standard model but not present within the project AOI. These raw statistic features for this project were:

Built

- Count of relocated residences within proposed 100' corridors
- Count of residences within 300' of proposed 100' corridors
- Count of undesirable parcels (schools, day-cares, churches, cemeteries, parks) that intersect with the proposed 100' corridors

Natural

- GIS calculated acres of forested land cover that intersect within the proposed 100' corridors
- Count of stream/river crossings within the proposed 100' corridors
- GIS calculated acres of floodplain land cover that intersect within the proposed 100' corridors

Engineering

- Length of route centerline in miles
- Number of parcels that intersect within the proposed 100' corridors
- Total Project Cost

The Total Project Cost layer is meant to provide an approximate value for the construction of the project. The generalized cost calculations were assessed by combining several cost related factors. Construction cost and clearing cost were per unit metrics provided by EKPC. The figure of $1,000,000 per mile was given to account for the construction of new and rebuild transmission line cost; the figure of $40,000 per acre of wooded land was given to account for clearing. Land costs are those costs associated with acquiring easement / property for the transmission line. After consulting with EKPC, it was decided to exclude fair market value for this project. Structure costs were estimated at $352,000 per mile, with additional costs for select engineered structures.
The sum of all these values, as they apply to each route, constitutes the "Total Project Cost" component of this phase of the route selection process.

Tables 12 illustrates the Alternate Route data inputs for Engineering Environment, Natural Environment, Built Environment, and Simple Average evaluations.

DATA	Raw Stats for Routes					
	1	2	3	4	5	6
Built						
Relocated Residences (within 150' Corridor)	0	0	0	0	0	0
Proximity to Residences (300' buffer)	0	1	0	0	0	0
Proximity to Commercial Buildings (300')	5	9	2	4	3	4
Proximity to Industrial Buildings (300')	5	3	2	4	4	3
(1500' from edge of R/W)	0	0	0	0	0	0
Natural						
Natural Forests (Acres)	1.52	0.60	1.39	1.48	0.28	1.33
Stream/River Crossings	1	1	0	0	1	1
Floodplain Areas (Acres)	0.00	0.00	0.00	0.00	0.00	0.00
Engineering						
Length (Miles)	0.85	0.80	1.42	1.16	1.06	0.83
Miles of Rebuild with Existing Utility*	0.00	0.00	0.00	0.00	0.00	0.00
Miles of Co-location with Roads*	0.66	0.40	0.00	0.31	0.96	0.50
Number of Parcels	5	6	4	6	5	6
Construction Cost	$ 850,000.00	$ 800,000.00	$ 1,420,000.00	$ 1,160,000.00	$ 1,060,000.00	$ 830,000.00
	$ -	$ -	$ -	$ -	$ -	$ -
Clearing	$ 60,800.00	$ 24,000.00	$ 55,600.00	$ 59,200.00	$ 11,200.00	$ 53,200.00
Structure Costs	$ 299,200.00	$ 281,600.00	$ 499,840.00	$ 408,320.00	$ 373,120.00	$ 292,160.00
Cost "adder"	$ 150,000.00	$ 79,000.00	$ -	$ 175,000.00	$ 25,000.00	$ 229,000.00
Total Project Costs	$ 1,360,000.00	$ 1,184,600.00	$ 1,975,440.00	$ 1,802,520.00	$ 1,469,320.00	$ 1,404,360.00
Hi angle Count (>30)--EXISTING STRUC	2	5	6	6	2	4
Low Angle Count (<30)	0	0	0	0	0	0
Self Supporting High Angle Count (>30)--NEW STRUC	0	0	0	0	0	0
Self Supporting Low Angle Count (<30)	0	0	0	0	0	0
Structure Costs per Mile	$ 352,000.00	$ 352,000.00	$ 352,000.00	$ 352,000.00	$ 352,000.00	$ 352,000.00
Structure COST	$ 299,200.00	$ 281,600.00	$ 499,840.00	$ 408,320.00	$ 373,120.00	$ 292,160.00
Low Angle Count (<30) COST	$ -	$ -	$ -	$ -	$ -	$ -
Self Supporting High Angle Count (>30) COST	$ -	$ -	$ -	$ -	$ -	$ -
Self Supporting Low Angle Count (<30) COST	$ -	$ -	$ -	$ -	$ -	$ -
	Route 1	Route 2	Route 3	Route 4	Route 5	Route 6
Eng_DE Structure	$ -	$ -	$ -	$ -	$ -	$ -
Eng_DE Structure if PI	$ 150,000.00	$ -	$ -	$ 150,000.00	$ -	$ 150,000.00
Stub Pole	$ -	$ 25,000.00	$ -	$ 25,000.00	$ 25,000.00	$ 25,000.00
Eng_Angle Structure	$ -	$ -	$ -	$ -	$ -	$ -
Overbuild	$ -	$ 54,000.00	$ -	$ -	$ -	$ 54,000.00
Costs	$ 150,000.00	$ 79,000.00	$ -	$ 175,000.00	$ 25,000.00	$ 229,000.00

Table 12 RAW Route Data Statistics

Table 13 show the standard route scoring weights and then Table 14 shows the project specific weights with values redistributed

	Weights
Built	
Feature	
Relocated Residences (within 100' Corridor)	54.0%
Weighted	
Proximity to Residences (300')	15.9%
Weighted	
Proposed Developments	3.8%
Weighted	
Proximity to Commercial Buildings (300')	2.6%
Weighted	
Proximity to Industrial Buildings (300')	1.5%
Weighted	
School, DayCare, Church, Cemetery, Park Parcels (#)	7.7%
Weighted	
NRHP Listed/Eligible Strucs./Districts (1500' from edge of R/W)	14.5%
Weighted	
TOTAL	100.0%
WEIGHTED TOTAL	
Natural	
Natural Forests (Acres)	42.6%
Weighted	
Stream/River Crossings	12.0%
Weighted	
Wetland Areas (Acres)	41.9%
Weighted	
Floodplain Areas (Acres)	3.5%
Weighted	
TOTAL	100.0%
WEIGHTED TOTAL	
Engineering	
% Rebuild with Existing Utility*	33.3%
Weighted	
% Co-location w/ Existing T/L or other major utilities*	52.7%
Weighted	
Total Project Costs	14.0%
Weighted	
TOTAL	100.0%
WEIGHTED TOTAL	
SUM OF WEIGHTED TOTALS	
RANK	

TABLE 13: Alternate Route Criteria & Weights (Model Values)

	Weights
Built	
Feature	
Relocated Residences (within 100' Corridor)	69.6%
Weighted	
Proximity to Residences (300')	20.5%
Weighted	
Proposed Developments	0.0%
Weighted	
Proximity to Commercial Buildings (300')	0.0%
Weighted	
Proximity to Industrial Buildings (300')	0.0%
Weighted	
School, DayCare, Church, Cemetery, Park Parcels (#)	9.9%
Weighted	
NRHP Listed/Eligible Strucs./Districts (1500' from edge of	0.0%
Weighted	
TOTAL	100.0%
WEIGHTED TOTAL	
Natural	
Natural Forests (Acres)	73.3%
Weighted	
Stream/River Crossings	20.7%
Weighted	
Wetland Areas (Acres)	0.0%
Weighted	
Floodplain Areas (Acres)	6.0%
Weighted	
TOTAL	100.0%
WEIGHTED TOTAL	
Engineering	
% Rebuild with Existing Utility*	0.0%
Weighted	
% Co-location w/ Existing T/L or other major utilities*	0.0%
Weighted	
Total Project Costs	100.0%
Weighted	
TOTAL	100.0%
WEIGHTED TOTAL	
SUM OF WEIGHTED TOTALS	
RANK	

TABLE 14: Alternate Route Criteria & Weights (Adjusted Values)

Raw Statistics and Normalized Statistics

The next step of the analysis is to normalize the raw statistics of the routes. Table 15 shows an example of the routes raw and normalized statistics for the Alternate Routes. The statistics were normalized (light blue cells), on a scale from zero to one, to provide a method of comparison between each of the layers' different units. The values associated with Miles of Co-location were inverted since a higher value in this category is seen as desirable.

DATA	Numbers Normalized					
FOR ALL ROUTES	1	2	3	4	5	6
Edit						
Feature	Unit	Unit	Unit	Unit	Unit	Unit
Relocated Residences (within 100' Corridor)	0.00	0.00	0.00	0.00	0.00	0.00
Normalized	0.00	0.00	0.00	0.00	0.00	0.00
Proximity to Residences (300')	0.00	1.00	0.00	0.00	0.00	0.00
Normalized	0.00	1.00	0.00	0.00	0.00	0.00
Proposed Developments	0.00	0.00	0.00	0.00	0.00	0.00
Normalized	0.00	0.00	0.00	0.00	0.00	0.00
Proximity to Commercial Buildings (300')	5.00	9.00	2.00	4.00	3.00	4.00
Normalized	0.43	1.00	0.00	0.29	0.14	0.29
Proximity to Industrial Buildings (300')	5.00	3.00	2.00	4.00	4.00	3.00
Normalized	1.00	0.33	0.00	0.67	0.67	0.33
School, DayCare, Church, Cemetery, Park Parcels (#)	0.00	0.00	0.00	0.00	0.00	0.00
Normalized	0.00	0.00	0.00	0.00	0.00	0.00
NRHP Listed/Eligible Struc./Districts (1500' from edge of ROW)	0.00	0.00	0.00	0.00	0.00	0.00
Normalized	0.00	0.00	0.00	0.00	0.00	0.00
Natural						
Natural Forests (Acres)	1.52	0.60	1.39	1.48	0.28	1.33
Normalized	1.00	0.26	0.90	0.97	0.00	0.85
Stream/River Crossings	1.00	1.00	0.00	0.00	1.00	1.00
Normalized	1.00	1.00	0.00	0.00	1.00	1.00
Wetland Areas (Acres)	0.00	0.00	0.00	0.00	0.00	0.00
Normalized	0.00	0.00	0.00	0.00	0.00	0.00
Floodplain Areas (Acres)	0.00	0.00	0.00	0.00	0.00	0.00
Normalized	0.00	0.00	0.00	0.00	0.00	0.00
Engineering						
Length (Miles)	0.85	0.80	1.42	1.16	1.06	0.83
Normalized	0.08	0.00	1.00	0.58	0.42	0.05
% Rebuild with Existing Utility*	0%	0%	0%	0%	0%	0%
Normalized	0.00	0.00	0.00	0.00	0.00	0.00
Inverted	0.00	0.00	0.00	0.00	0.00	0.00
% Co-location w/ Existing Trl. of other major utilities*	0.00	0.00	0.00	0.00	0.00	0.00
Normalized	0.00	0.00	0.00	0.00	0.00	0.00
Inverted	0.00	0.00	0.00	0.00	0.00	0.00
Miles of Co-location with Roads*	0.66	0.40	0.00	0.31	0.96	0.50
Normalized	0.69	0.42	0.00	0.32	1.00	0.52
Inverted	0.00	0.00	1.00	0.68	0.00	0.48
Number of Parcels	5.00	6.00	4.00	6.00	5.00	6.00
Normalized	0.50	1.00	0.00	1.00	0.50	1.00
Total Project Costs	$1,360,000	$1,184,600	$1,975,440	$1,802,520	$1,469,320	$1,404,360
Normalized	0.22	0.00	1.00	0.78	0.36	0.28
SUM of UNWeighted Totals	4.23	4.59	3.90	4.96	3.09	4.27
RANK	3	5	2	6	1	4

Table 15: Raw Statistics and Normalized Statistics

Like the Alternate Corridors, each perspective has a five times emphasis. The Simple Average perspective has an equal amount of weight assigned to each perspective (33.3%). Each of the routes is ranked according to its values with respect to the individual environment being emphasized.

Emphasis on Engineering Environment

Engineering Emphasis	Weights						
		3	1	6	5	2	4
		Rte 1	Rte 2	Rte 3	Rte 4	Rte 5	Rte 6
Built	14%						
Feature		Unit	Unit	Unit	Unit	Unit	Unit
Relocated Residences (within 100' Corridor)	0.0%	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00
Proximity to Residences (300')	79.5%	0.00	1.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.80	0.00	0.00	0.00	0.00
Proposed Developments	0.0%	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00
Proximity to Commercial Buildings (300')	13.0%	0.43	1.00	0.00	0.29	0.14	0.29
Weighted		0.06	0.13	0.00	0.04	0.02	0.04
Proximity to Industrial Buildings (300')	7.5%	1.00	0.33	0.00	0.67	0.67	0.33
Weighted		0.08	0.03	0.00	0.05	0.05	0.03
School, DayCare, Church, Cemetery, Park Parcels (ft)	0.0%	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00
NRHP Listed/Eligible Structs./Districts (1500' from edge of	0.0%	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.0%	0.13	0.95	0.00	0.09	0.07	0.06
WEIGHTED TOTAL		0.018	0.133	0.000	0.012	0.010	0.009
Natural	14%						
Natural Forests (Acres)	78.0%	1.00	0.26	0.90	0.97	0.00	0.85
Weighted		0.78	0.20	0.70	0.75	0.00	0.66
Stream/River Crossings	22.0%	1.00	1.00	0.00	0.00	1.00	1.00
Weighted		0.22	0.22	0.00	0.00	0.22	0.22
Wetland Areas (Acres)	0.0%	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00
Floodplain Areas (Acres)	0.0%	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.0%	1.00	0.42	0.70	0.75	0.22	0.88
WEIGHTED TOTAL		0.140	0.059	0.098	0.106	0.031	0.123
Engineering	72%						
% Rebuild with Existing Utility*	0.0%	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00
% Co-location w/ Existing TL, or other major utilities*	0.0%	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00
Total Project Costs	100.0%	0.22	0.00	1.00	0.78	0.36	0.28
Weighted		0.22	0.00	1.00	0.78	0.36	0.28
TOTAL	100.0%	0.22	0.00	1.00	0.78	0.36	0.28
WEIGHTED TOTAL		0.160	0.000	0.720	0.563	0.259	0.200
SUM OF WEIGHTED TOTALS		0.318	0.192	0.818	0.680	0.300	0.332
RANK		3	1	6	5	2	4
* Inverted for calculations	Lowest Number is Best						

Table 16: Alternate Route Evaluation Matrix Emphasis on Engineering Environment

Emphasis on Natural Environment

Natural Emphasis	Weights						
		6	2	3	4	1	5
		Rte 1	Rte 2	Rte 3	Rte 4	Rte 5	Rte 6
Built	14%						
Feature		Unit	Unit	Unit	Unit	Unit	Unit
Relocated Residences (within 100' Corridor)	0.0%	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00
Proximity to Residences (300')	79.5%	0.00	1.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.80	0.00	0.00	0.00	0.00
Proposed Developments	0.0%	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00
Proximity to Commercial Buildings (300')	13.0%	0.43	1.00	0.00	0.29	0.14	0.29
Weighted		0.06	0.13	0.00	0.04	0.02	0.04
Proximity to Industrial Buildings (300')	7.5%	1.00	0.33	0.00	0.67	0.67	0.33
Weighted		0.08	0.03	0.00	0.05	0.05	0.03
School, DayCare, Church, Cemetery, Park Parcels (#)	0.0%	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00
NRHP Listed/Eligible Sites /Districts (1500' from edge of	0.0%	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.0%	0.13	0.95	0.00	0.09	0.07	0.06
WEIGHTED TOTAL		0.018	0.133	0.000	0.012	0.010	0.009
Natural	28%						
Natural Forests (Acres)	78.0%	1.00	0.26	0.90	0.97	0.00	0.85
Weighted		0.78	0.20	0.70	0.75	0.00	0.66
Stream/River Crossings	22.0%	1.00	1.00	0.00	0.00	1.00	1.00
Weighted		0.22	0.22	0.00	0.00	0.22	0.22
Wetland Areas (Acres)	0.0%	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00
Floodplain Areas (Acres)	0.0%	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.0%	1.00	0.42	0.70	0.75	0.22	0.88
WEIGHTED TOTAL		0.720	0.303	0.503	0.543	0.158	0.634
Engineering	14%						
% Rebuild with Existing Utility*	0.0%	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00
% Co-location w/ Existing T/L or other major utilities*	0.0%	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00
Total Project Costs	100.0%	0.22	0.00	1.00	0.78	0.36	0.28
Weighted		0.22	0.00	1.00	0.78	0.36	0.28
TOTAL	100.0%	0.22	0.00	1.00	0.78	0.36	0.28
WEIGHTED TOTAL		0.031	0.000	0.140	0.109	0.050	0.039
SUM OF WEIGHTED TOTALS		0.769	0.436	0.643	0.665	0.218	0.682
RANK		6	2	3	4	1	5
* Inverted for calculations	Lowest Number is Best						

Table 17: Alternate Route Evaluation Emphasis on Natural Environment

Emphasis on Built Environment

Built Emphasis	Weights						
		4	6	3	5	1	2
		1	2	3	4	5	6
Built	72%						
Feature		Unit	Unit	Unit	Unit	Unit	Unit
Relocated Residences (within 100' Corridor)	0.0%	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00
Proximity to Residences (300')	79.5%	0.00	1.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.80	0.00	0.00	0.00	0.00
Proposed Developments	0.0%	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00
Proximity to Commercial Buildings (300')	13.0%	0.43	1.00	0.00	0.29	0.14	0.29
Weighted		0.06	0.13	0.00	0.04	0.02	0.04
Proximity to Industrial Buildings (300')	7.5%	1.00	0.33	0.00	0.67	0.67	0.33
Weighted		0.08	0.03	0.00	0.05	0.05	0.03
School, DayCare, Church, Cemetery, Park Parcels (#)	0.0%	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00
NRHP Listed/Eligible Struc./Districts (1500' from edge of	0.0%	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.0%	0.13	0.95	0.00	0.09	0.07	0.06
WEIGHTED TOTAL		0.094	0.684	0.000	0.063	0.049	0.045
Natural	14%						
Natural Forests (Acres)	78.0%	1.00	0.26	0.90	0.97	0.00	0.85
Weighted		0.78	0.20	0.70	0.75	0.00	0.66
Stream/River Crossings	22.0%	1.00	1.00	0.00	0.00	1.00	1.00
Weighted		0.22	0.22	0.00	0.00	0.22	0.22
Wetland Areas (Acres)	0.0%	0.00	0.05	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00
Floodplain Areas (Acres)	0.0%	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.0%	1.00	0.42	0.70	0.75	0.22	0.88
WEIGHTED TOTAL		0.140	0.059	0.098	0.106	0.031	0.123
Engineering	14%						
% Rebuild with Existing Utility*	0.0%	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00
% Co-location w/ Existing TL or other major utilities*	0.0%	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00
Total Project Costs	100.0%	0.22	0.00	1.00	0.78	0.36	0.28
Weighted		0.22	0.00	1.00	0.78	0.36	0.28
TOTAL	100.0%	0.22	0.00	1.00	0.78	0.36	0.28
WEIGHTED TOTAL		0.031	0.000	0.140	0.109	0.050	0.039
SUM OF WEIGHTED TOTALS		0.265	0.743	0.238	0.278	0.131	0.207
RANK		4	6	3	5	1	2
* Inverted for calculations	Lowest Number is Best						

Table 18: Alternate Route Evaluation Matrix Emphasis on Built Environment

Equal Consideration of Categories (Simple Average)

Simple Emphasis	Weights						
		3	4	6	5	1	2
		Rte 1	Rte 2	Rte 3	Rte 4	Rte 5	Rte 6
Built	33%						
Feature		Unit	Unit	Unit	Unit	Unit	Unit
Relocated Residences (within 100' Corridor)	0.0%	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00
Proximity to Residences (300')	79.5%	0.00	1.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.80	0.00	0.00	0.00	0.00
Proposed Developments	0.0%	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00
Proximity to Commercial Buildings (300')	13.0%	0.43	1.00	0.00	0.29	0.14	0.29
Weighted		0.06	0.13	0.00	0.04	0.02	0.04
Proximity to Industrial Buildings (300')	7.5%	1.00	0.33	0.00	0.67	0.67	0.33
Weighted		0.08	0.03	0.00	0.05	0.05	0.03
School, DayCare, Church, Cemetery, Park Parcels (#)	0.0%	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00
NRHP Listed/Eligible Sites /Districts (1500' from edge of	0.0%	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.0%	0.13	0.95	0.00	0.09	0.07	0.06
WEIGHTED TOTAL		0.044	0.316	0.000	0.029	0.023	0.021
Natural	33%						
Natural Forests (Acres)	78.0%	1.00	0.26	0.90	0.97	0.00	0.85
Weighted		0.78	0.20	0.70	0.75	0.00	0.66
Stream/River Crossings	22.0%	1.00	1.00	0.00	0.00	1.00	1.00
Weighted		0.22	0.22	0.00	0.00	0.22	0.22
Wetland Areas (Acres)	0.0%	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00
Floodplain Areas (Acres)	0.0%	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.0%	1.00	0.42	0.70	0.75	0.22	0.88
WEIGHTED TOTAL		0.333	0.140	0.233	0.251	0.073	0.293
Engineering	33%						
% Rebuild with Existing Utility*	0.0%	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00
% Co-location w/ Existing TL or other major utilities*	0.0%	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00
Total Project Costs	100.0%	0.22	0.00	1.00	0.78	0.36	0.28
Weighted		0.22	0.00	1.00	0.78	0.36	0.28
TOTAL	100.0%	0.22	0.00	1.00	0.78	0.36	0.28
WEIGHTED TOTAL		0.074	0.000	0.333	0.260	0.120	0.093
SUM OF WEIGHTED TOTALS		0.450	0.457	0.566	0.541	0.216	0.406
RANK		3	4	6	5	1	2
* Inverted for calculations	Lowest Number is Best						

Table 19: Alternate Route Evaluation Matrix Emphasis on Equal Weights

Overall Scores & Ranks of Each Route

	Rte 1	Rte 2	Rte 3	Rte 4	Rte 5	Rte 6
Built	0.265	0.743	0.238	0.278	0.131	0.207
Engineering	0.318	0.192	0.818	0.680	0.300	0.332
Natural	0.769	0.436	0.643	0.665	0.218	0.682
Simple	0.450	0.457	0.566	0.541	0.216	0.406
	Rte 1	Rte 2	Rte 3	Rte 4	Rte 5	Rte 6
Built	4	6	3	5	1	2
Engineering	3	1	6	5	2	4
Natural	6	2	3	4	1	5
Simple	3	4	6	5	1	2

Table 20: Overall Scores and Ranks of Routes

Cost drivers per each perspective:

Engineering

100%- Cost

Built

69.6%- Relocated Residences
20.5%- Proximity to Residences
9.9%- Avoidance Parcels

Natural

73.3%- Natural Forested Acres
20.7%- Stream/River Crossings
6.0%- Floodplain Acres

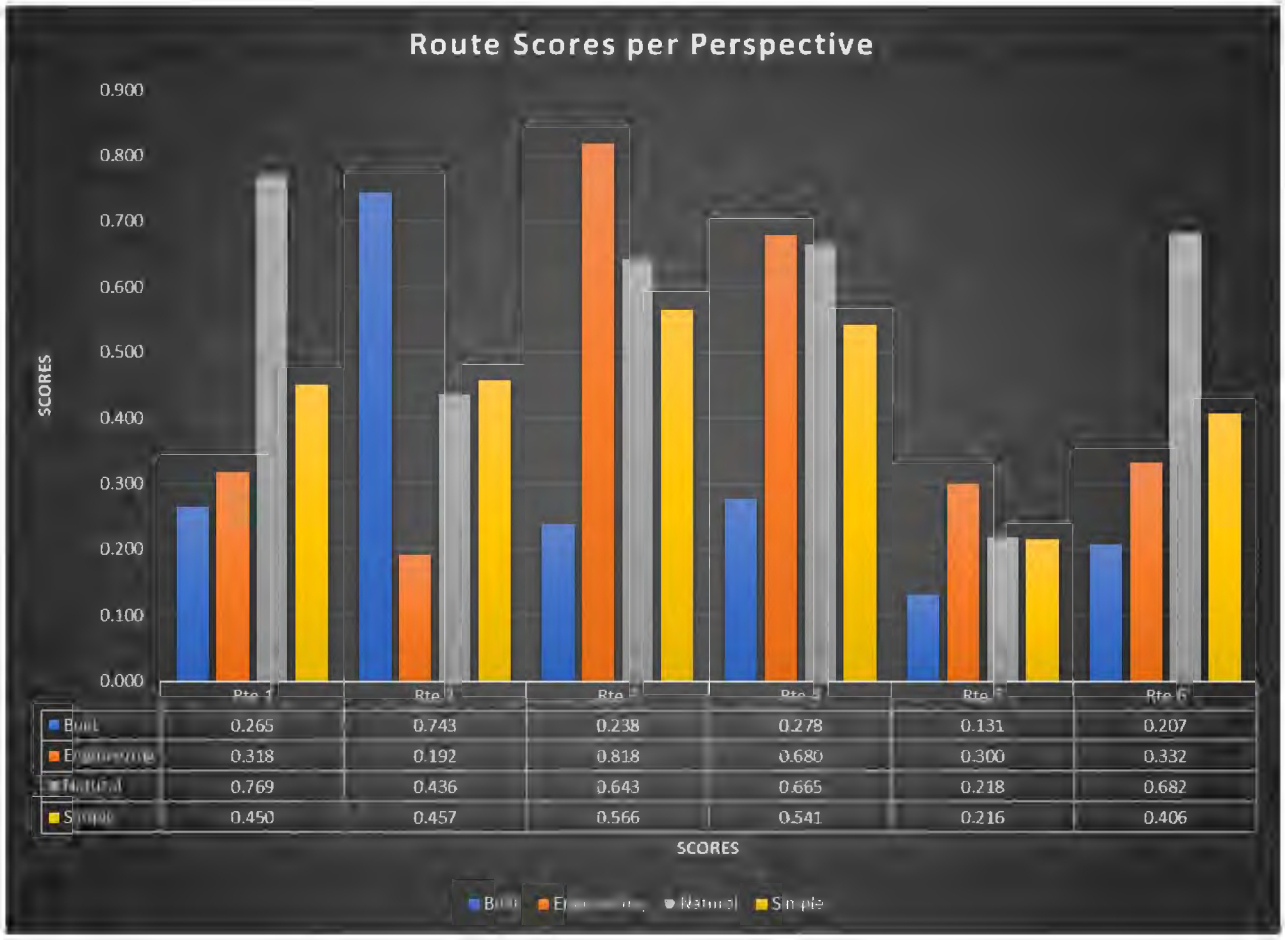


Figure 42: Route Comparison

EXPERT JUDGMENT (5)	1 = Low Impact	2 = Med. Impact	3 = High Impact				
Visual Issues	10%	0	0	0	0	0	0
Weighted		0	0	0	0	0	0
Community Issues	30%	0	0	0	0	0	0
Weighted		0	0	0	0	0	0
Project Management (Schedule, Cost)	20%	0	0	0	0	0	0
Weighted		0	0	0	0	0	0
Special Permit Issues	15%	0	0	0	0	0	0
Weighted		0	0	0	0	0	0
Construction/ Maintenance Accessability	15%	0	0	0	0	0	0
Weighted		0	0	0	0	0	0
Dist. Reliability	5%	0	0	0	0	0	0
Weighted		0	0	0	0	0	0
Environmental Justice	5%	0	0	0	0	0	0
Weighted		0	0	0	0	0	0
TOTAL							
	100%	0	0	0	0	0	0

Table 21: Expert Judgement

For some projects, the utility may utilize expert judgment to capture factors that are not present in the model. EKPC elected to forgo expert judgement ranking and utilize the calibrated model results.

Route Selection

At the conclusion of the Alternate Route Analysis, the top performing routes were reviewed by the EKPC project team. The result of this review concludes the selection of the Preferred Route. It is important to note that the GIS representation of the routes considered in these analyses may not exactly match the constructed line. Small adjustments may be made in the exact geographical location of the routes during the physical construction, as a result of real-world engineering and building activities.

As a conclusion to the project, EKPC has selected to move forward with Route 5 for the Mett's 161 kV Transmission Line.

Figure 43: Alternate Route 5

PART XI: REFERENCES

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

"Kentucky Transmission Siting Methodology," Electric Power Research Institute, December 2007

U.S. Census Bureau State and County Quick Facts http://quickfacts.census.gov/qfd/index.html

2021 Google – Map data – "Street View" http://maps.google.com/

Kentucky Geological Survey, University of Kentucky http://www.uky.edu/KGS/geoky/regionbluegrass.htm

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

Wilgreen Lake, Madison County KY.
https://madisoncountyky.us/index.php/county-parks/wilgreen-lake

Memorandum to File

To: File
From: Lucas Spencer
Date: December 18, 2023

Re: Marion Co. Industrial Parallel Line and Mett's Tap Line – Expert Judgement

NV5 delivered the scores for the alternative routes on 12/14/2023 as part of the deliverables for both the Marion County Industrial Parallel Tap Line and the Mett's Tap Line Routing Studies. EKPC held a meeting to discuss the scoring from NV5.

Marion Co. Industrial Parallel Tap Line:

After reviewing the scores for the various routes, Alternative 5 was the lowest scoring (i.e. best scoring) route in the Simple environment as well as the built environment. It was the second best in both the engineering and natural environments, with the engineering score being very close to the best scoring engineering route (alternative 3).

Although alternative 3 was the best scoring in the engineering and natural environments, it was the lowest scoring route in the built environment and only the third best route in the simple environment.

With this in mind, the project team agrees that there is no need to utilize the expert judgement criteria to further funnel the results and that the EPRI-KY Routing methodology has objectively selected the best route.

Mett's Tap Line:

After reviewing the scores for the various routes, Alternative 5 was the lowest scoring (i.e. best scoring) route in the Simple environment, natural environment as well as the built environment. It was the fourth best in the engineering; this was driven by the line length.

Route 2 is the best scoring route from an engineering standpoint, but is the worst scoring route in the built environment. Route 2 was the third best route in the simple environment.

Route 6 was the 2nd best route in the built, simple and engineering environments but 5th best in the natural environment this is caused by the increased amount of tree clearing.

With this in mind, the project team agrees that there is no need to utilize the expert judgement criteria to further funnel the results and that the EPRI-KY Routing methodology has objectively selected the best route.

Attendees at the meeting as listed below:
Laura LeMaster
Lucas Spencer
Jake Dawn
Butch McCoy
Josh Young

Exhibit 20

Siting Report

Metts Drive 161 kV Tap

Electric Transmission Route Selection Technical Report

Marion 161kv Transmission Line

Prepared BY:

NV5
421 SW 6th Ave, Suite 800
Portland, OR 97204

Prepared for:

East Kentucky Power Cooperative
4775 Lexington Rd,
Winchester, KY 40392

TABLE OF CONTENTS

List of Figures

List of Tables

List of Acronyms

EPA	Environmental Protection Agency
EPRI	Electric Power Research Institute
EKPC	East Kentucky Power Cooperative
DEM	Digital Elevation Model
DOT	Department of Transportation
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
GIS	Geographic Information System
GTC	Georgia Transmission Corporation
NAIP	National Agriculture Imagery Program
NHD	National Hydrography Dataset
NRHP	National Register of Historic Places
OSRW	Outstanding State Resource Waters
PVA	Property Valuation Administrator
NV5	NV5 Geospatial
ROW	Right of Way
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WMA	Wildlife Management Area

List of Units

cf/s	cubic feet per second
m	meter
kV	kilovolt

PART I: INTRODUCTION

East Kentucky Power Cooperative (EKPC) is an electric generation and transmission cooperative based in Winchester, Kentucky. EKPC is owned and governed by 16 a member-owned cooperative which provide service to over 1.1 million Kentuckians in 87 counties. Founded in 1941, EKPC operates base load power plants in Mason, Clark, Oldham and Pulaski Counties and landfill gas to electric facilities located in Boone, Laurel, Greenup, Pendleton, and Hardin Counties. EKPC also provides peaking generation with its combustion turbines in Clark County. Some generation for the system is provided through hydroelectric plants and all of the electricity is delivered through more than 2,800 miles of transmission lines.

EKPC elected to conduct a suitability study to determine the routing of a 161kV line between a new tap location on an existing EKPC Transmission line and the South Marion Industrial substation in Marion County, Kentucky. The route for the proposed transmission line considers many diverse factors, including existing land uses and habitats, special geographic classifications (e.g. National or State Parks, military sites, floodplains, wetlands), existing infrastructure co-building opportunities, impact to local human communities, previously-confirmed cultural resources, and threatened or endangered species.

The first step in the methodology was the development of Macro Corridors, which defined an area for more detailed study between the proposed endpoints. A 0.5-meter NAIP imagery dataset was used to provide context for the Macro Corridors. The land cover dataset utilized was the latest the National Land Cover Dataset from 2023 per the standard Kentucky Transmission Line Siting methodology. Slope data was derived from the latest 2023 USGS 5-meter DEM available from the KYAPED domain. Road features were compiled from the latest US TIGER line files.

Once Macro Corridor data was compiled and prepped, the Macro Corridors were used to develop a study area of approximately 3.75 square miles, with a straight line distance of approximately 2.07 miles from existing South Marion Industrial Substation and a Proposed Substation site option in Marion County.

Once the study area was identified, detailed dataset layers were developed for siting purposes. Using these detailed layers, Alternate Corridors were generated. For the purposes of this study, the study area represents a larger land area between the end points of the project, and through which corridors might be logically and practically identified. “Corridors” are defined as the most suitable areas for routing a transmission line within the study area. Corridors may vary greatly depending upon the resources encountered in the study area. “Routes” describe the potential centerline path of a transmission line, whereas a “corridor” is a more general area of sufficient width to contain the eventual right-of-way (ROW).

Per the Electric Power Research Institute-Kentucky (EPRI-KY) methodology described in Part III, four corridors (Built, Natural, Engineering, and Simple Average) are produced that represent different perspectives for routing transmission facilities with respect to the dataset layers. The Built Corridor seeks to avoid impacts to human development and historical/ cultural resources. The Natural Corridor emphasizes protection of natural resources and avoiding impacts to natural plant and animal species. The Engineering Corridor maximizes co-location opportunities and avoids areas in which it would be geographically difficult to construct a new transmission line. Finally, the Simple Average Corridor weighs all criteria equally with no emphasis on any one group of criteria.

EKPC developed alternate route possibilities using the corridors identified through the above methodology. The possible alternate routes were evaluated and ranked, and analytical decisions were made based on the best practices of the EPRI model and EKPC stakeholders. The purpose of this report is to document the objective process for selecting a Preferred Route between the existing EKPC start and end locations.

PART II: PROJECT DESCRIPTION

EKPC utilized the EPRI-KY methodology to identify the preferred route for construction of a new 161 kV from a new tap on an existing EKPC transmission line to the South Marion Industrial Substation. The new transmission line would serve identified load growth and would provide increased system reliability for the area.

Figure 1 Typical land cover within the project AOI (NV5 Field Photo)

PART III: OVERVIEW OF SUITABILITY ANALYSIS

EPRI-KY Methodology

The EPRI-KY methodology is a quantitative, computer-based methodology developed by EPRI and the commonwealth of Kentucky for use as a tool to evaluate the suitability of individual grid cells (15 feet by 15 feet) within a large area for locating transmission facilities. A study area was developed based on analysis of the geography between the endpoints of the proposed transmission line. Then, using more-detailed information for the grid cells within the study area, Alternate Corridors were developed for further evaluation. Within the Alternate Corridors, Alternate Routes were developed and analyzed to determine a Preferred Route.

The EPRI-KY methodology is an objective, comprehensive and consistent approach for routing a proposed transmission line. The EPRI-KY methodology provides a structured approach to apply quantitative stakeholder input and organize a vast amount of data. Figure 2 represents the EPRI-KY methodology.

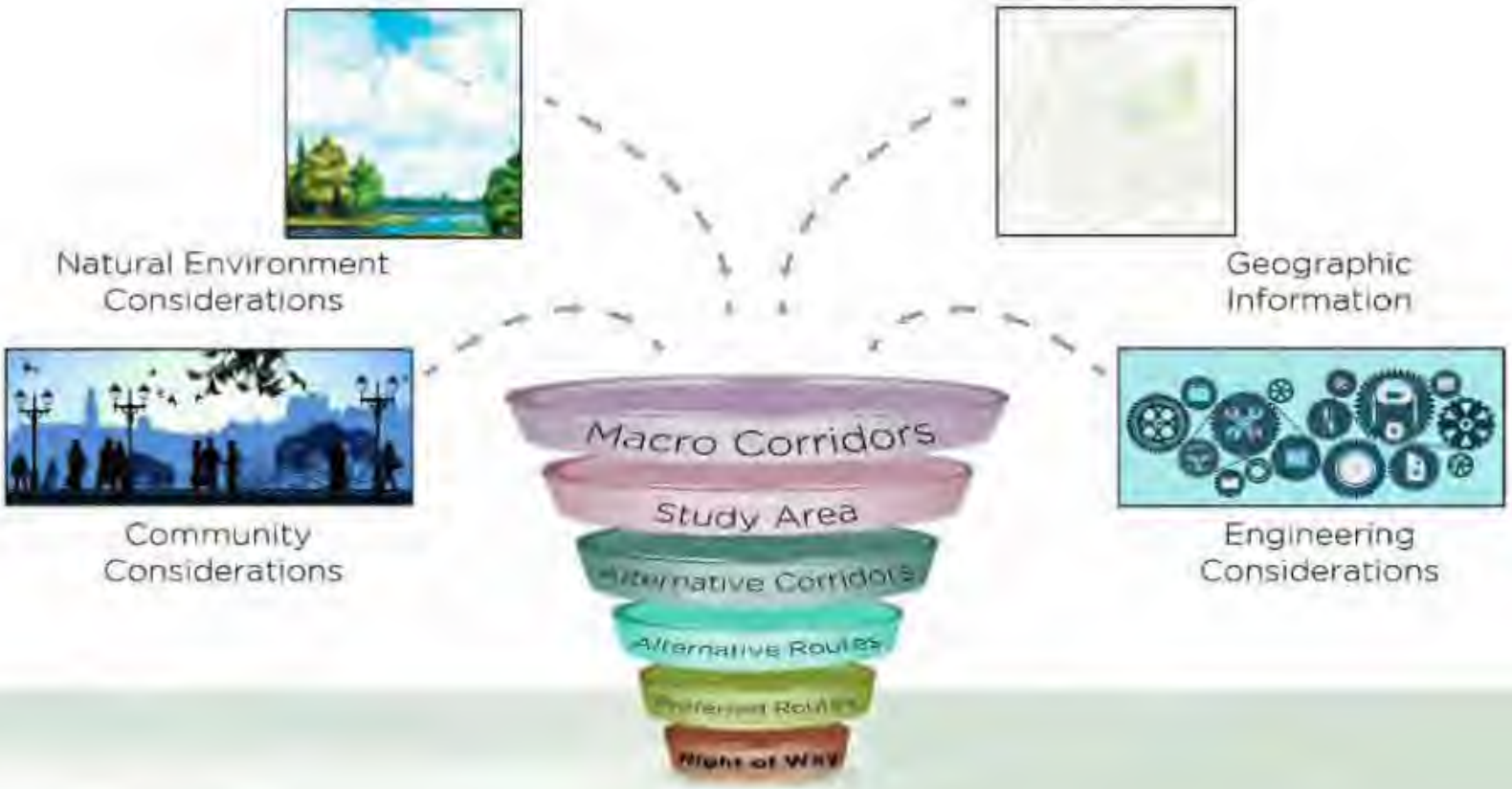


Figure 2: EPRI-KY Siting Methodology

The EPRI-KY methodology approaches corridor development by considering four broad environments:

- Built Environment minimizes the impact on people, places and cultural resources
- Natural Environment minimizes impacts to water resources, plants and animals
- Engineering Environment minimizes terrain restraints and construction variables
- Simple Average of Environments weighs each environment equally

Features within each of the environments were identified and evaluated to map the suitability of grid cells and develop Alternate Corridors. Simple Average Alternate Corridors were developed to consider all three environments equally. The environments are discussed in detail in the following sections.

The Siting Model

The siting model was developed using data collected during a stakeholder workshop in February 2006 in Lexington, Kentucky. The model was developed and tested by a project team of independent experts during the workshops. Stakeholders at the workshops represented a range of interests, such as environmental interest, historic preservation, homeowners' associations, agricultural groups, government agencies, and representatives of utility companies. The resulting model (shown in Table 1) includes data layers, features, layer weights and suitability values that were used for siting transmission lines. More information concerning these workshops is available in the Kentucky Transmission Line Siting Methodology (published by EPRI in 2007). Some minor adjustments can be made to this model for site specific and data availability reasons.

Co-location / Engineering		Natural Environment		Built Environment			
Linear Infrastructure	**86.2%**	**Floodplain**	**4.6%**	**Proximity to Buildings**	**16.8%**	**Proximity to Eligible Historic and Archeological Sites**	**31.0%**
Parallel Existing Transmission Lines	1	Background	1	Background	1	Background	1
Rebuild Existing Transmission Lines (good)	2.2	100 Year Floodplain	9	900-1200'	3.4	900-1200'	4.6
Background	4.4	**Streams/Wetlands**	**29.2%**	600-900'	5.7	600-900'	7.9
Parallel Interstates ROW	4.7	Background	1	300-600'	8	0-300'	8.6
Parallel Roads ROW	5.4	Streams < 5cfs+ Regulatory Buffer	6.2	0-300'	9	300-600'	9
Parallel Pipelines	5.6	Rivers/Streams > 5cfs+ Regulatory Buffer	7.1	**Building Density**	**8.4%**	**AVOIDANCE AREAS**	
Future DOT Plans	5.6	Wetlands + 30' Buffer	8.7	0 - 0.05 Buildings/Acre	1	Listed Archaeology Sites & Dist.	
Parallel Railway ROW	6.1	Outstanding State Resource Waters	9	0.05 - 0.2 Buildings/Acre	3	Listed NRHP Districts and Buildings	
Road ROW	7.2	**Public Lands**	**17.7%**	0.2 - 1 Buildings/Acre	5.6	City and County Parks	
Rebuild Existing Transmission Lines (bad)	8.6	Background	1	1 - 4 Buildings/Acre	8.5	Day Care Parcels	
Scenic Highways ROW	9	WMA - Not State Owned	5.1	> 4 Buildings/Acre	9	Cemetery Parcels	
Slope	**13.8%**	USFS (proclamation area)	6.2	**Proposed Development**	**3.9%**	School Parcels	
Slope 0-15%	1	Other Conservation Land	7.8	Background	1	Church Parcels	
Slope 15-30%	4	USFS (actually owned)	9	Proposed Development	9		
Slope 30-40%	6.7	State Owned Conservation Land	9	**Spannable Lakes and Ponds**	**4.0%**		
Slope >40%	9	**Land Cover**	**19.8%**	Background	1		
AVOIDANCE AREAS		Developed Land	1	Spannable Lakes and Ponds	9		
Non-Spannable Waterbodies		Agriculture	4.6	**Land Use**	**35.9%**		
Mines and Quarries (Active)		Forests	9	Commercial/Industrial	1		
Buildings		**Wildlife Habitat**	**28.7%**	Agriculture (crops)	3.5		
Airports		Background	1	Agriculture (other livestock)	4.6		
Military Facilities		Species of Concern Habitat	9	Silviculture	6		
Center Pivot Irrigation		**AVOIDANCE AREAS**		Other (forest)	6.7		
		EPA Superfund Sites		Equine Agri - Tourism	8		
		State and National Parks		Residential	9		
		USFS Wilderness Area					
		Wild/Scenic Rivers					
		Wildlife Refuge					
		State Nature Preserves					
		Designated Critical Habitat					

Table 1: KY EPRI Full Weighted Model

Data layers (green cells): Percentages represent relative importance, or weighting, of each layer in the siting process, as determined by stakeholders.

Features (yellow cells): Numbers between one and nine represent degrees of suitability, as determined by stakeholders, with one being most suitable for locating a transmission line and nine being least suitable for locating a line.

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

Each stakeholder was assigned to a breakout group for one of the three environments based on their interest (Built, Natural or Engineering Environments). Guided by an independent expert from the project team, each of these groups developed a set of data layers (shown in green in Table 1) with component features (shown in yellow), as well as avoidance areas (shown as 'areas of least preference' at the bottom of each of the environment columns). For example, one of the data layers in the Natural Environment is floodplains, which has two component features: background and 100-year floodplain.

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

> Areas that have High Suitability for an Overhead Electric Transmission Line (1, 2, 3)
> - These are areas that do not contain known sensitive resources or physical constraints, and therefore should be considered as suitable areas for the development of corridors.
>
> Moderate Suitability for an Overhead Electric Transmission Line (4, 5, 6) - These are areas that contain resources or land uses that are moderately sensitive to disturbance or that present a moderate physical constraint to overhead electric transmission line construction and operation. Resource conflicts or physical constraints in these areas can generally be reduced or avoided using standard mitigation measures.
>
> Low Suitability for an Overhead Electric Transmission Line (7, 8, 9) - These are areas that contain resources or land uses that present a potential for significant impacts that cannot be readily mitigated. Locating a transmission line in these areas would require careful siting or special design measures. It is important to note that these areas can be crossed but it is not desirable to do so if other alternatives are available.

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

One of the first steps in implementing the EPRI-KY methodology is identifying local areas of least preference within the study area where, if possible, the project area avoids locating facilities (i.e., state boundary waterbodies, sensitive areas, permitting delays, unique considerations etc.). Once these local areas are determined, suitability mapping of macro corridors can begin.

Suitability Mapping

The methodology began with the proposed starting and ending locations as the basis for creating Macro Corridors. The area in this vicinity was divided into grid cells 98.43 feet by 98.43 feet in size.

Data from aerial photography, geographic information systems (GIS), publicly available datasets and other sources were used to identify features within each grid cell. Based on these features and the values of data layer weights determined in the EPRI-KY Siting Model, a suitability value was assigned to each cell. The suitability is constrained in resolution by the input raster cell size of 98.45 feet.

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

Figure 3 through Figure 5 demonstrate the development of a sample optimal path using information from a hypothetical situation.

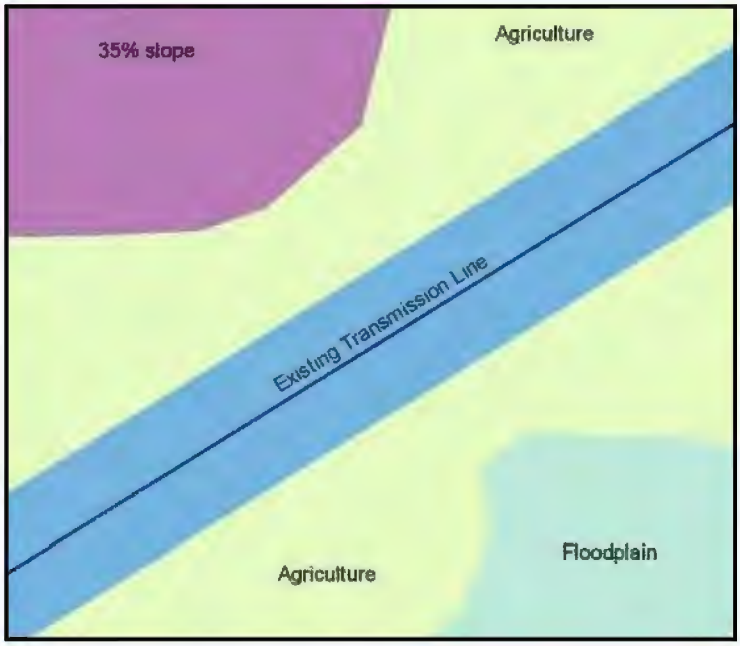


Figure 3 (Above): Feature Map of Example Area

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

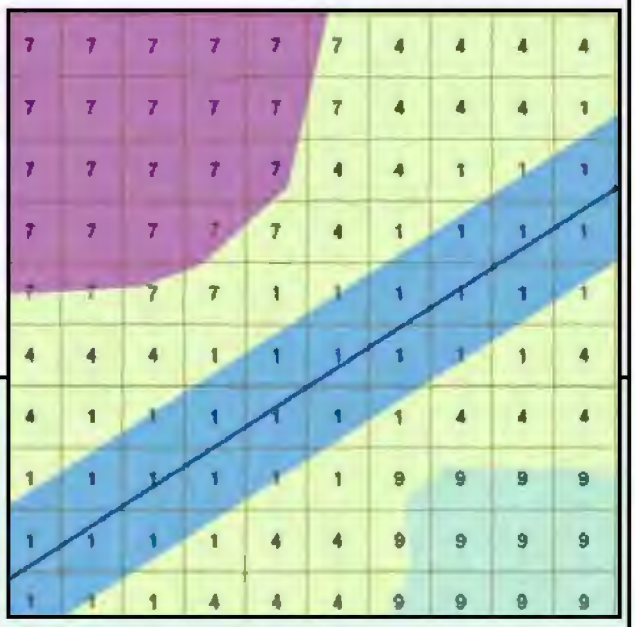


Figure 4 (Above): Grid Cell of Example Area with Suitability Values

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

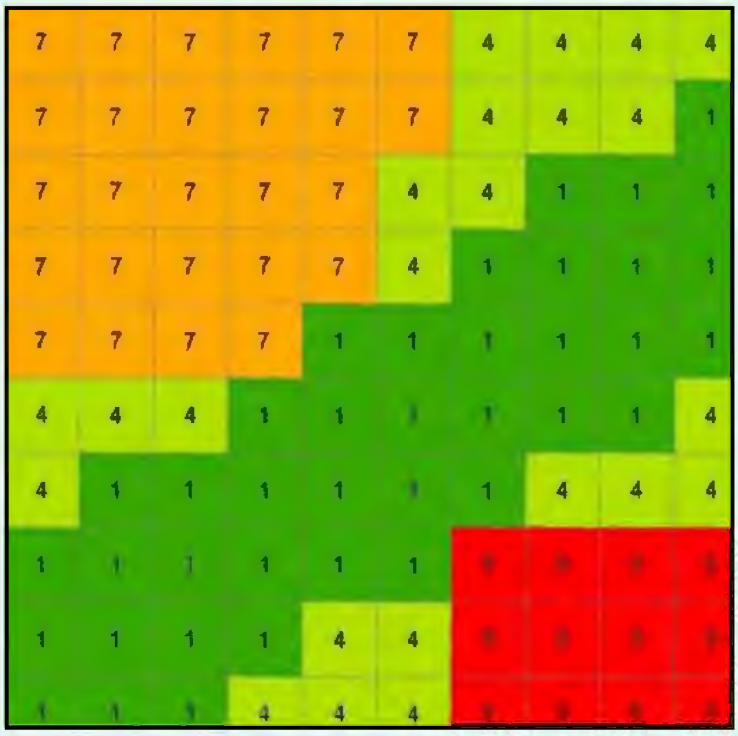


Figure 5: Suitability Map of Example Area

Finally, Figure 5 shows in green the most suitable corridor through the area for locating a transmission line. Light green areas are moderately suitable. The orange area has a moderate suitability value, and the red area is highly unsuitable. The most suitable corridor from East to West in this example was the one that follows the existing transmission line.

Developing Macro Corridors

As described above, the EPRI-KY methodology analyzed land tracts, or "grid cells," within the area to develop Macro Corridors. The analysis was based on GIS information that is readily available from public sources as well as data extracted from aerial photo interpretation. The data was then used to develop the grid cells. The numbers that were applied to the grid cells were taken from the siting model. The Macro Corridors developed from the model were the most suitable five percent of possible routes within the study area. Macro Corridors were then generated for each of the three environments (Built, Natural, and Engineering).

It should be noted that when generating Macro Corridors for each environment, data layers from the other two environments were taken into account. While the target environment was weighted much more heavily (five times so), values and weights from the other environments can affect Alternate Corridors generated for that respective environment. For example, when creating the engineering corridor, the engineering grid is given five times more weight than the built and natural grids when the three are added together. The equation would appear similar to ((Engineering Grid * 0.72) + (Built Grid * 0.14) + (Natural Grid * 0.14)) where 0.72 is five times greater than 0.14 and these three values add up to 1.

The final step in generating Macro Corridors was to equally weigh the three environments and generate a Simple Average Alternate Corridor. The equation for the Simple Average Corridor would look similar to ((Engineering Grid * 0.333) + (Built Gird * 0.333) + (Natural Grid * 0.333)). Once corridors are created, the top ten percent scores of the overall corridors are extracted to a vector format and buffered for a final Phase 1 study area.

The macro corridors present a larger 10,000 ft view of the suitability process. These corridors are fairly generic, do not take in much of the project specific nuances, and solely serve as the inputs to create the Phase 1 study area. To create a more detailed view and apply the EPRI-KY model, the next step in the process is to compile vector or raster data per the model at a much finer level of precision than the macro corridors. Whereas the macro corridors have cell resolution of 98.43 ft x 98.43 ft, the cell resolution of the Alternate corridors are much more detailed at a 15 ft x 15 ft resolution.

The following sections of this report provide information about features that were found within the study area, the creation and compilation of inputs to the EPRI-KY model for this specific project, suitability maps, Alternate Corridors, Alternate Routes geographies and score and the selection of a Preferred Route for construction of the proposed line.

PART IV: STUDY AREA DESCRIPTION

Study Area Location

The project study area located in central Marion County Kentucky.

Figure 6: Project Study Area: Marion County Kentucky

Study Area Characteristics

Ecological Region

The project area crosses multiple ecological regions. The Knobs-Normal Upland (71c), and the Outer Bluegrass (71d) regions of the state which is an EPA- defined geographic and ecological region shown in Figure 7 below.

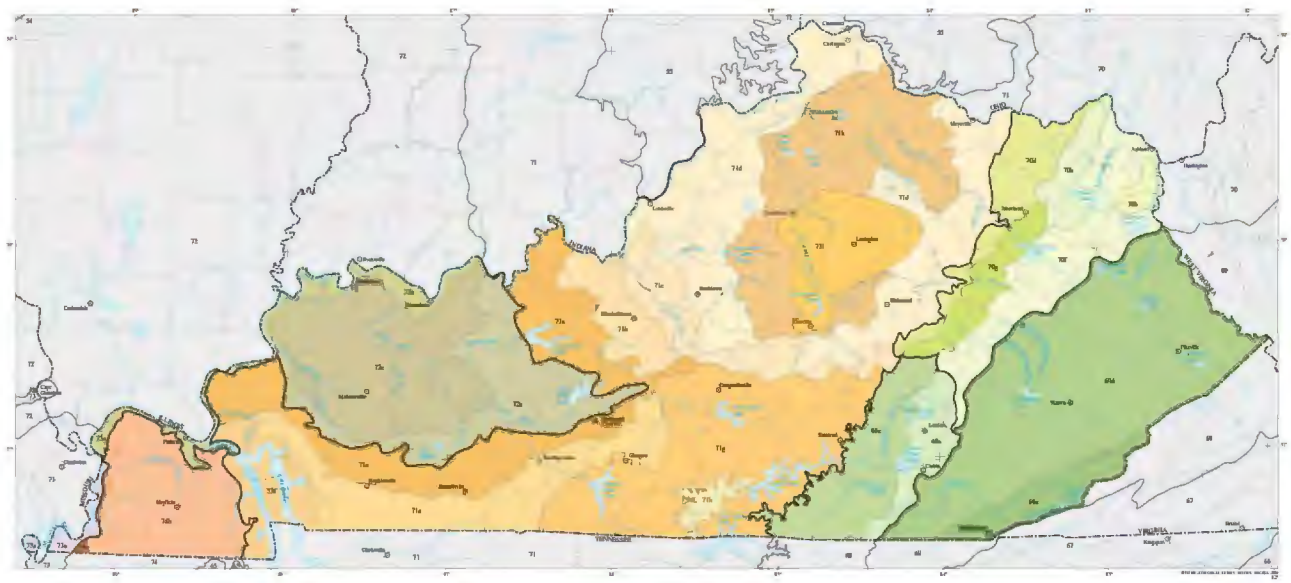


Figure 7 Ecological Regions of Kentucky. Source: http://ecologicalregions.info/data/ky/ky_front.pdf

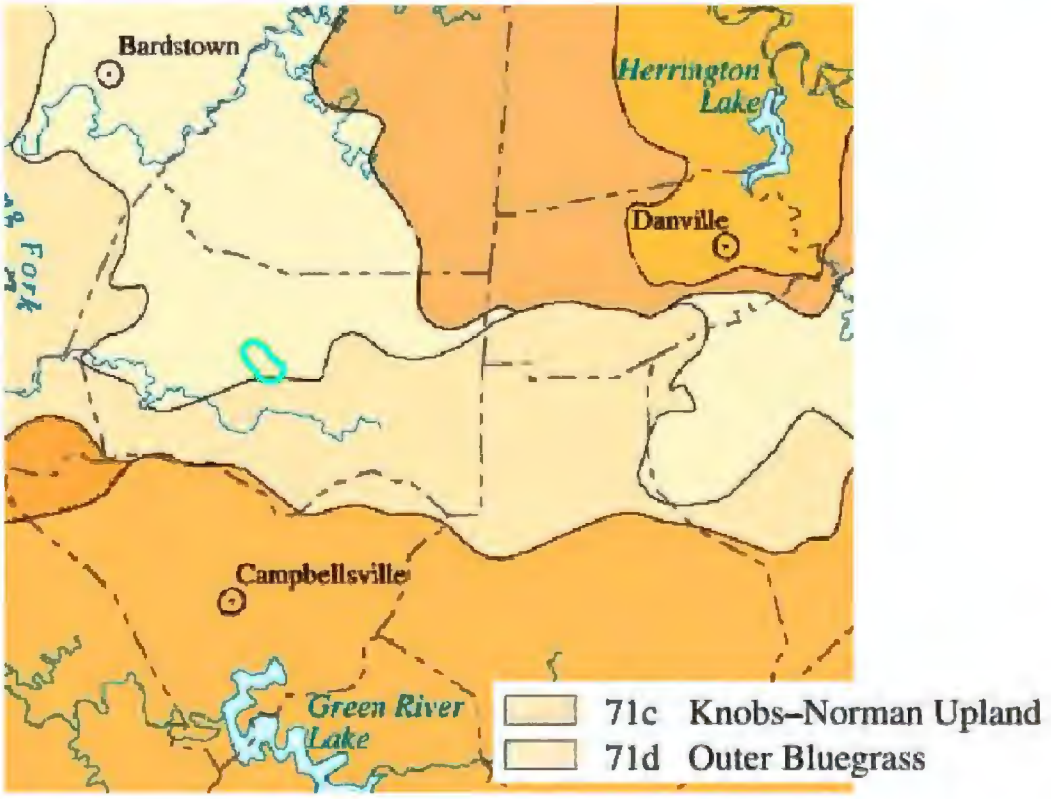


Figure 8: AOI Detail of Western Allegheny Plateau Ecoregion

The Knobs–Norman Upland is underlain by Pennsylvanian-age through Silurian-age sedimentary rocks. Its rounded hills and ridges are mostly forested and divide the Bluegrass (Ecoregions 71d, 71k, and 71l) from the rest of the Interior Plateau (71). Inceptisols and Ultisols occur on slopes and support mixed deciduous forests. Narrow, high gradient valleys are also common. In addition, a few wide, locally swampy valley floors occur and are used for livestock farming, general farming, and woodland. Ecoregion 71c is characterized by large amounts of geological, topographical, and ecological diversity. Overall, however, physiography, soils, lithology, and land use are distinct from the limestone- and Alfisol-dominated agricultural plains of Ecoregions 71b, 71d, 71e, and 71l. The density of perennial upland streams is far greater than on nearby limestone plains. Nutrient and ionic concentrations are much lower in streams that originate in Ecoregion 71d than outside it in heavily populated, agricultural ecoregions underlain by limestone. Fish and macroinvertebrate diversity is in between that of the Bluegrass (Ecoregions 71d, 71k, and 71l) and that of Ecoregions 71b, 71g, and 70g. The rolling to hilly Outer Bluegrass contains sinkholes, springs, entrenched rivers, and intermittent and perennial streams. Local relief is variable but is usually less than in the geomorphically distinct Knobs–Norman Upland (71c). Discontinuous glacial outwash and leached, pre-Wisconsinan till deposits occur in the north from Louisville to Covington. Glacial deposits do not occur elsewhere in Kentucky. Ecoregion 71d is mostly underlain by Upper Ordovician limestone and shale. Natural soil fertility is higher than in the shale-dominated Hills of the Bluegrass (71k). Today, pastureland and cropland are widespread and dissected areas are wooded. At the time of settlement, open savanna woodlands were found on most uplands. On less fertile, more acidic soils derived from Silurian dolomite, white oak stands occurred and had barren openings. Cane grew along streams and was especially common in the east. Distinct vegetation grew in areas underlain by glacial drift (see summary table). Upland streams have moderate to high gradients and cobble, boulder, or bedrock substrates. Mean stream density is greater than in Ecoregion 71l but less than in Ecoregion 71k. Mean summer stream temperatures are much warmer than in Ecoregions 71b, 71c, and 71e. Concentrations of suspended sediment and nutrients can be high. Source: http://ecologicalregions.info/data/ky/ky_front.pdf

Socioeconomics

According to the US Census, the Commonwealth of Kentucky's population growth from 2010 to 2020 was a 3.8% increase. Marion County experienced an 1.% increase in population between 2020 and 2022, with a total 2022 population of 19,775 people. Lebanon is the county seat and largest city in the area, with a population of 6,436. The 2022 Median household income was $49,627 with a 18.6% poverty level.

Transportation

The AOI is intersected by U.S. Highway 68 which is designated as a scenic highway and part to the heritage corridor. Also the Kentucky DOT has planned to improve connectivity and congestion between U.S. 68 and KY 55 on the East side of Lebanon.

Figure 9: Transportation Features intersecting AOI. (Google Earth Imagery)

Water Resources

No major waterbodies are found within the AOI.

PART V: ENGINEERING ENVIRONMENT

Table 2 shows the Engineering Environment sub-model of the Kentucky tailored EPRI siting model. The sub-model incorporates those features whose presence or absence should be considered from the perspective of constructing a transmission line.

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

Table 2: Engineering Environment Layers and Weights (Model Values)

Weights (Project-Adjusted Values)

Not all features are present within every study area. Each model and sub-model must be adjusted based on the contents of the study area for a particular project. When a feature or layer is absent, the weights are adjusted accordingly and evenly across the remaining features or layers. The Engineering Environment data layers and their relative weights for the Big Hill project are summarized in Table 3 Below. Items highlighted in gray are not present in the study area unless otherwise discussed below.

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

Table 3: Engineering Environment Adjusted Layers and Weights

Engineering Perspective Features

Parallel Existing Transmission Lines - An area that is a buffer half the distance to the existing ROW of transmission lines with the AOI. For this study, all lines were used for paralleling with a 50' buffer on each side of the ROW.

Rebuild Existing Transmission Lines (Good) – No "Good" Rebuild opportunities are those existing transmission lines and easements that are suitable for reconstruction as double-circuited.

Background – Any area within the AOI that is not listed as a specified engineering features.

Parallel Interstates – No parallel Interstates were present in the study area for this project.

Parallel Roads ROW – Parallel Roads ROW were considered for this perspective.

Parallel Pipelines - Atmos Energy Corporation natural gas pipelines exists, running from the north end of the AOI through the center of AOI to the southwest side of the AOI. This data was extracted from the National Pipeline Mapping Service.

Future DOT Plans – There are future DOT plans to improve connectivity and congestion between U.S. 68 and KY 55 on the East side of Lebanon.

Parallel Railway ROW – No Parallel Railways were present in the study area for this project.

Road ROW - there are highways, business lanes, and residential roads within the AOI. Road data was extracted from the US Census Bureau Tigerline Network.

Rebuild Existing Transmission lines (Bad)- Existing Transmission lines (Bad) were present in the study area for this project.

Scenic Highways ROW - Highway 68 is considered a Scenic Highway and the ROW were present in the study area for this project.

Avoidances

Non-Spannable Water Bodies – No Non-Spannable Waterbodies were present within the study area

Mines and Quarries –Haydon Materials Lebanon, located at 1270 New Calvary Rd Lebanon, KY 40033 is within the AOI and therefore treated as an avoidance area.

Buildings - Numerous residential, government, business and agricultural buildings were found within the study area.

Airports- None present in the AOI.

Military Facilities - No military facilities were found within the study area.

Center Pivot Irrigation – Aerial photography interpretation was used to determine that there were no center pivots used for agriculture within the project study area.

Linear Infrastructure Features

High Suitability: Parallel Existing Transmission Lines

Opportunities for co-location that parallel existing transmission lines are the most desirable locations for routing new transmission lines. NV5 worked with EKPC to determine what the existing ROW for the transmission lines within the AOI are, as well as what the future ROW would be for the new line. The future EKPC line will have a 100' ROW therefore on the side of ROW adjacent to existing EKPC ROW, EKPC's ROW will have an offset of 25', with 75' on the opposite side.
Figure 11 displays the suitable ROW paralleling opportunities found within the study area, which were lines owned by EKPC and LGE & KU.

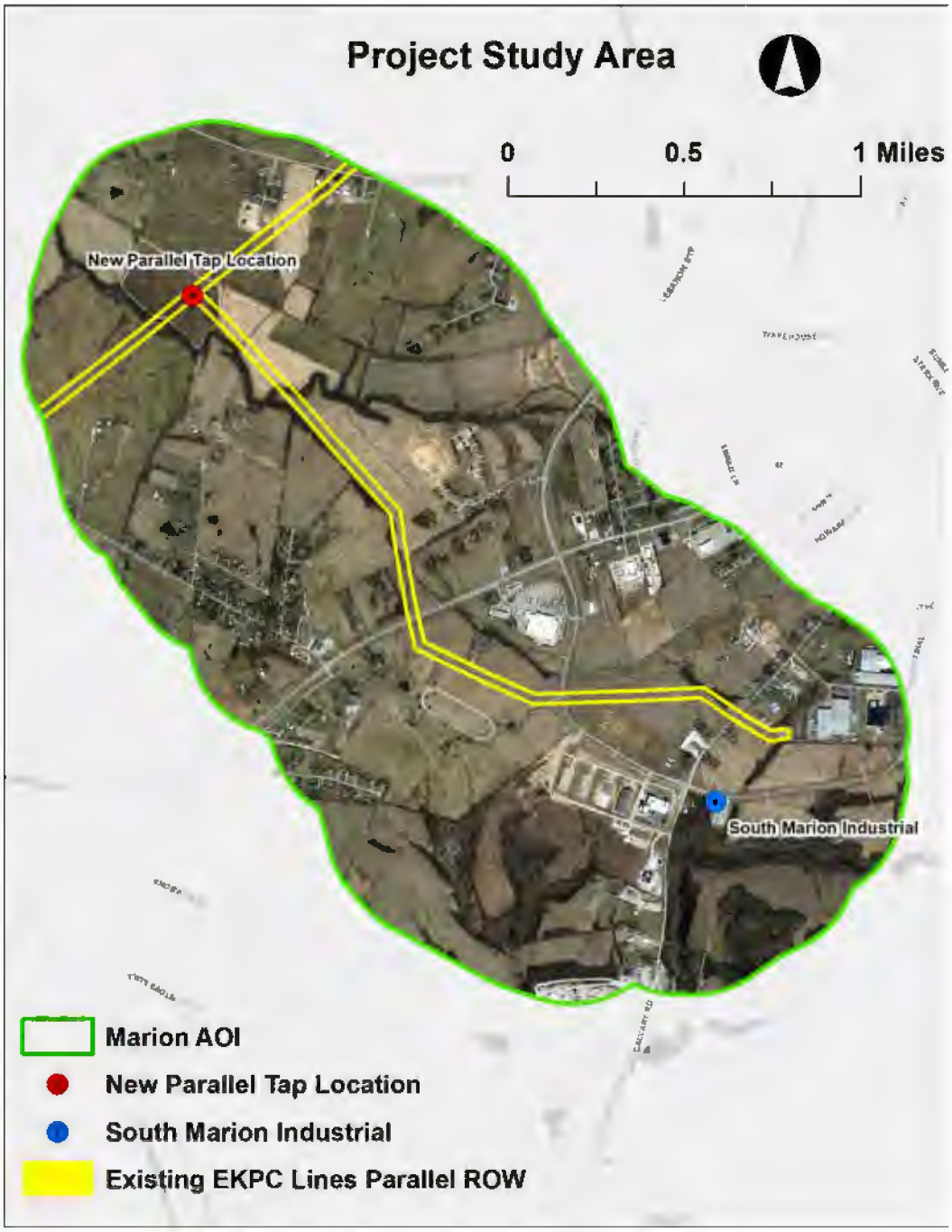


Figure 10: Parallel Existing Transmission Lines

Paralleling road ROW (50' buffer outside road ROW) are given a moderate suitability in the Engineering Environment. Within the study area, there were many roads that provided paralleling opportunities. Roads that were residential in nature and did not provide any connectivity were not considered. Figure 13 displays the suitable road ROW paralleling opportunities found within the study area. The road right-of-way data used in this analysis was created from US Census TIGER lines.

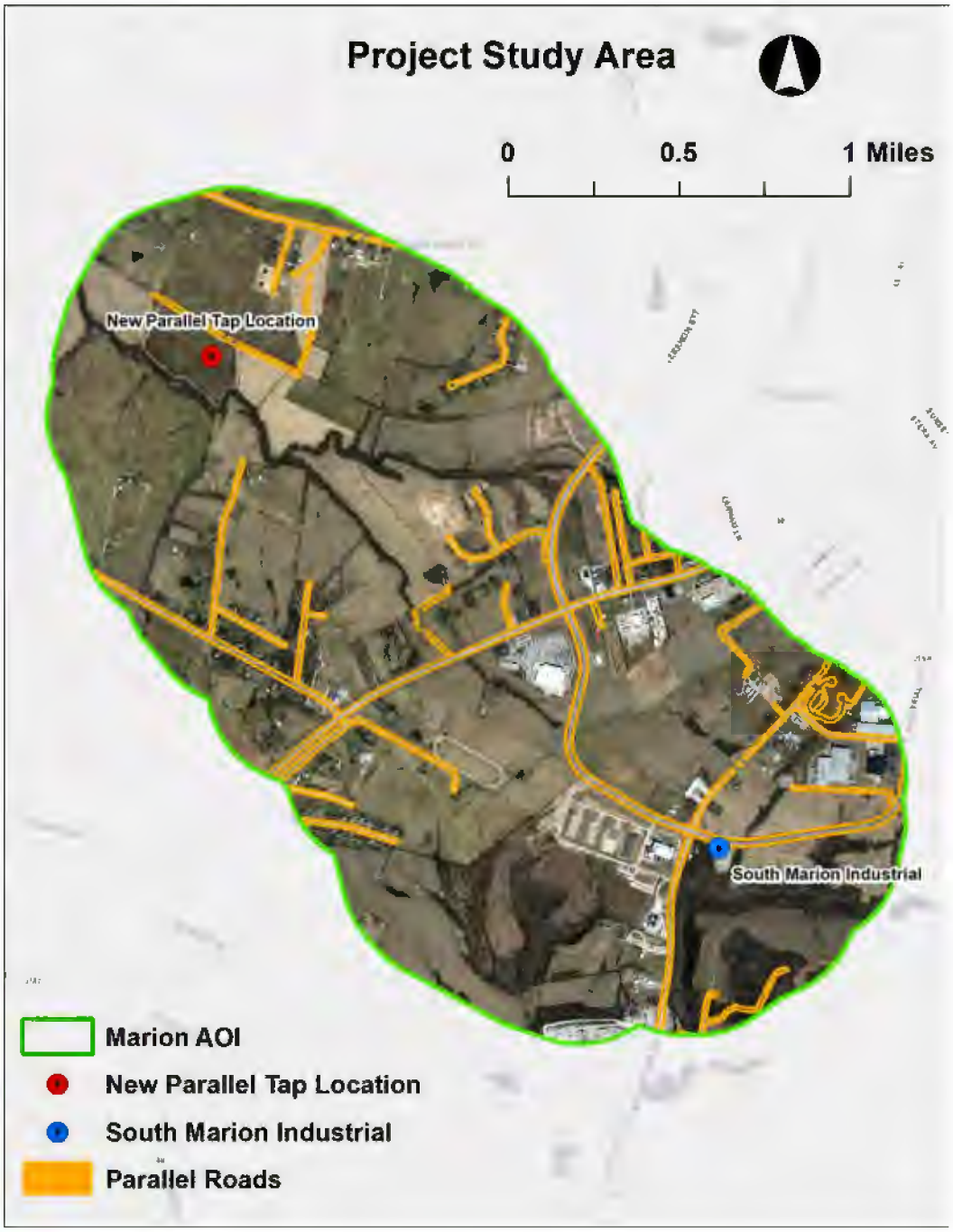


Figure 11: Parallel Road Right-of-Ways

The EPRI Model looks to co-locate electric and gas utility locations by applying a paralleling buffer to existing pipeline features. Like other parallel features, this a 50’ buffer outside pipeline rows. Upon examining the National Pipeline Mapping System, there are natural gas pipelines within the northern extent of the AOI (operated by Atmos Energy Corporation). These figures were georeferenced and digitized, with final QC via aerial and spherical imagery.

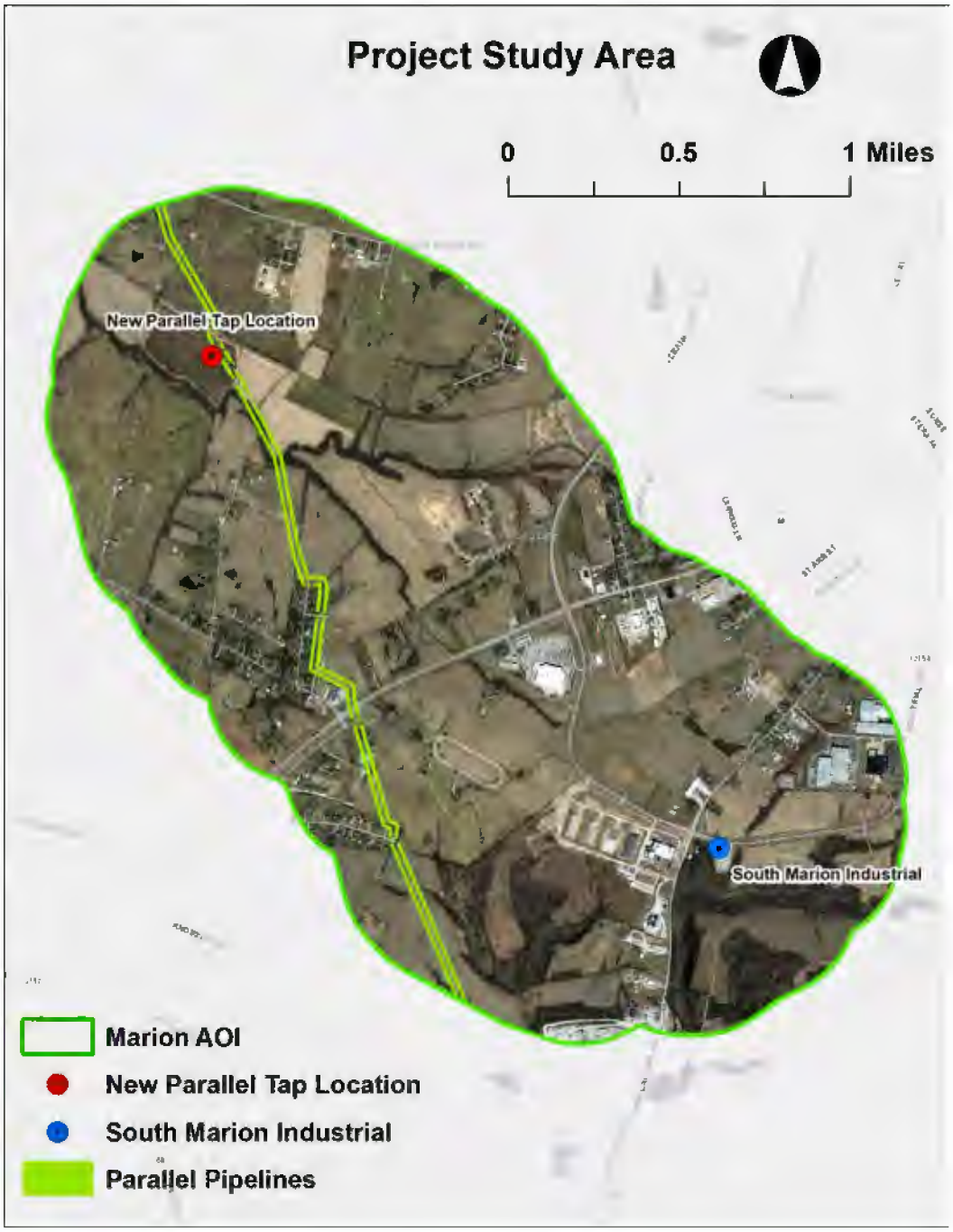


Figure 12: Parallel Pipelines

Upcoming Department of Transportation projects are moderately suitable within the EPRI model. Within this project, there is one proposed by the DOT to improve connectivity and congestion between U.S. 68 and KY 55 on the East side of Lebanon. Data was referenced from the Kentucky Department of Transportation and transcribed into existing road features.

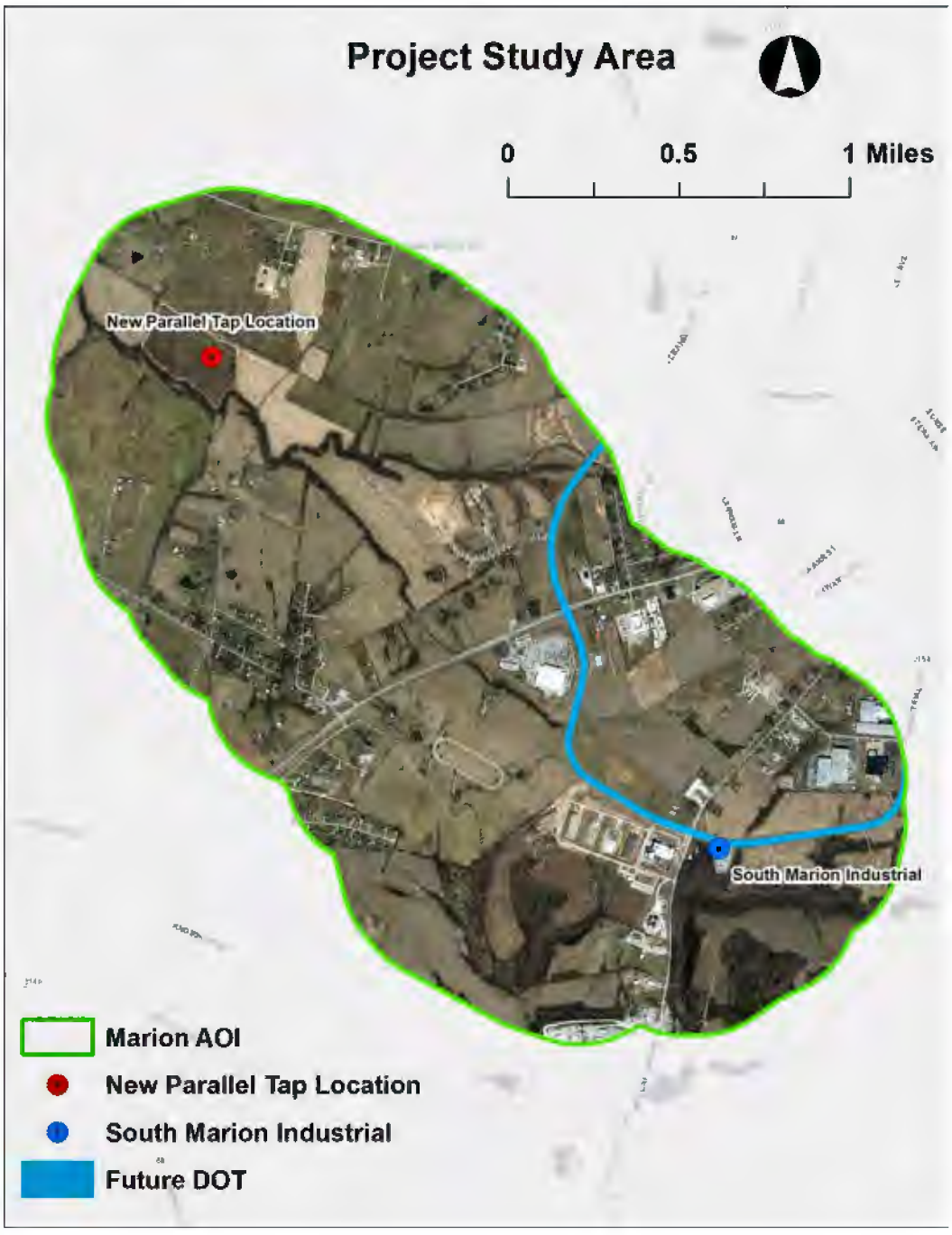


Figure 13: Future DOT

Lower Suitability: Road Right-of-Ways

Road ROWs are given a lower suitability in the Engineering Environment. The ROW feature is the area inside of the parallel roads feature and is derived from the same dataset (US Census Tiger Lines). Though it is often necessary to cross over existing road ROWs, the centerline of the transmission line should not travel directly down the center of an existing roadway. Figure 15 highlights existing road right of ways.

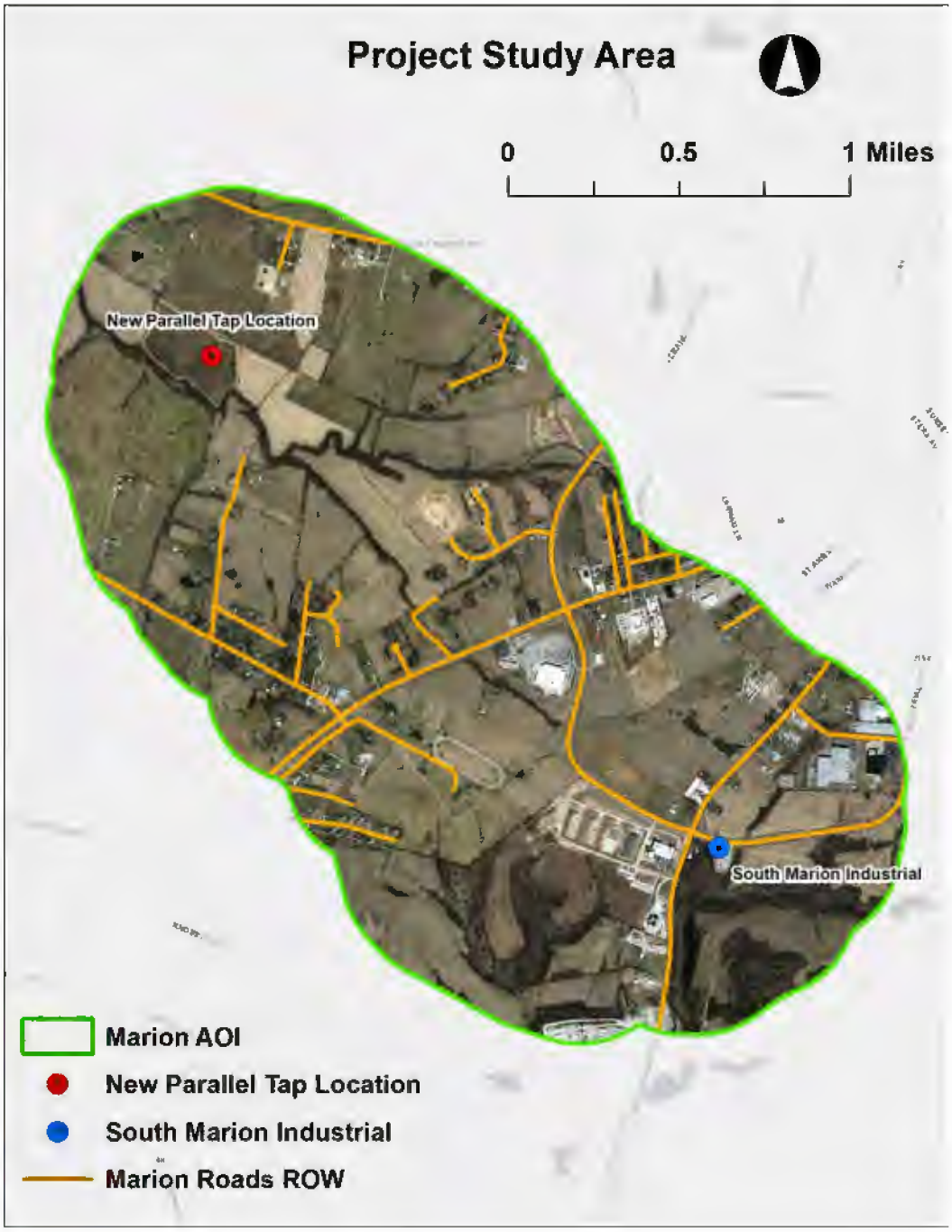


Figure 14: Road Right-of-Ways

The EPRI Model distinguishes between “good” and “bad” rebuild opportunities present in existing transmission lines. “Bad” rebuild opportunities represent transmission line easements with existing infrastructure that have been determined to be unsuitable to rebuild as a double-circuited transmission line. It could be feasible in some circumstances to rebuild an existing transmission line (Good) and use the existing easement, while purchasing only a minimal amount of additional ROW. For this project EKPC determined that All EKPC lines would be desirable to rebuild (Bad).

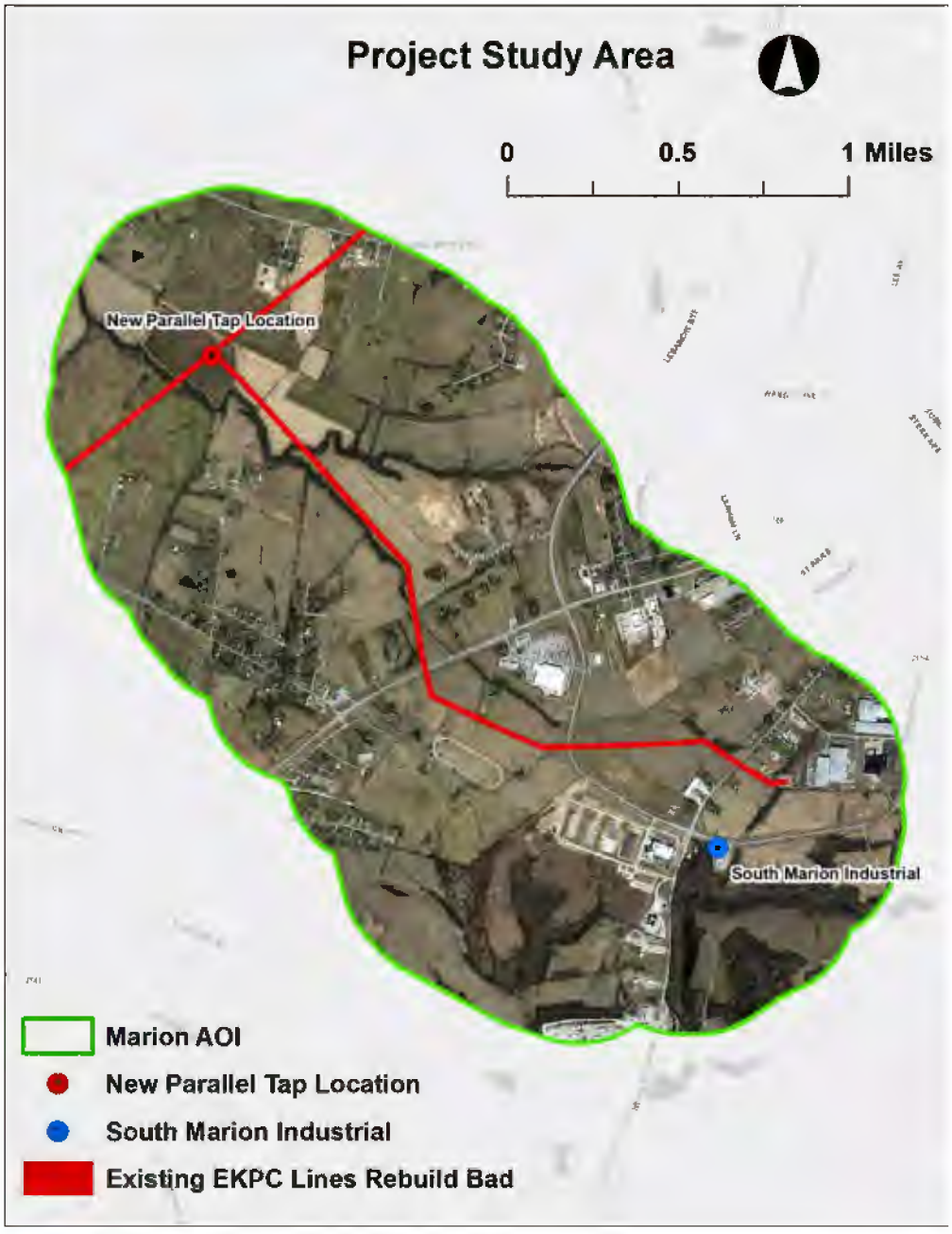


Figure 15: Rebuild (Bad) Existing Transmission Lines

Lower Suitability: Scenic Highways

Scenic Highways ROW are given a lower suitability in the Engineering Environment. The ROW feature is the area inside of the scenic highway feature and is derived from the KYTC road centerlines that reflect roadsides and viewsheds selected by the Kentucky Transportation Cabinet, Office of Local Programs for their scenic, natural, cultural, historical, archaeological, and/or recreational value worthy of preservation, restoration, protection, and enhancement.

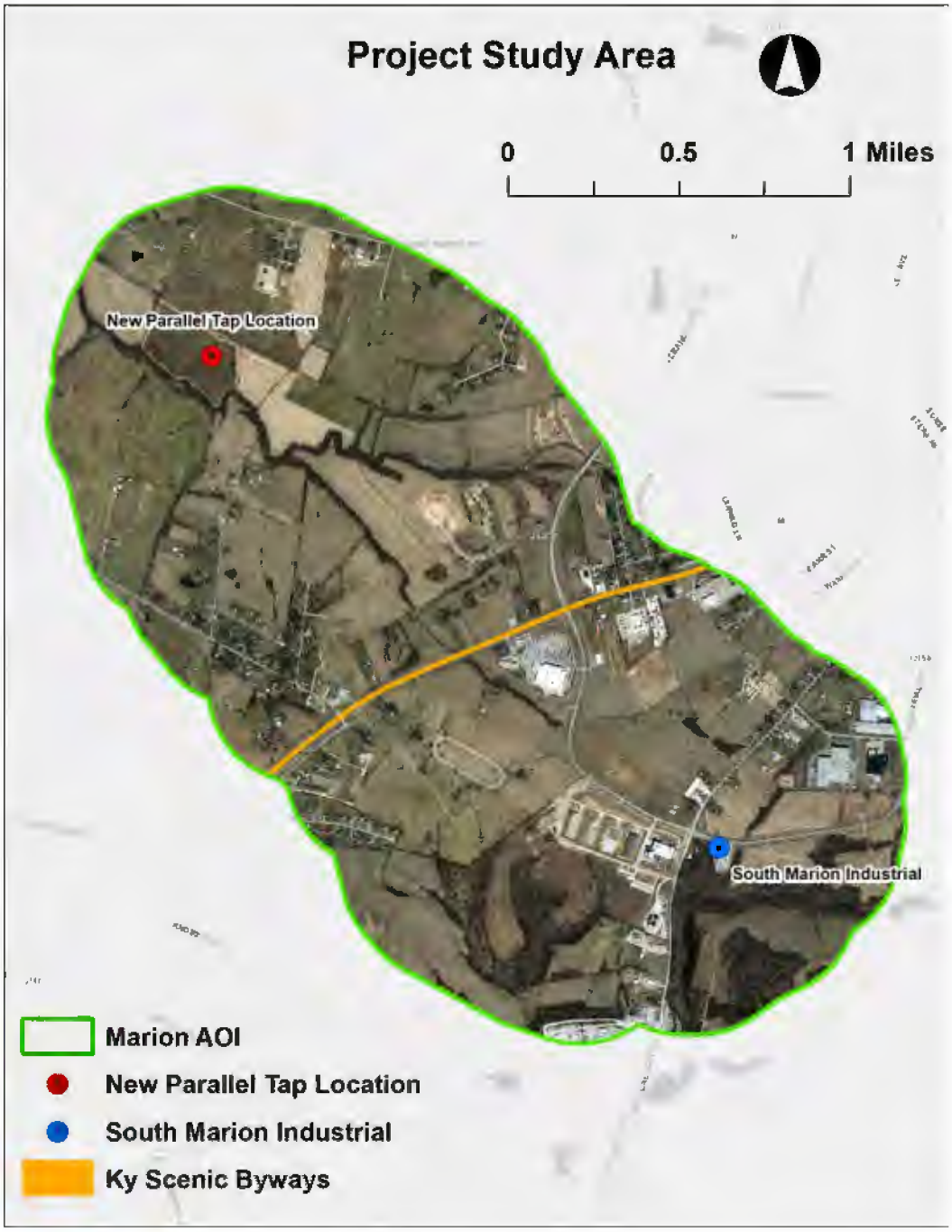


Figure 16:Scenic Highways ROW

Slope

The slope of the terrain can play a significant role in routing and constructing a transmission line. Using Digital Elevation Model (DEM) data for the commonwealth of Kentucky, percent slope is extracted and used in the model. Figure 16 details the locations and percentages of the slopes found within the study area. The steepest and least desirable areas in the project are found along the area where the forested plateau escarpments drop into narrow valleys and ravines. Slope percent breakdowns are set by the KY EPRI model at 0-15%, 15-30%, 30-40% and >40%.

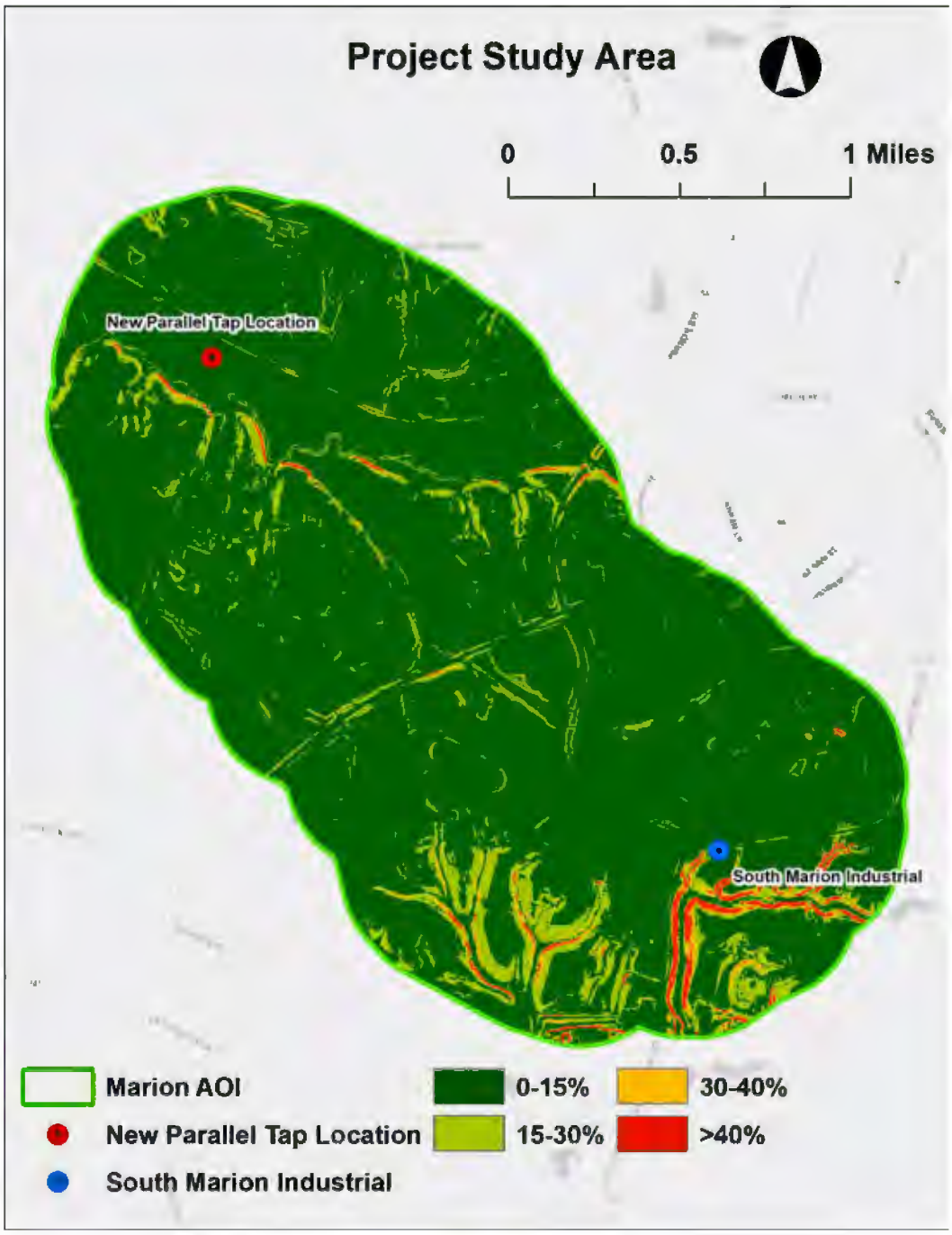


Figure 17: Slope

Parallel interstates, parallel railroad ROW, and Rebuild existing transmission lines (Good), were not present within the area of interest.

Avoidance Areas

Buildings, mines, quarries, airports, military facilities, and non-spannable water bodies are designated as areas of least preference in the Engineering Environment of the siting model. Within the study area, buildings and a quarry were the only avoidance features found to be present.

Buildings

Buildings are designated as areas of least preference within the Engineering Environment. NV5 Geospatial used basemap imagery to extract the footprints of buildings. The most prominent buildings within the AOI were residential, accounting for the highest percentage of the structure types in the AOI.

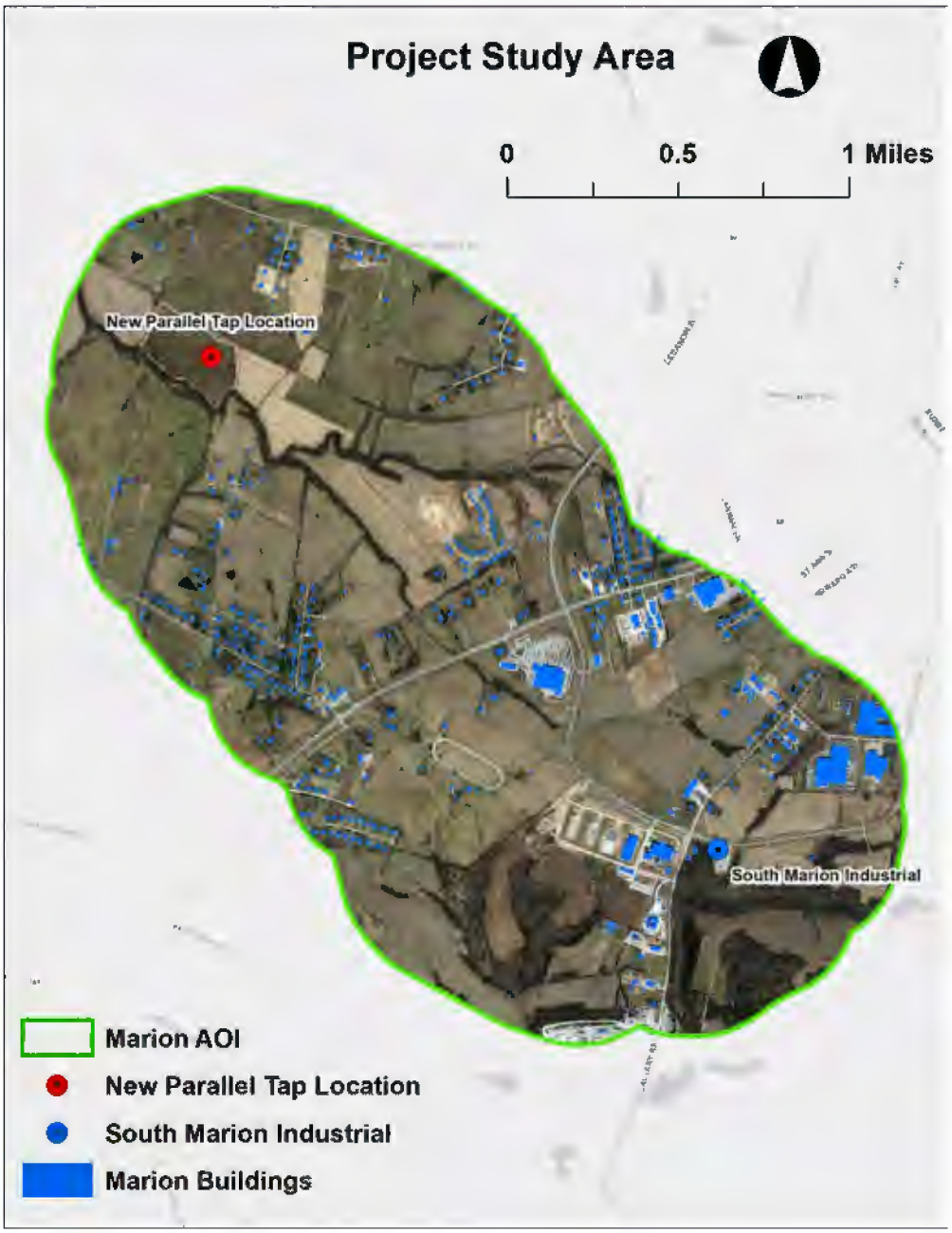


Figure 18: Avoidance Areas; Buildings

Quarries are designated as areas of least preference within the Engineering Environment. NV5 used Parcel data and image interpretation to determine the presence of quarries.

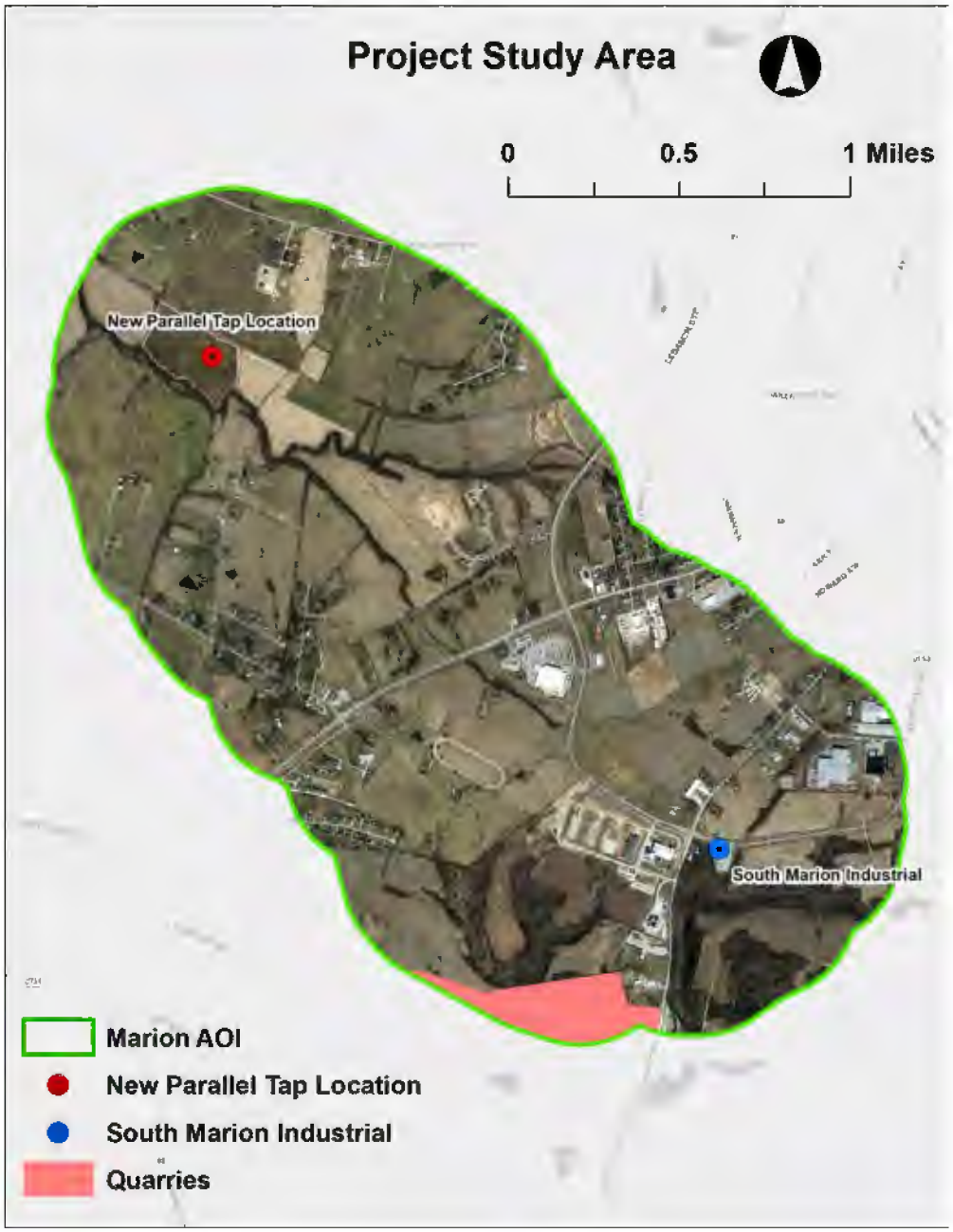


Figure 19: Avoidance Areas; Quarries

Figure 20: Buildings within the AOI (NV5 Field Photo)

Engineering Environment Features not present within the AOI

Parallel Interstates ROW

No parallel Interstates ROW were found to be present within the AOI.

Parallel Railway ROW

No parallel Railways ROW were found to be present within the AOI.

Rebuild Existing Transmission Lines (Good)

No Rebuild Existing Transmission Lines (Good) were found to be present within the AOI.

PART VI: NATURAL ENVIRONMENT

Table 4 is the Natural Environment sub-model of the Kentucky tailored EPRI siting model. The sub-model incorporates those features whose presence or absence should be considered from the perspective of protecting the natural environment when constructing a transmission line.

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

Table 4: Natural Environment Layers and Weights (Model Values)

Natural Environment Data Layer Weights (Project-Adjusted Values)

Not all features are present within every study area. Each model and sub-model must be adjusted based on the contents of the study area for a particular project. When a feature or layer is absent, the weights are adjusted accordingly and evenly across the remaining features or layers. The Natural Environment data layers and their relative weights for the Big Hill project are summarized in Table 5 below. Items highlighted in gray are not present in the study area unless otherwise discussed below.

Natural Environment	
Floodplain	**8.6%**
Background	1
100 Year Floodplain	9
Streams/Wetlands	**54.5%**
Background	1
Streams < 5cfs+ Regulatory Buffer	6.4
Rivers/Streams > 5cfs+ Regulatory	7.3
Wetlands + 30' Buffer	9
~~Outstanding State Resource Wate~~	-
Public Lands	**0.0%**
~~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	**36.9%**
Developed Land	1
Agriculture	4.6
Forests	9
Wildlife Habitat	**0.0%**
~~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~~	

Table 5: Natural Environment Adjusted Data Layers and Weights

Natural Perspective Features

100 Year Floodplain- Federal Emergency Management Agency (FEMA) designated Federal 100-year floodplain. Approximately 109.02 acres of floodplain exist within the project study area, which is about 4.5% of the study area.

Streams/Rivers cf/s+ Regulatory Buffer – USGS National Map geospatial products delineate flowline features that have quantified cubic feet per second within their home watershed. These features were parsed out for the two features within the Natural Environment.

Wetlands + 30ft' Buffer – Several small wetlands were present in the study area for this project.
Outstanding State Resource Waters – There are no listings of State Resource Waters within the AOI
WMA – Not State Owned – There are no Wildlife Management Areas that are not owned by the state within the AOI.
Other Conservation Land – There are no conservation lands within the AOI.
USFS (proclamation area) – There are no USFS Proclamation within the AOI

USFS (actually owned) – USFS lands that are owned by the agency were not present.
State Owned Conservation Land – No State Conservation Lands exist within the AOI.
Land Use – Developed Land, Agriculture, Forest, are all present within the AOI.
Species of Concern Habitat – No species of concern habitat is present in the study area.

Avoidances

State & National Parks – Analysis of the tax parcel information obtained from the Marion County PVA and national records finds no areas that are federal or state owned parks within the AOI.

EPA Superfund Site – The EPA lists no current superfund sites in the study area.
USFS Wilderness Area – No Wilderness areas exist within the AOI.
Wild / Scenic Rivers – The National Wild & Scenic Rivers System lists no wild / scenic rivers within the AOI.

State Nature Preserves – Data from the Kentucky State Nature Preserve Commission indicates that there are no state nature preserves in the study area.
Wildlife Refuge – The Kentucky State Nature Preserve lists no wildlife refuges in the study area.
Designated Critical Habitat– No designated critical habitat is found in the study area.

Floodplain

Low Suitability: 100 Year Floodplain

The Natural Environment places a low desirability to build transmission within floodplains. The model utilizes the FEMA 100 Year Flood via the National Flood Hazard Map.

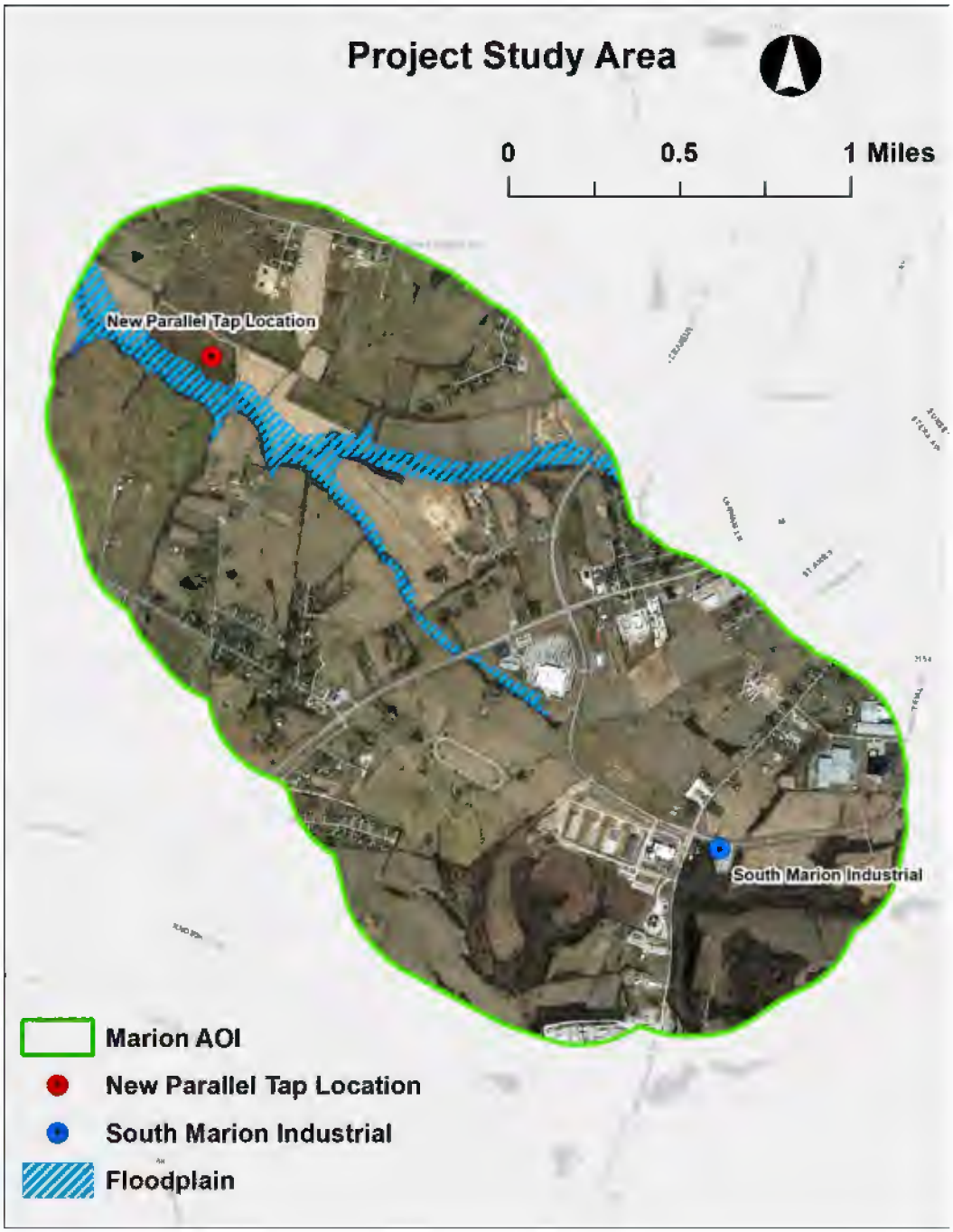


Figure 21: 100 Year Floodplain

Streams and Wetlands

Moderate to Low Suitability: Streams & Rivers

There are two categories for streams & rivers: those with a flow greater than five cubic feet per second (cf/s) and those whose flow is less than five cf/s. It is moderately suitable to cross a stream with a flow that is less than five cf/s and low suitability to crossing a stream with a flow greater than five cf/s. Figure 21 illustrates these river features.

No Wetlands were present within the study area.

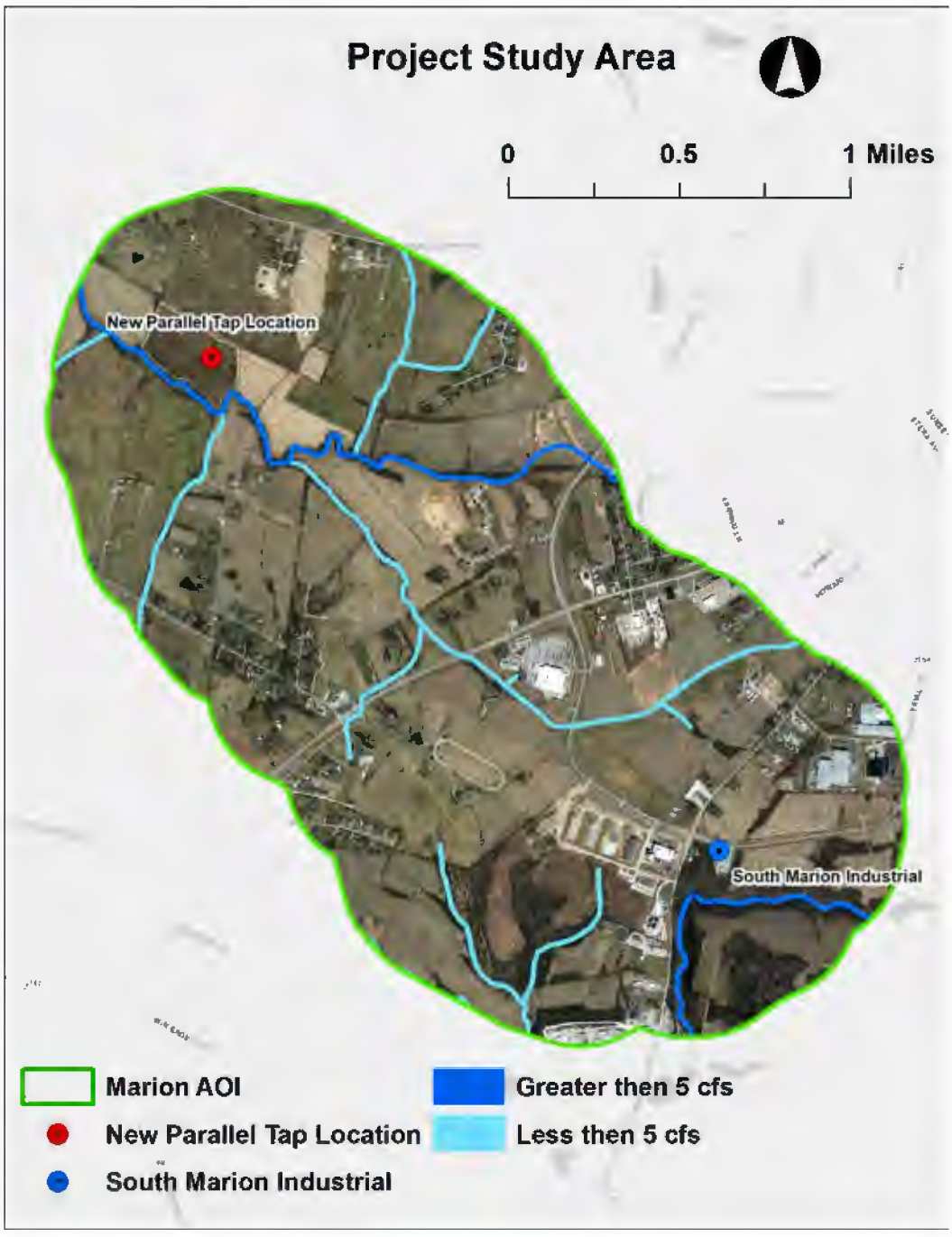


Figure 22: Streams and Rivers

Public Lands

No WMA – Not State Owned, Other Conservation Land, USFS (proclamation area), USFS (actually owned), or State Owned Conservation Land were found within the study area.

Figure 23: Open Land (NV5 Field Photo)

Land Cover

In the Natural Environment, the sub-model finds developed land most suitable for transmission lines. Open and agricultural lands have moderate suitability for the construction of transmission lines. Naturally forested lands and hydrological features have the lowest suitability with respect to the Natural Environment. This layer was created by NV5 Geospatial through aerial photo interpretation of the most recent NAIP imagery as seen in Figure 26.

Land Cover	Model Value	Suitability
Developed Land	1	High
Agriculture	4.6	Moderate
Forests	9	Low

Table 6: Land Cover Suitability

Figure 24: Land Cover

Wildlife Habitat

Lowest Suitability: Species of Concern Habitat

No species of concern habitat was found within the study area.

Figure 25: Open Land (NV5 Field Photo)

Avoidance Areas

EPA Superfund Sites, State and National Parks, USFS Wilderness Area, Wild/Scenic Rivers, Wildlife Refuge, and State Nature Preserves are designated as areas of least preference in the Environmental Environment of the siting model. Within the study area none of these features were found to be present.

Natural Environment features not present within the AOI

Outstanding State Resource Waters

There are no Outstanding State Resource Waters within the AOI.

Wetlands

No wetlands were found to be present within the AOI.

WMA

No Wilderness Management Areas were found to be present within the AOI

State Owned Conservation Land

No State owned Conservation areas were found to be present within the AOI

USFS (Proclamation area)

No USFS (Proclamation area) was found to be present within the AOI

Other Conservation Land

No other Conservation land was found to be present within the study area.

USFS (actually owned)

No USFS land was found to be present within the study area.

State Owned Conservation Land

No State owned conservation land was found to be present within the study area.

Species of Concern Habitat

No Species of concern habitat was found to be present within the study area.

PART VII: BUILT ENVIRONMENT

Table 7 is the Built Environment sub-model of the Kentucky tailored EPRI Siting Model. The sub-model incorporates those features whose presence or absence should be considered from the perspective of preserving human development and activities, including view shed, when constructing a transmission line.

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

Table 7: Built Environment Data Layers and Weights

Built Environment Data Layer Weights (Project-Adjusted Values)

Not all features are present within every study area. Each model and sub-model must be adjusted based on the contents of the study area for a particular project. When a feature or layer is absent (greyed out), the weights are adjusted evenly across the remaining features or layers. The Built Environment data layers and their relative weights for the BIG HILL project are summarized in Table 8.

Built Environment			
Proximity to Buildings	24.3%	Proximity to Eligible Historic and Archeological Sites	0.0%
Background	1	~~Background~~	~~1~~
900-1200	3.4	~~900-1200~~	~~4.6~~
600-900	5.7	~~600-900~~	~~7.9~~
300-600	8	~~0-300~~	~~8.6~~
0-300	9	~~300-600~~	~~9~~
Building Density	12.2%	AVOIDANCE AREAS	
0 - 0.05 Buildings/Acre	1	~~Listed Archaeology Sites & Dist.~~	
0.05 - 0.2 Buildings/Acre	3.1	Listed NRHP Districts and Buildings	
0.2 - 1 Buildings/Acre	5.9	~~City and County Parks~~	
1 - 4 Buildings/Acre	9	Day Care Parcels	
~~> 4 Buildings/Acre~~	-	Cemetery Parcels	
Proposed Development	5.7%	~~School Parcels~~	
Background	1	~~Church Parcels~~	
Proposed Development	9		
Spannable Lakes and Ponds	5.8%		
Background	1		
Spannable Lakes and Ponds	9		
d Use	52.0%		
Commercial/Industrial	1		
Agriculture (crops)	3.5		
Agriculture (other livestock)	4.6		
~~Silviculture~~	-		
Other (forest)	6.7		
~~Equine Agri - Tounsm~~	-		
Residential	9		

Table 8: Built Environment Adjusted Data Layers and Weights

Built Perspective Features

Proximity to Buildings- Building footprints are delineated from aerial photography with progressive 300' buffers applied to them to create the proximity feature. See Figure 32 for further details.

Building Density – Each building is given a centroid point and point densities are created with the EPRI contained area for calculated areas. See Figure 33 for further details.

Proposed Developments- Data from County sources revealed a proposed development within the AOI.

Spannable Lakes and Ponds–Open waters, such as lakes, ponds, and rivers, are designated as less suitable for locating transmission lines. A number of small isolated water bodies exist in the study area. These areas are small enough to allow the construction of a transmission line, however, they still present challenges to the routing process. Therefore, according to the model, they should be circumnavigated where appropriate. Figure 29 depicts the location of water bodies distributed within the study area.

Land Use–Within the Built Perspective there are seven categories of land classification. Within this project five of them were found within the AOI and are detailed in Figure 36.

Proximity To Eligible Historic and Archaeological Sites- Utilizing University of Kentucky and national data sources, no eligible archaeological site were found within the AOI.

Avoidances

Listed Archaeology Sites and Districts–The UK Department of Archaeology has no listed sites or districts within the AOI.

National Register of Districts and Buildings– US National Register of Historic Places shows one feature within the AOI, the

Lebanon National Cemetery.

City and County Parks- Marion County PVA lists no parks within the AOI.

Day Care Parcels- Marion County PVA does not list day care parcels within the AOI.

Cemetery Parcels- Marion County PVA does list cemetery parcels within the AOI.

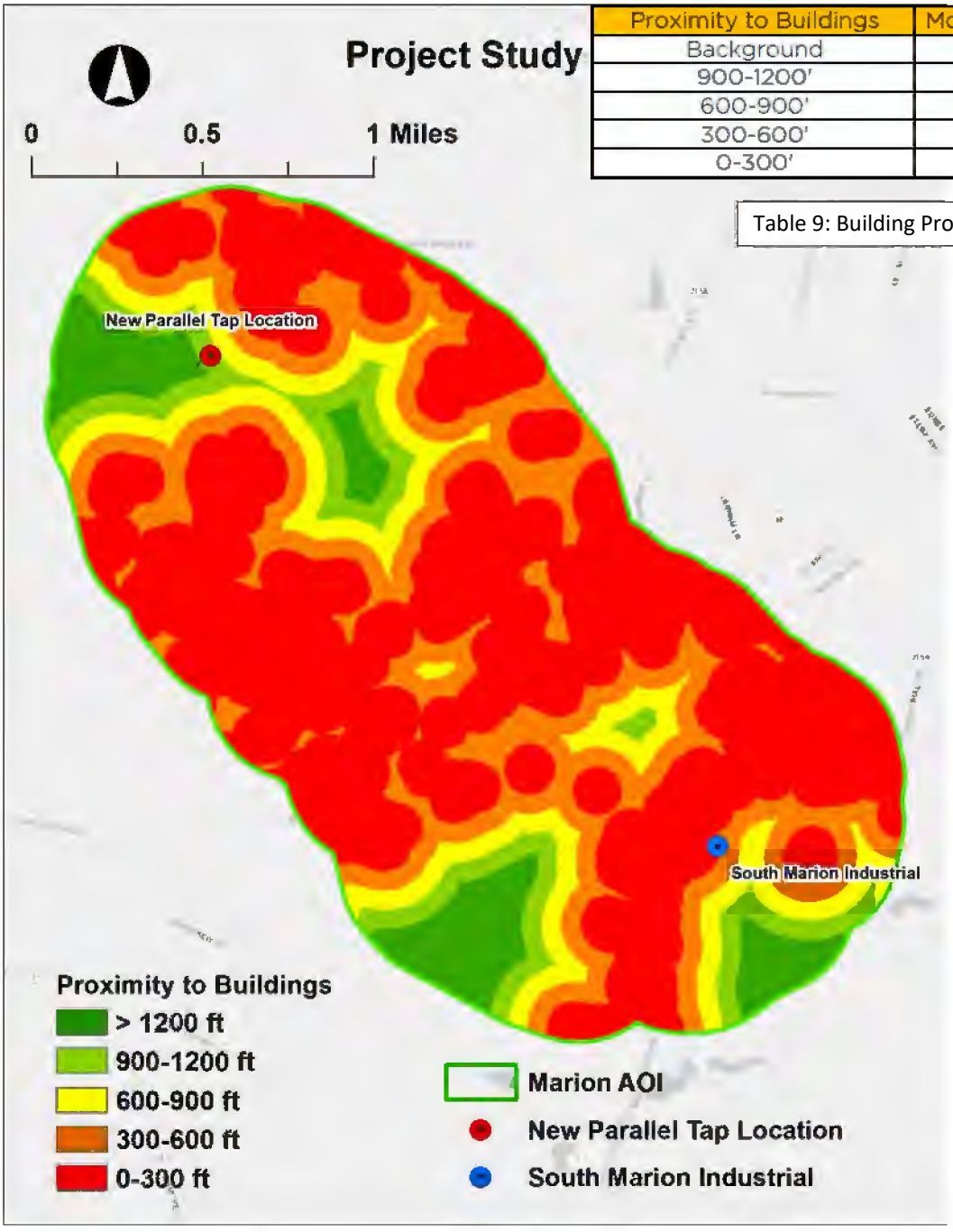
School Parcels- Marion County PVA does not list school parcels within the AOI.

Church Parcels- Marion County PVA does not list Church parcels within the AOI.

Figure 26: Built Avoidances within the Project AOI (NV5 Field Survey)

Proximity to Buildings

In the Built Environment, it is more suitable to locate a transmission line away from buildings. The model has five categories to rank the proximity to buildings layer for suitability at 300 ft increments. The background category constitutes all areas that are farther than 1,200 ft from any building. This data was derived and complied by NV5 from analysis from aerial photography. It is displayed in Figure 29. Building proximity was determined by buffering half the distance to the ROW (50ft from building footprints), and then applying the 300 ft incremental buffer zones.



Proximity to Buildings	Model Value	Suitability
Background	1	High
900-1200'	3.4	Moderate
600-900'	5.7	Moderate
300-600'	8	Low
0-300'	9	Low

Table 9: Building Proximity Suitability

Figure 27: Proximity to Buildings

Building Density

Areas of lower building density are considered more suitable to locate a transmission line within the Built Environment. The density metric is broken down into four classifications which can be viewed in table below. Building centroid information was derived by NV5 from analysis of the same building centroids and footprints as the building proximity layer. Areas of building density of greater than 4 buildings per acre are not present within this AOI.

Building Density	Model Value	Suitability
0 - 0.05 Buildings/Acre	1	High
0.05 - 0.2 Buildings/Acre	3.1	Moderate
0.2 - 1 Buildings/Acre	5.9	Moderate
1 - 4 Buildings/Acre	9	Low

Table 10: Building Density Suitability

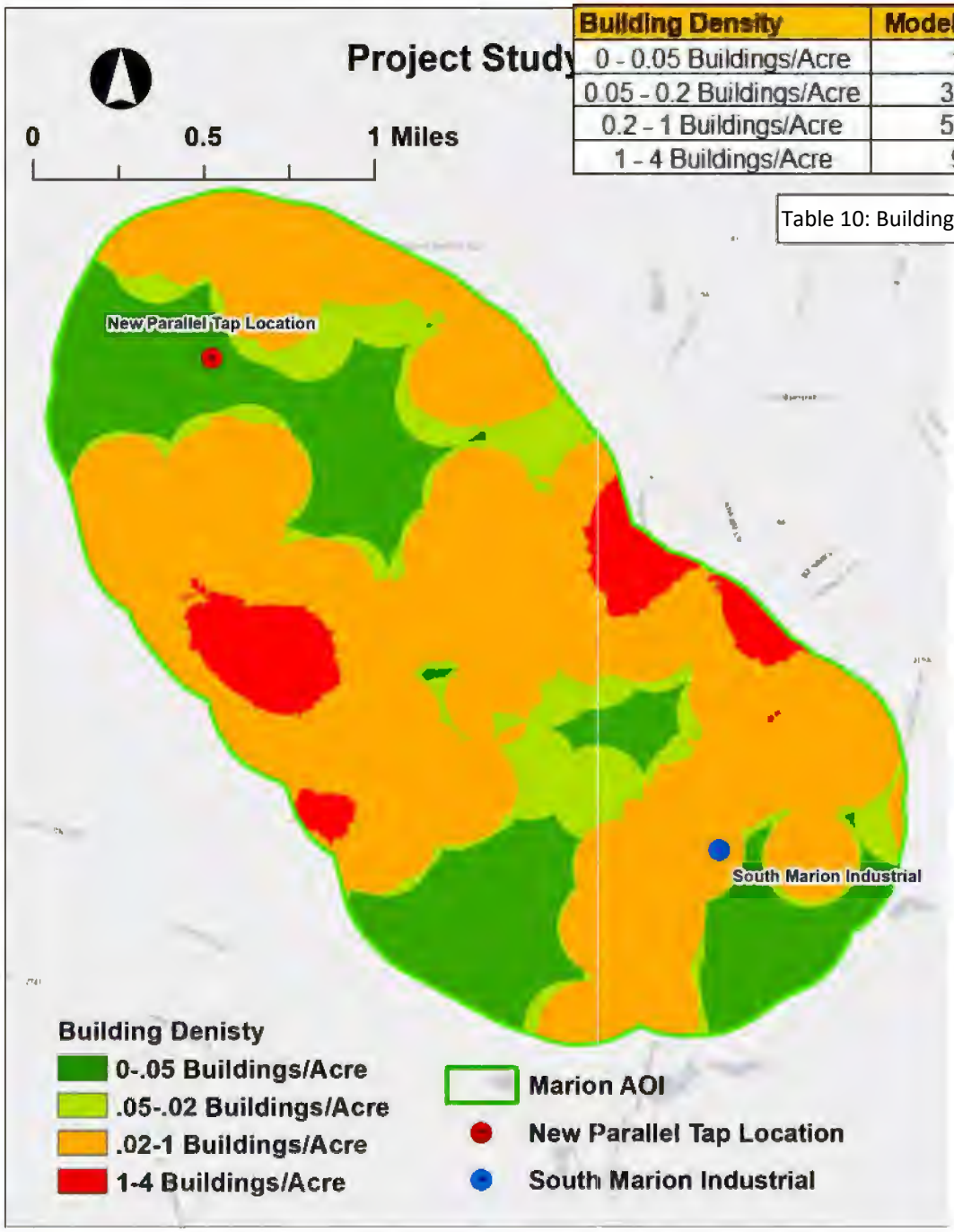


Figure 28: Building Density

Waterbodies

Low Suitability: Spannable Lakes and Ponds

Open waters, such as lakes, ponds, and rivers, are designated as less suitable for locating transmission lines. Several small, isolated water bodies exist in the study area. These areas are small enough to allow the construction of a transmission line, however, they still present challenges to the routing process. Figure 31 depicts the location of water bodies distributed within the study area. The hydrologic features were extracted from aerial photography interpretation and supplemented by the NHD of water bodies in the study area.

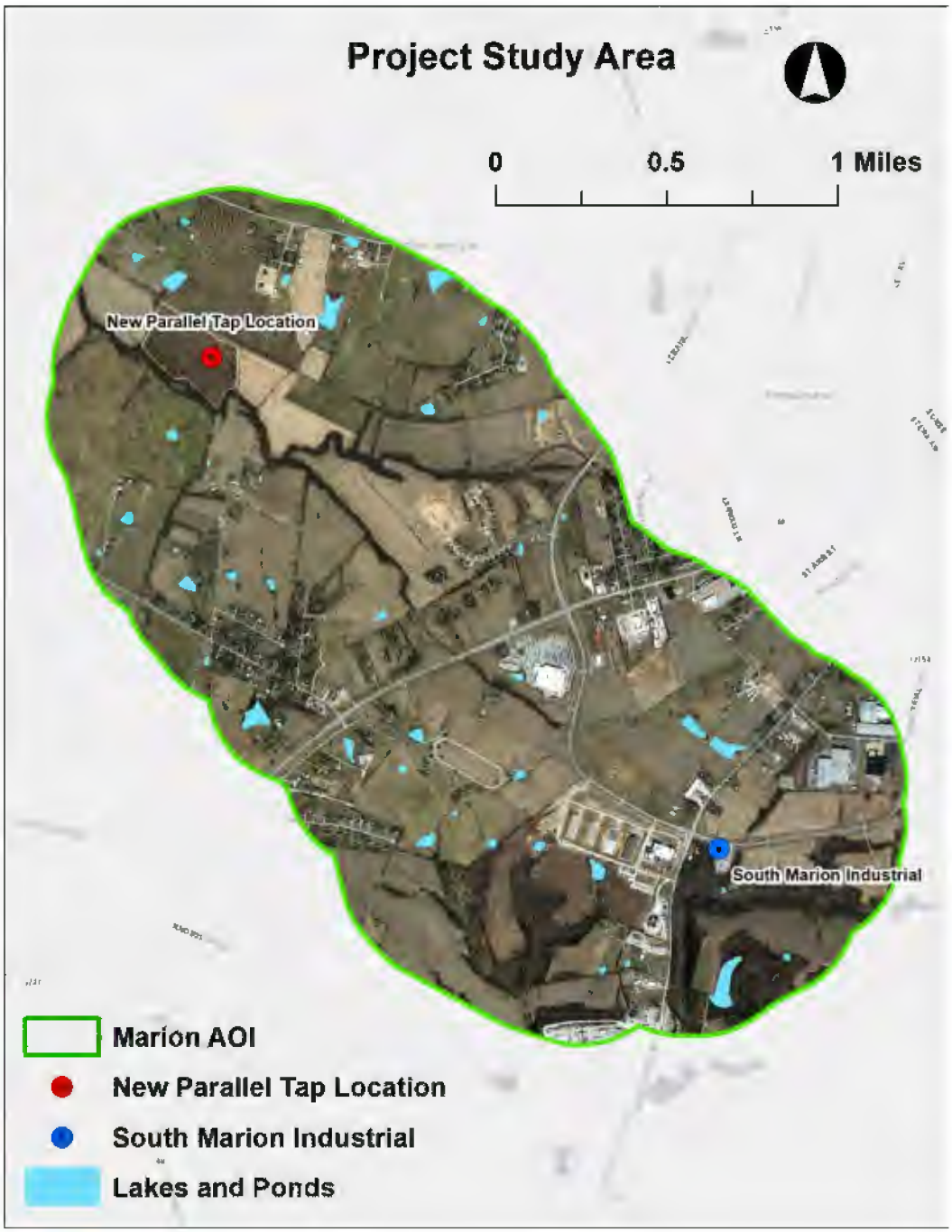


Figure 29: Spannable Lakes and Ponds

Land Use

Land use within the build environment considers commercial or industrial land to be the most suitable for locating transmission lines. Figure 32 shows the existing land use patterns within the study area. Table 11 shows the land use classifications considered by the model. Silviculture and equine agri-tourism classifications were not present in the project AOI. The land use data was extracted using aerial imagery by NG5 Geospatial and cross-referenced with County PVA parcel data.

Land Use	Model Value	Suitability
Commercial/Industrial	1	High
Agriculture (crops)	3.5	Moderate
Agriculture (livestock)	4.6	Moderate
Other (forest/river)	6.7	Low
Residential	9	Low

Table 11: Land Use Suitability

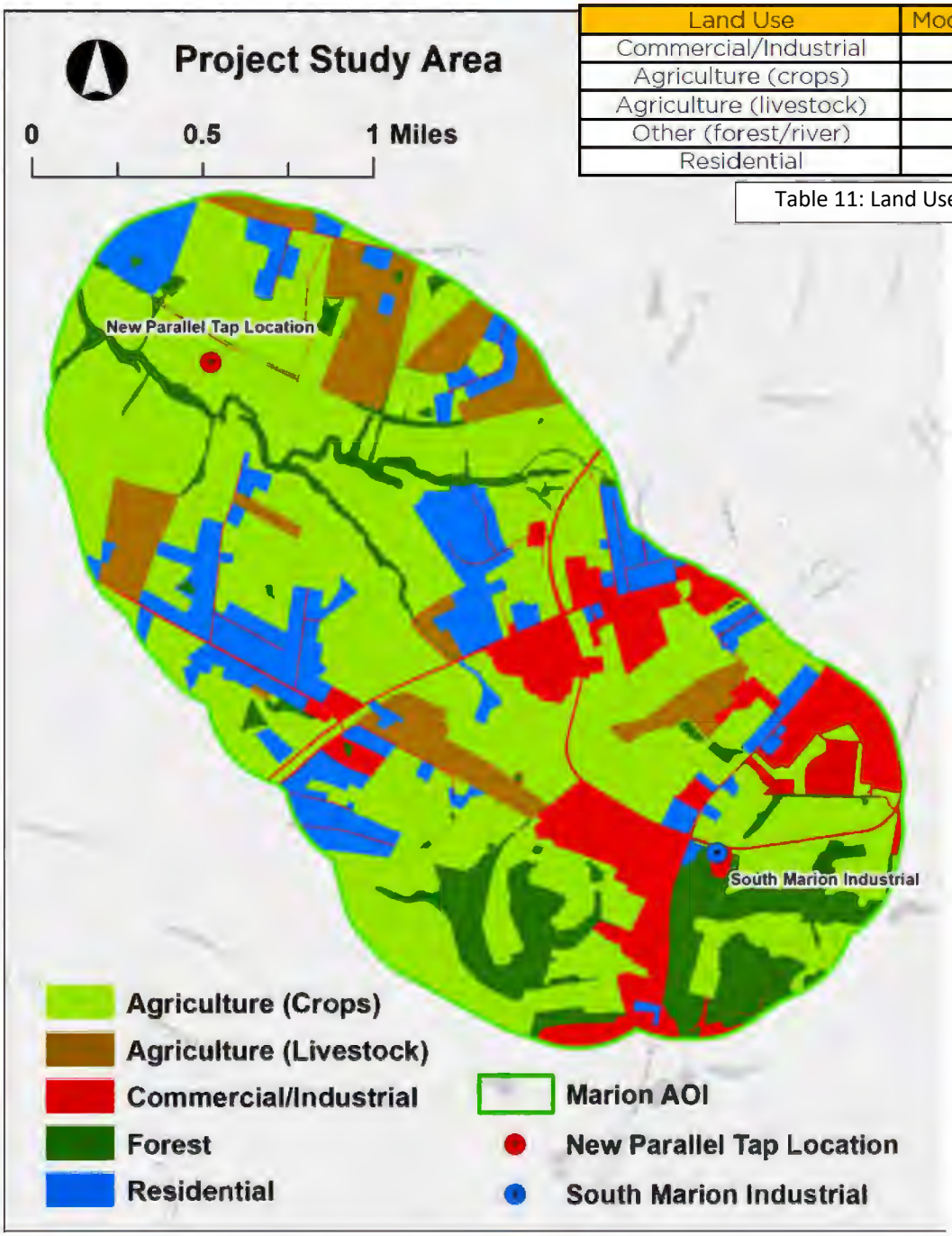


Figure 30: Land Use

Proposed Development

Low Suitability: Proposed Development

Within the EPRI model, areas for proposed development are found to be low suitability for building a new transmission line. For the Marion project,one proposed development was within the AOI. The parcel owned by Diageo Americas Supply INC. is developing a new distillery. Construction has been completed on much of the project, however Diageo is in the process of building additional warehouses.

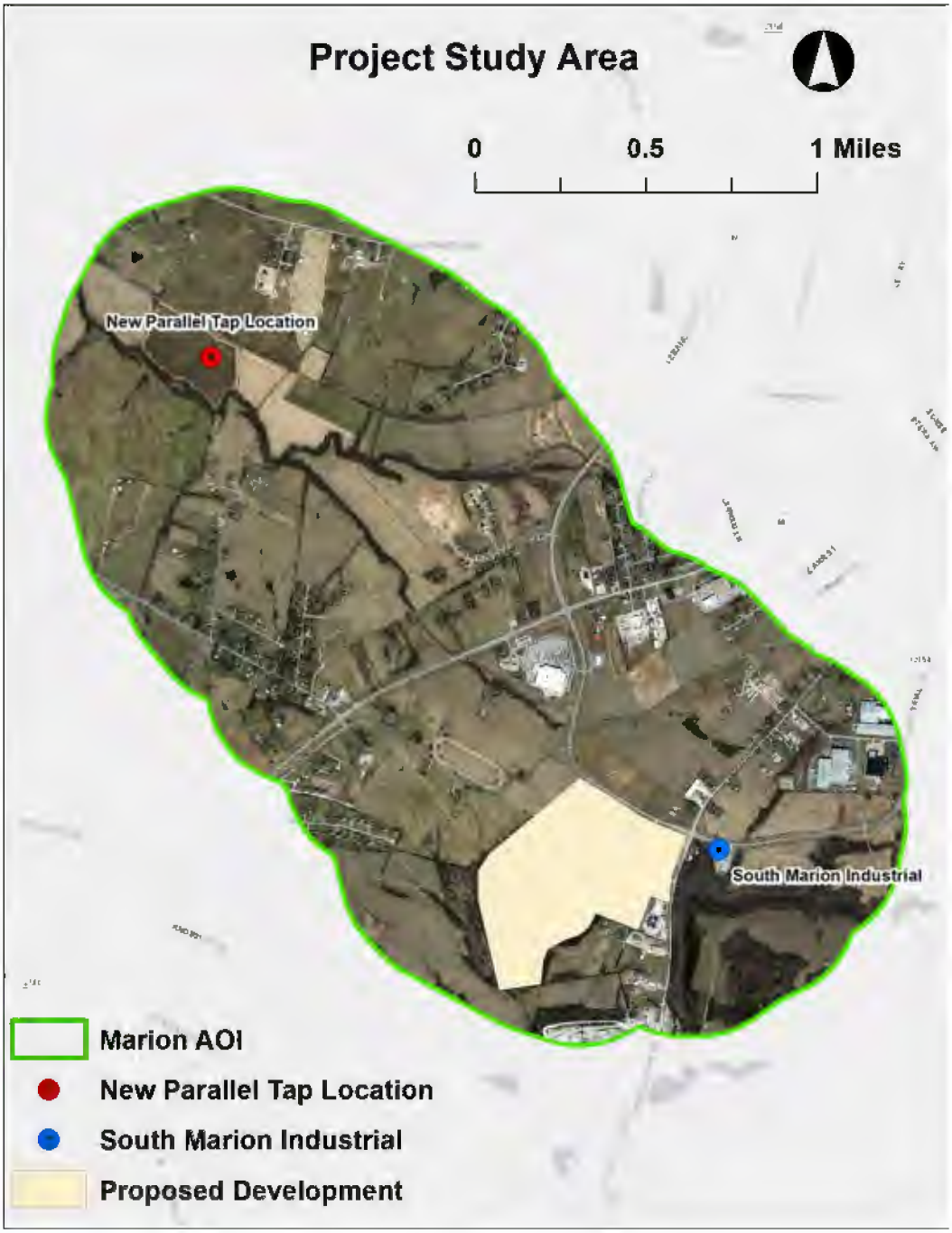


Figure 31: Proposed Developments

Built Environment features not present within the AOI

Building Density

Areas of building density greater than 4 buildings per acre are not present within the AOI

Silviculture

Using aerial imagery, it was determined that no silviculture was found to be present within the AOI

Equine Agri - Tourism

The AOI was cross referenced with the Kentucky Thoroughbred Farm Managers' Club and no Equine Agri - Tourism areas were found to be present within the AOI

Avoidance Areas

Listed Archaeology Sites & Districts- After reviewing UK, State, and National data sources no listed archaeology features were found within the AOI.

Listed HRHP Districts and Buildings - One Registered historical feature was found within the AOI, the Lebanon Historic Cemetery

City and County Parks- No parks were found within the AOI.

Day Care Parcels- No day-care parcels were found within the AOI.

Cemetery Parcels - In the project study area one cemetery was found.

School Parcels- No school parcels were found within the AOI.

Church Parcels- No religious parcels were found within the AOI.

Present features can be seen in Figure 32 on the next page.

Avoidance Areas

Listed Archaeological sites, Listed NHRP, City and County parks, Daycare Parcels, Cemeteries, School parcels, and church parcels are designated as areas of least preference in the Built Environment of the siting model. Within the study area, a National Registered Histroric cemetery is the only avoidance feature found to be present.

Cemetery

Cemeteries are designated as areas of least preference within the Built Environment. NV5 used basemap imagery and parcel to extract the Cemeteries. The only cemetery found within the AOI is also a listed national registered and historic place, The Lebanon National Cemetery.

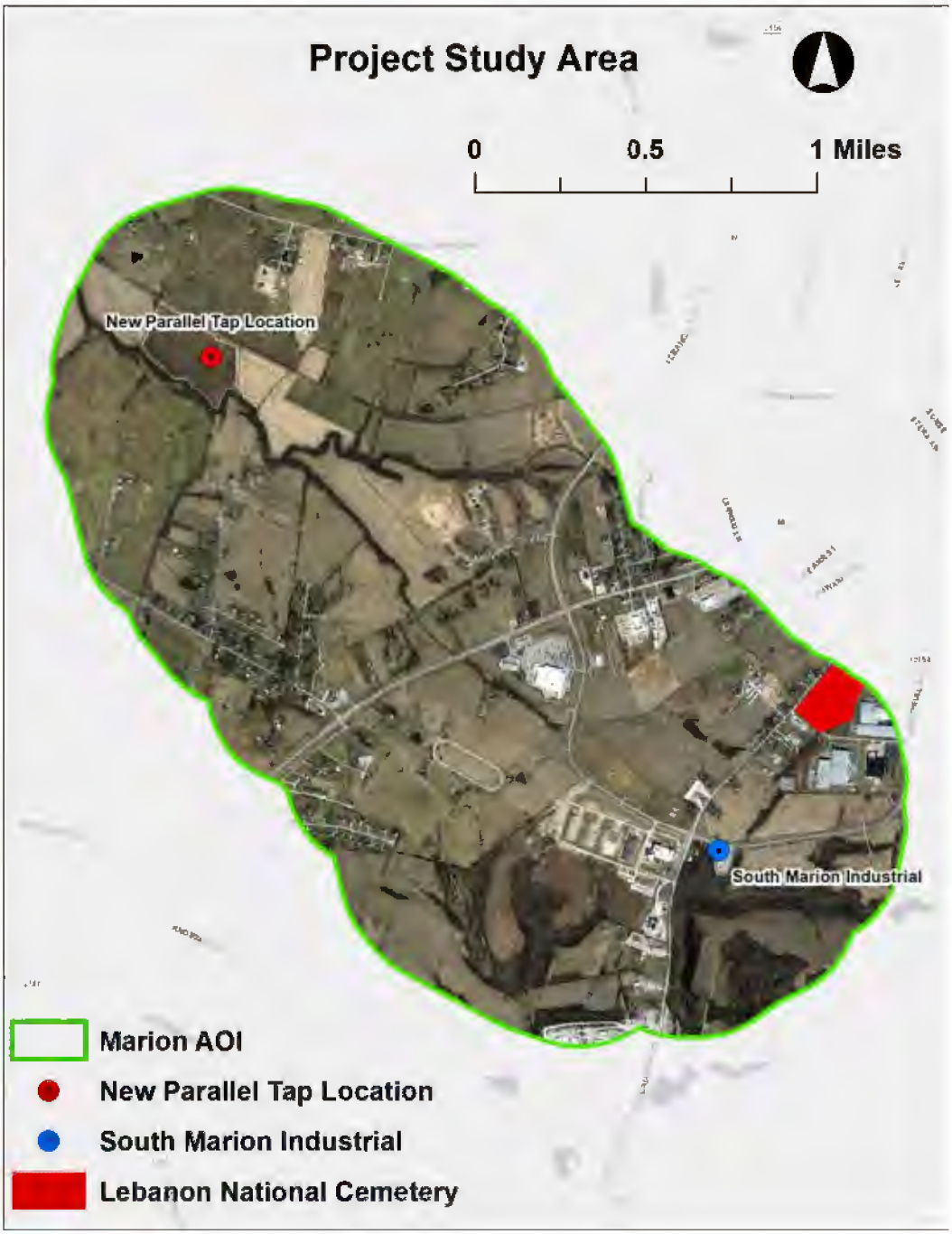


Figure 32: Built Avoidance Areas

PART VIII: SUITABILITY SURFACES

Once all inputs for the environments were researched and created, values and weights were redistributed for each feature and perspective. The normalizing of missing values follows a min-max routine that is part of the standard EPRI methodology. For example, within the Natural perspective, Outstanding State Resource Waters are the least desirable location (score of 9) of Streams/Wetlands to build a transmission line. Since there are no Outstanding State Resource Waters within the Marion study area, that value of 9 is re-assigned to the next least desirable feature (Road ROW), and every other feature's score is increased proportionally.

See pages 26 and 27 regarding Tables 4 and 5 for specific reallocation of weighted percentages withing this example.

The next step in the analysis is to take all the avoidance features and create an avoidance area that is removed from the suitability mapping. This is done to limit the prospective corridors from being created over features that have been identified within the model.

Once model weights and avoidance features have been completed, the next step in the methodology is to create Suitability Surfaces by combining the three sub-model inputs (Engineering, Natural, and Built) described in the preceding sections. Each Suitability Surface represents a weighted combination of the three sub-models. This means that for the Engineering Suitability, its features are weighted 5x the amount of the Built and Natural perspectives. By utilizing this approach, each perspective has a higher weight, but is still slightly influenced by the other features within other perspectives. There is finally a Simple Suitability Surface that is the equal distribution of weight from each perspective, to create four total surfaces.

The Suitability Surfaces are shown in Figure 33 through Figure 36. The optimal path algorithm was then applied to each surface to develop the four Alternate Corridors with the top ten percent extracted and displayed in Figures 37 through 42.

Engineering Suitability Surface

The data layers from the Engineering Environment are given five times (72%) the emphasis of the Built (14%) and Natural (14%) groups, as shown in Figure 33.

Figure 33: Engineering Suitability Surface

Natural Suitability Surface

The data layers from the Natural Environment are given five times (72%) the emphasis of the Engineering (14%) and Built (14%) groups, as shown in Figure 34.

Figure 34: Natural Suitability Surface

Built Suitability Surface

The data layers from the Built Environment are given five times (72%) the emphasis of the Engineering (14%) and Natural (14%) groups, as shown in Figure 35.

Figure 35: Built Suitability Surface

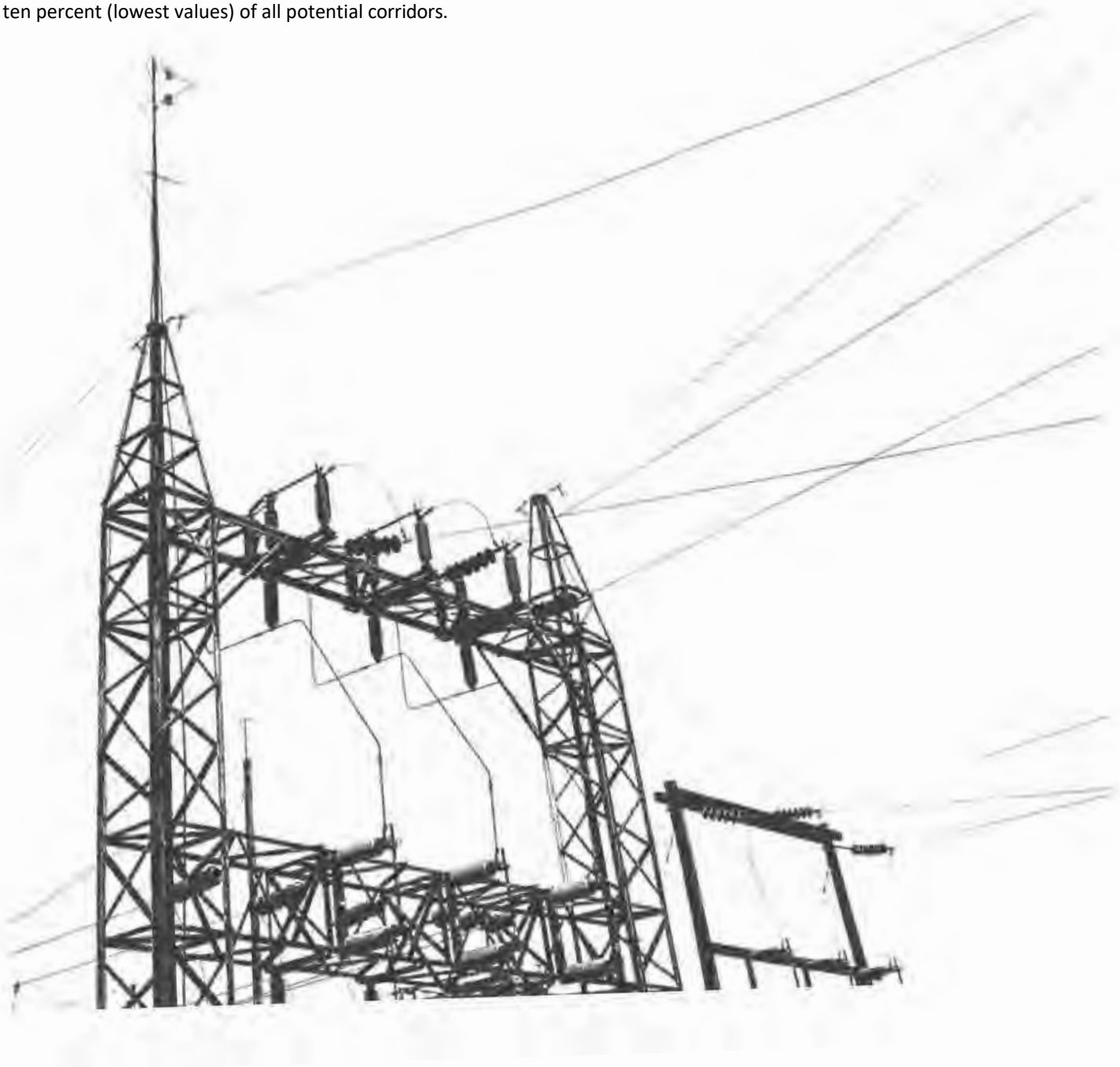
Simple Suitability Surface

The data layers from all the perspectives are given equal weights to create the Simple Suitability Surface. The breakdown of the weights are Natural (33.3%), Engineering (33.3%) and Built (33.3%) as shown in Figure 36.

Figure 36: Simple Suitability Surface

PART IX: ALTERNATE CORRIDOR GENERATION

Each Suitability Surface was used in the next phase of the analysis. This phase is called Alternate Route Analysis, and involves the creation of "least cost paths." An algorithm is used to find the cost of every possible path (corridor) between the two end points. A corridor is any continuous string of grid cells, 15 by 15 feet in size, connecting the end point and start point. The cost is the accrual of values of those cumulative grid cells, and the value of each cell varies depending on the features that the cell represents by virtue of their weighted suitability environment. Lower summed values indicate relatively suitable corridors, whereas higher summed values indicate relatively unsuitable corridors. The Alternate Corridor for each perspective (Engineering, Built, Natural, and Simple Average) is the total area representing the top ten percent (lowest values) of all potential corridors.



Engineering Environment Alternate Corridor

The Engineering Corridor of the siting model is heavily weighted toward co-location and with good rebuild opportunities for existing transmission lines. NV5 received and confirmed the existence of all transmission lines within the study area. Starting from the New Parallel Tap, this corridor seeks out the existing 161 kV line for paralleling and rebuilding opportunities. Because of this, the corridor sets a narrow berth in the north where the existing transmission line exists and then heads south, to connect with the South Marion Industrial substation.

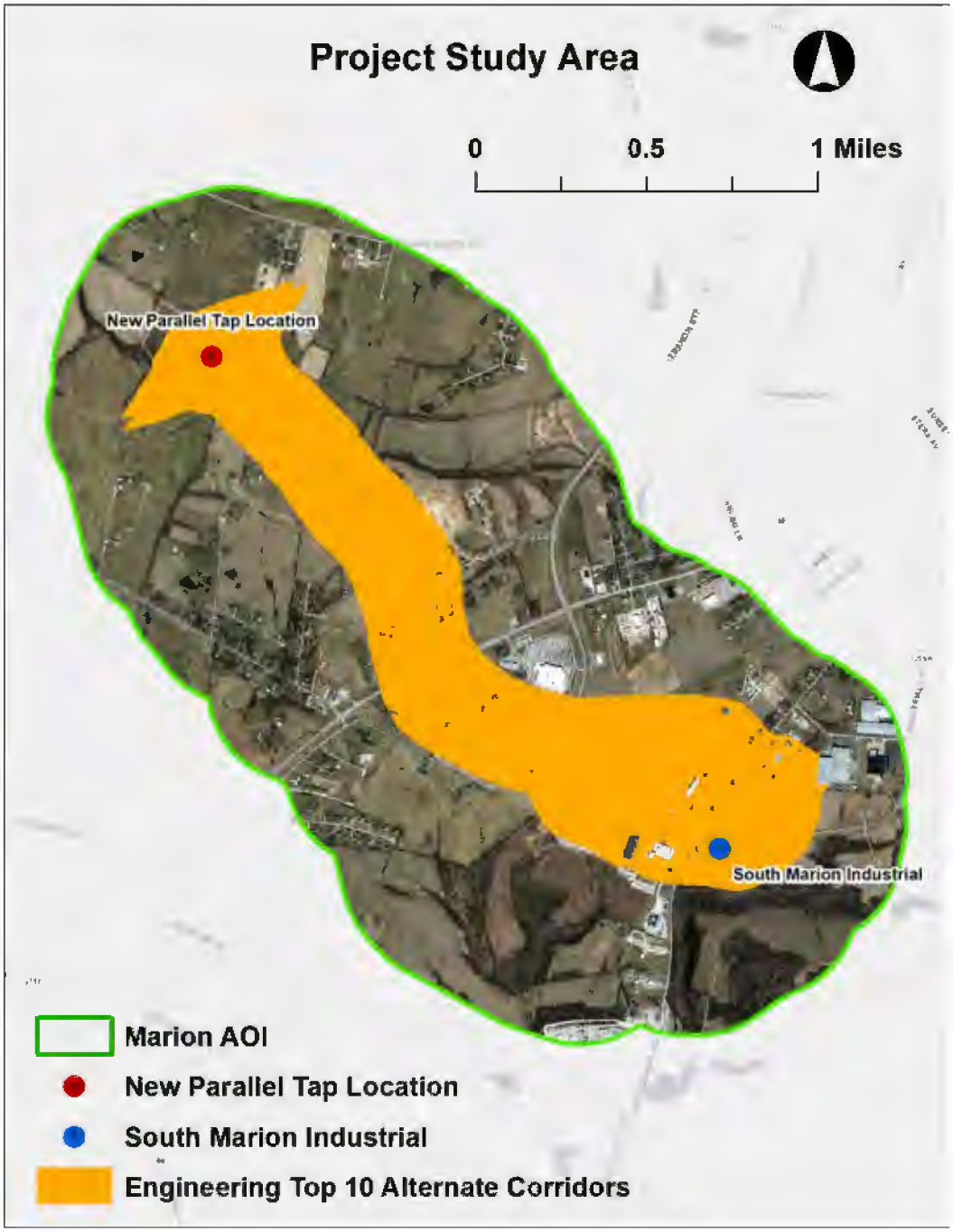


Figure 37: Engineering Environment Alternate Corridor

Natural Environment Alternate Corridor

The Natural Corridor of the model seeks to protect the natural environment, favoring developed land classification over wetlands, streams, rivers, FEMA floodplain areas, or protected species. The Natural Corridor looks to minimize stream crossings, forested land, and seeking out developed land. Starting from the new parallel tap, it has a cross-country path south through the center of the AOI to the South Marion Industrial substation.

Figure 38: Natural Environment Alternate Corridor

Built Environment Alternate Corridor

The Built Corridor seeks out developed land use that isn't near existing structures, that isn't close to densely populated areas of the study area and is as far as possible from historic sites as possible. Starting from the New parallel tap, the Built Corridor avoids the densely populated neighborhoods and proximity to structures, heading south towards the South Marion Industrial substation.

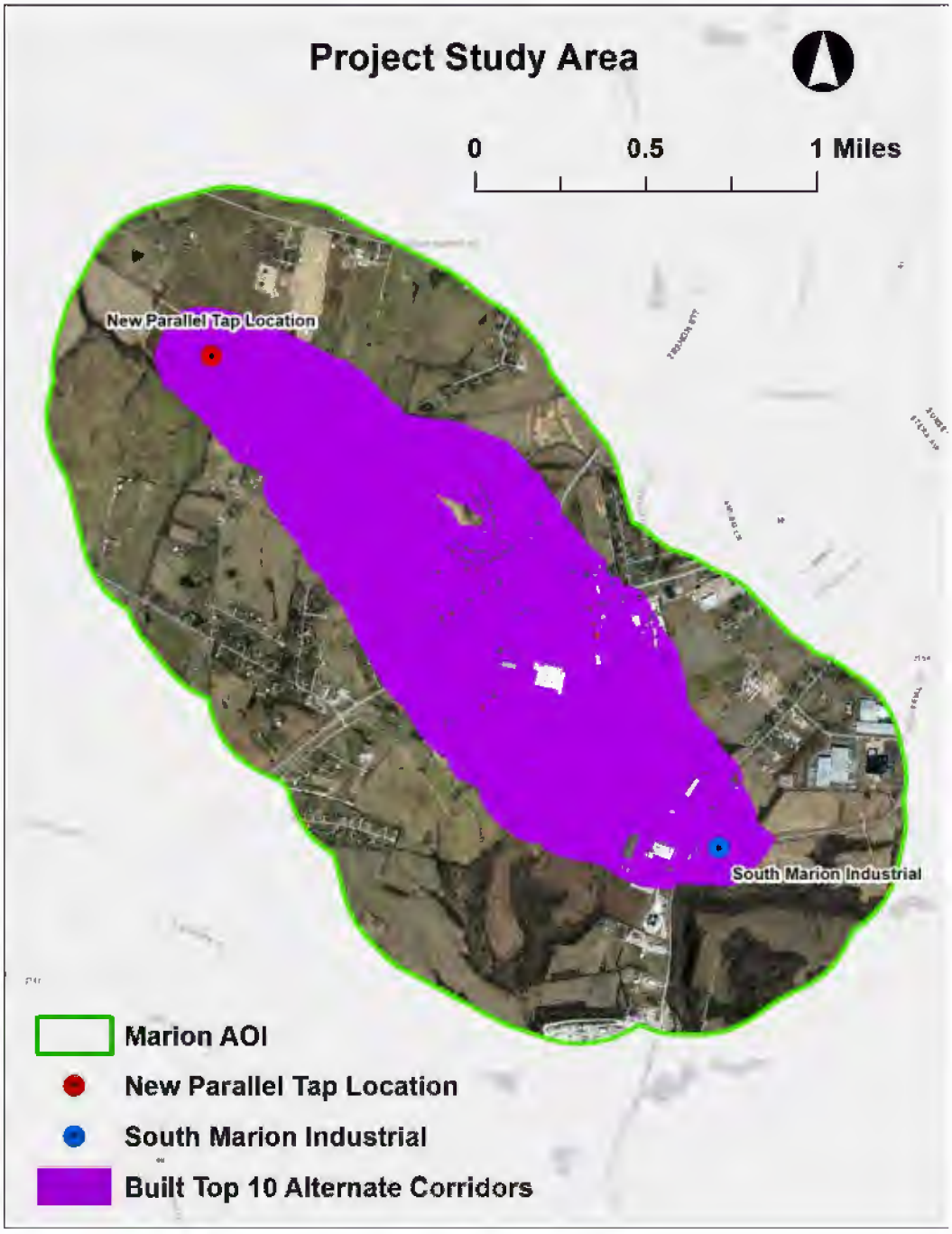


Figure 39: Built Environment Alternate Corridor

Simple Average Alternate Corridor

The Simple Average Corridor will resemble elements of the previous perspectives' corridors, since each features contributes to the corridor equally. The greatest variation between the simple and the other corridors has to do with how the algorithm looks to optimize the balance between avoiding natural features (streams, floodplains, wetlands), avoiding built features (developed land), and utilizing existing electrical infrastructure (parallel and rebuild of transmission lines).

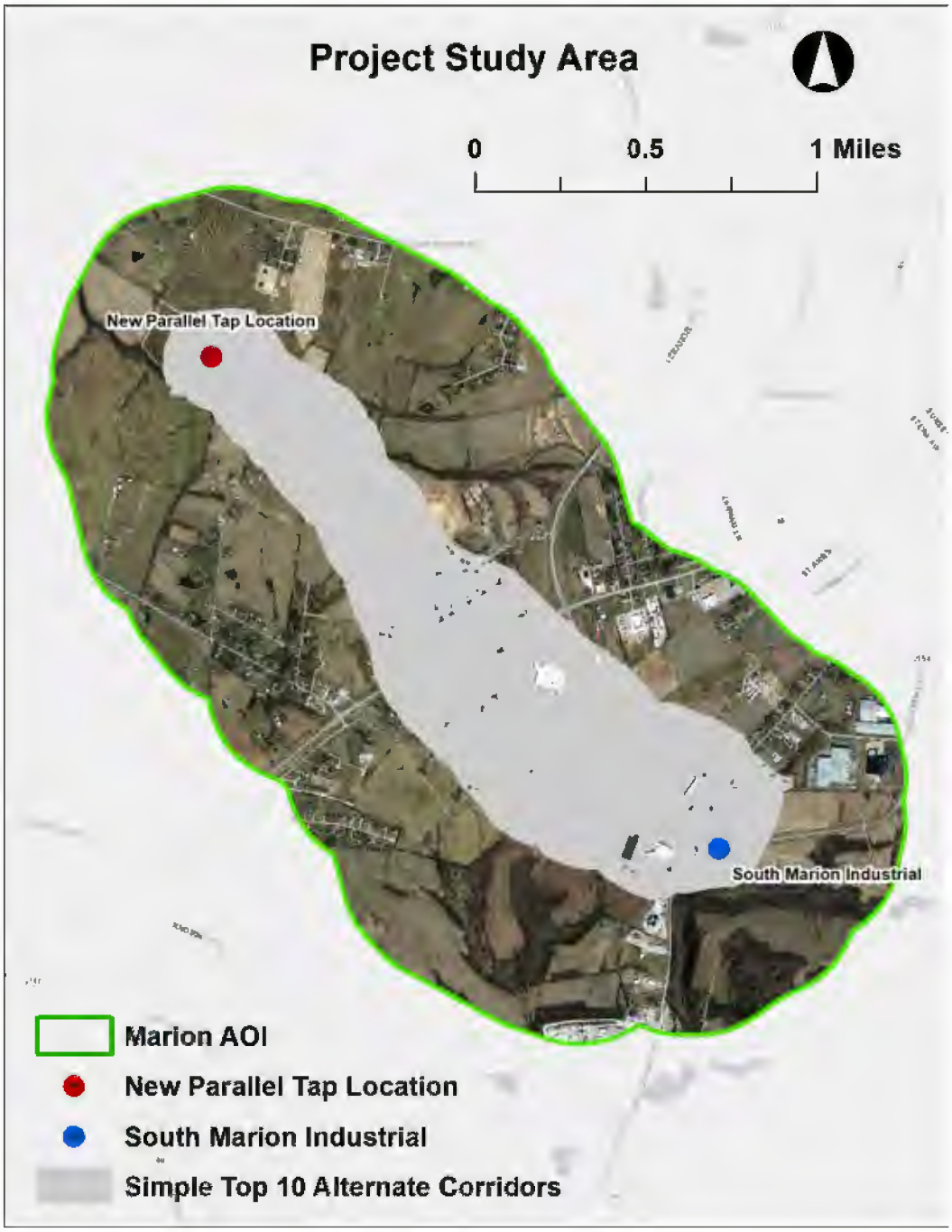


Figure 40: Simple Average Alternate Corridor

When comparing corridors, it is useful to the siting team to compare corridors with each other to ensure the model accurately captures each perspective's features. Ideal locations for Engineering perspective are parallel opportunities for existing transmission lines and low angle sloped terrain. Ideal locations from the Natural perspective avoid floodplains and wetlands and prefer developed land. Ideal locations from the Built perspective avoid existing human impacts and seek developed areas. The four corridors are shown below in Figure 41.

Figure 41: Alternate Corridors

Composite of Alternate Corridors

A composite of all four Alternate Corridors is shown in Figure 44. The Composite Corridor is simply the combination of all four Alternate Corridors. The area that is represented by the Composite Corridor serves as the main area for route creation, with the best practice in siting to chart a route within the Composite Corridor. To ensure all pertinent data is captured in the field and given the potential real-world constraints of the Composite Corridor, there is a 1,500 ft buffer area which is added to the Composite Corridor to create the Phase 2 field work AOI. Whereas the Phase I study area was examined almost exclusively using aerial photography, the features in the Phase 2 were reviewed by NV5 staff members sent into the field to verify the data. This buffer captures all possible features if there are routes that extend beyond the composite corridor. The Phase 2 field AOI is below in Figure 42.

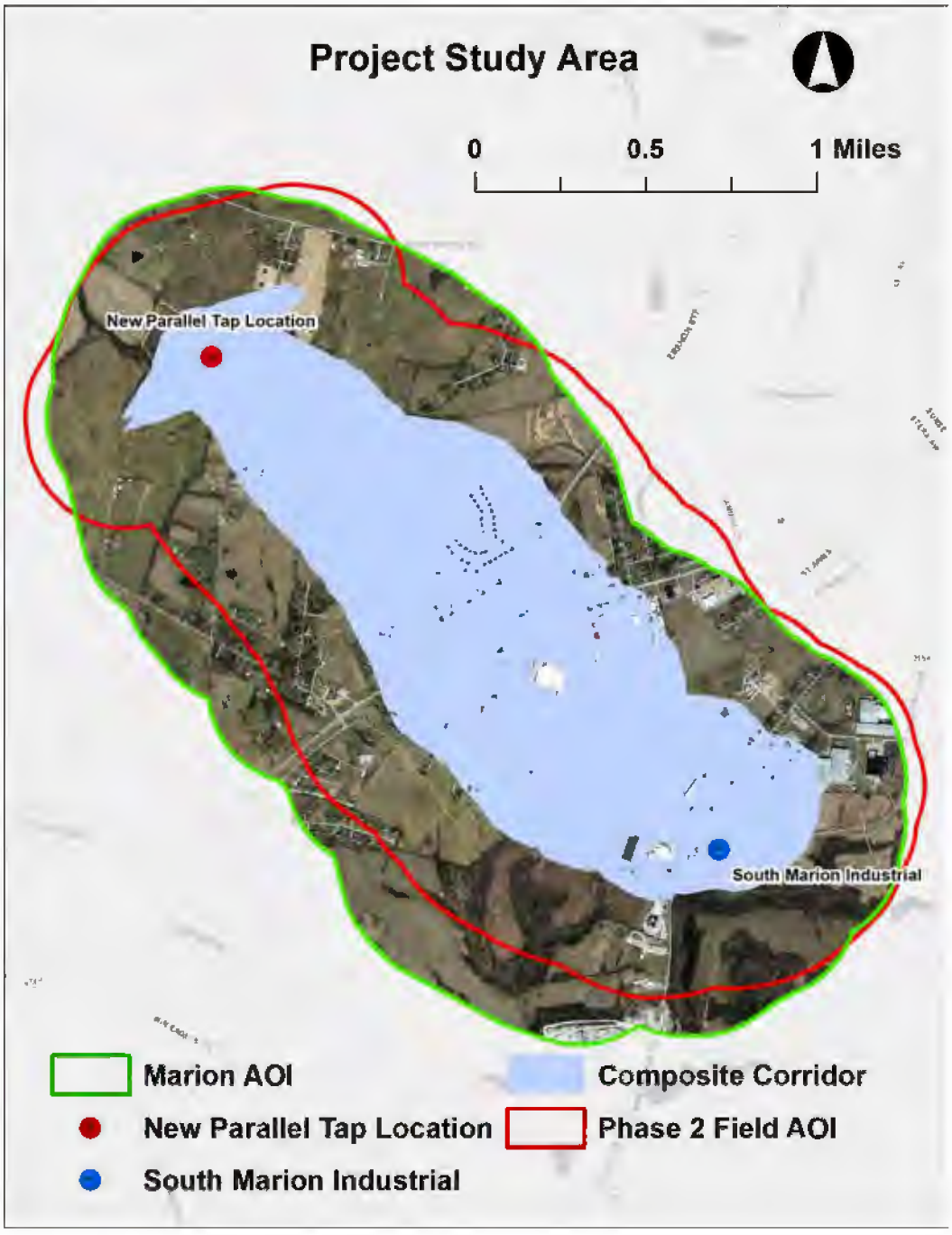


Figure 42: Composite Corridors

PART X: ALTERNATE ROUTES

Alternate Route Inputs

After reviewing and analyzing the Alternate & Composite Corridors, the EKPC project team developed possible centerline routes that were located within the corridors. Within the context of this study, these potential centerline routes are referred to as Alternate Routes. Each individual route is then scored using the EPRI KY Scoring Methodology. Once routes are scored, perspective weights are applied for final route scores. Like the Alternate Corridors, each perspective is given five times the weight of the other two perspective, with a final simple equal weight applied as well. These routes followed the EPRI standards for all being unique, and not backtracking in direction between towers while connecting substation to substation. These five routes are displayed in Figure 45.

The inputs to complete route scoring fall into two categories, EKPC provided or NV5 provided.

EKPC provided:

- Centerline route geometry
- Proposed ROW width
- Substation and Tap locations
- Project costs of construction and clearing

NV5 provided

- Buildings
- Proposed developments
- Schools, Day-cares, Churches, Cemeteries, Parks
- NRHP listed or eligible structures
- Forested area
- Stream crossings
- Wetlands
- Floodplains
- Line length
- Location of other utilities in the proximity
- Parcel data
- Scoring Matrix

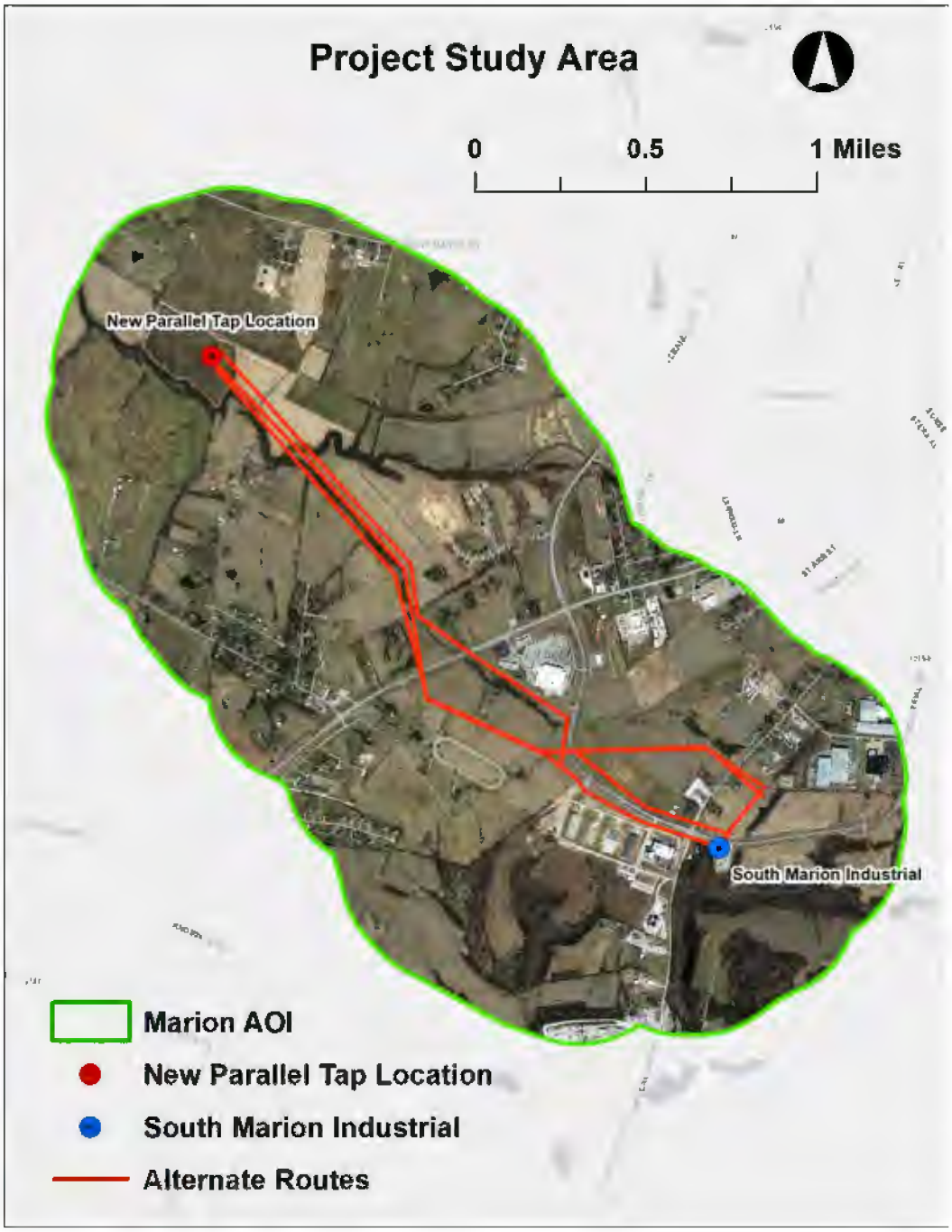


Figure 43: Alternate Routes

Alternate Route Evaluation

Statistics were collected for the six Alternate Routes and divided into three categories that are like the Alternate Corridor perspectives of the Built, Natural, and Engineering layers. The statistics were then normalized and assigned weights based on standardized EPRI weights. Also like the Alternate Corridor model, features or layers not found within the project study area were removed from consideration, and their weight distributed proportionally among the remaining feature layers. The raw statistics for the five routes are shown below in Table 13. Grayed out cells represent features that are listed in the standard model but not present within the project AOI. These raw statistic features for this project were:

Built

- Count of relocated residences within proposed 100' corridors
- Count of residences within 300' of proposed 100' corridors
- Count of undesirable parcels (schools, day-cares, churches, cemeteries, parks) that intersect with the proposed 100' corridors

Natural

- GIS calculated acres of forested land cover that intersect within the proposed 100' corridors
- Count of stream/river crossings within the proposed 100' corridors
- GIS calculated acres of floodplain land cover that intersect within the proposed 100' corridors

Engineering

- Length of route centerline in miles
- Number of parcels that intersect within the proposed 100' corridors
- Total Project Cost

The Total Project Cost layer is meant to provide an approximate value for the construction of the project. The generalized cost calculations were assessed by combining several cost related factors. Construction cost and clearing cost were per unit metrics provided by EKPC. The figure of $1,000,000 per mile was given to account for the construction of new and rebuild transmission line cost; the figure of $40,000 per acre of wooded land was given to account for clearing. Land costs are those costs associated with acquiring easement / property for the transmission line. After consulting with EKPC, it was decided to exclude fair market value for this project. Structure costs were estimated at $352,000 per mile, with additional costs for select engineered structures.

The sum of all these values, as they apply to each route, constitutes the "Total Project Cost" component of this phase of the route selection process.

Tables 13 illustrates the Alternate Route data inputs for Engineering Environment, Natural Environment, Built Environment, and Simple Average evaluations.

DATA	Raw Stats for Routes				
	1	2	3	4	5
Built					
Relocated Residences (within 100' Corridor)	0	0	0	0	0
Proximity to Residences (300' buffer)	2	3	4	3	2
Proposed Developments	1	0	1	0	0
Proximity to Commercial Buildings (300')	0	2	3	0	2
Proximity to Industrial Buildings (300')	5	0	5	1	0
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
(1500' from edge of R/W)	0	0	0	0	0
Natural					
Natural Forests (Acres)	6.08	3.11	0.92	3.11	3.11
Stream/River Crossings	5	3	2	3	3
[redacted]					
Floodplain Areas (Acres)	7.44	9.15	9.94	9.15	9.15
Engineering					
Length (Miles)	2.18	2.50	2.20	2.22	2.30
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
% Co-location w/ Existing T/L or other major utilities	0.6	0.0	2.3	1.7	2.1
Miles of Co-location with Roads*	0.47	0.00	0.67	0.53	0.96
Number of Parcels	13	10	9	11	10
Construction Cost	$ 2,180,000.00	$ 2,500,000.00	$ 2,200,000.00	$ 2,220,000.00	$ 2,300,000.00
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Clearing	$ 243,200.00	$ 124,400.00	$ 36,800.00	$ 124,400.00	$ 124,400.00
Structure Costs	$ 767,360.00	$ 880,000.00	$ 774,400.00	$ 781,440.00	$ 809,600.00
Cost "adder"	$ 150,000.00	$ 150,000.00	$ -	$ 270,000.00	$ 150,000.00
Total Project Costs	$ 3,340,560.00	$ 3,654,400.00	$ 3,011,200.00	$ 3,395,840.00	$ 3,384,000.00
Hi angle Count (>30)--EXISTING $200k	6	7	8	6	5
Low Angle Count (<30)	0	0	0	0	0
Self Supporting High Angle Count (>30)--NEW $320k	0	0	0	0	0
Self Supporting Low Angle Count (<30)	0	0	0	0	0
Structure Costs per Mile	$ 352,000.00	$ 352,000.00	$ 352,000.00	$ 352,000.00	$ 352,000.00
Structure COST	$ 767,360.00	$ 880,000.00	$ 774,400.00	$ 781,440.00	$ 809,600.00
Low Angle Count (<30) COST	$ -	$ -	$ -	$ -	$ -
Self Supporting High Angle Count (>30) COST	$ -	$ -	$ -	$ -	$ -
Self Supporting Low Angle Count (<30) COST	$ -	$ -	$ -	$ -	$ -
	Route 1	Route 2	Route 3	Route 4	Route 5
Eng. DE Structure	$ 150,000.00	$ 150,000.00	$ -	$ 150,000.00	$ 150,000.00
Eng. DE Structure if PI	$ -	$ -	$ -	$ -	$ -
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Eng. Angle Structure	$ -	$ -	$ -	$ 120,000.00	$ -
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Costs	$ 150,000.00	$ 150,000.00	$ -	$ 270,000.00	$ 150,000.00

Table 12 RAW Route Data Statistics

Table 13 shows the standard route scoring weights and values.

	Weights
Built	
Feature	
Relocated Residences (within 100' Corridor)	54.0%
Weighted	
Proximity to Residences (300')	15.9%
Weighted	
Proposed Developments	3.8%
Weighted	
Proximity to Commercial Buildings (300')	2.6%
Weighted	
Proximity to Industrial Buildings (300')	1.5%
Weighted	
School, DayCare, Church, Cemetery, Park Parcels (#)	7.7%
Weighted	
NRHP Listed/Eligible Strucs./Districts (1500' from edge of R/W)	14.5%
Weighted	
TOTAL	100.0%
WEIGHTED TOTAL	
Natural	
Natural Forests (Acres)	42.6%
Weighted	
Stream/River Crossings	12.0%
Weighted	
Wetland Areas (Acres)	41.9%
Weighted	
Floodplain Areas (Acres)	3.5%
Weighted	
TOTAL	100.0%
WEIGHTED TOTAL	
Engineering	
% Rebuild with Existing Utility*	33.3%
Weighted	
% Co-location w/ Existing T/L or other major utilities*	52.7%
Weighted	
Total Project Costs	14.0%
Weighted	
TOTAL	100.0%
WEIGHTED TOTAL	
SUM OF WEIGHTED TOTALS	
RANK	

TABLE 13: Alternate Route Criteria & Weights (Model Values)

Table 14 shows the standard route scoring weights with values redistributed

Built Emphasis	Weights
Built	
Feature	
Relocated Residences (within 100' Corridor)	0.0%
Weighted	
Proximity to Residences (300')	66.8%
Weighted	
Proposed Developments	16.0%
Weighted	
Proximity to Commercial Buildings (300')	10.9%
Weighted	
Proximity to Industrial Buildings (300')	6.3%
Weighted	
School, DayCare, Church, Cemetery, Park Parcels (#)	0.0%
Weighted	
NRHP Listed/Eligible Strucs./Districts (1500' from edge of	0.0%
Weighted	
TOTAL	100.0%
WEIGHTED TOTAL	
Natural	
Natural Forests (Acres)	73.3%
Weighted	
Stream/River Crossings	20.7%
Weighted	
Wetland Areas (Acres)	0.0%
Weighted	
Floodplain Areas (Acres)	6.0%
Weighted	
TOTAL	100.0%
WEIGHTED TOTAL	
Engineering	
% Rebuild with Existing Utility*	0.0%
Weighted	
% Co-location w/ Existing T/L or other major utilities*	79.0%
Weighted	
Total Project Costs	21.0%
Weighted	
TOTAL	100.0%
WEIGHTED TOTAL	
SUM OF WEIGHTED TOTALS	
RANK	

TABLE 14: Alternate Route Criteria & Weights (Adjusted Values)

Raw Statistics and Normalized Statistics

The next step of the analysis is to normalize the raw statistics of the routes. Table 15 shows an example of the routes raw and normalized statistics for the Alternate Routes. The statistics were normalized (light blue cells), on a scale from zero to one, to provide a method of comparison between each of the layers' different units. The values associated with Miles of Co-location were inverted since a higher value in this category is seen as desirable.

DATA	Numbers Normalized				
FOR ALL ROUTES	1	2	3	4	5
Built					
Feature	Unit	Unit	Unit	Unit	Unit
Relocated Residences (within 100' Corridor)	0.00	0.00	0.00	0.00	0.00
Normalized	0.00	0.00	0.00	0.00	0.00
Proximity to Residences (300')	2.00	3.00	4.00	3.00	2.00
Normalized	0.00	0.50	1.00	0.50	0.00
Proposed Developments	1.00	0.00	1.00	0.00	0.00
Normalized	1.00	0.00	1.00	0.00	0.00
Proximity to Commercial Buildings (300')	0.00	2.00	3.00	0.00	2.00
Normalized	0.00	0.67	1.00	0.00	0.67
Proximity to Industrial Buildings (300')	5.00	0.00	5.00	1.00	0.00
Normalized	1.00	0.00	1.00	0.20	0.00
School, DayCare, Church, Cemetery, Park Parcels (#)	0.00	0.00	0.00	0.00	0.00
Normalized	0.00	0.00	0.00	0.00	0.00
NRHP Listed/Eligible Sites/Districts (1500' from edge of RW)	0.00	0.00	0.00	0.00	0.00
Normalized	0.00	0.00	0.00	0.00	0.00
Natural					
Natural Forests (Acres)	6.08	3.11	0.92	3.11	3.11
Normalized	1.00	0.42	0.00	0.42	0.42
Stream/River Crossings	5.00	3.00	2.00	3.00	3.00
Normalized	1.00	0.33	0.00	0.33	0.33
Wetland Areas (Acres)	0.00	0.00	0.00	0.00	0.00
Normalized	0.00	0.00	0.00	0.00	0.00
Floodplain Areas (Acres)	7.44	9.15	9.94	9.15	9.15
Normalized	0.00	0.68	1.00	0.68	0.68
Engineering					
Length (Miles)	2.18	2.50	2.20	2.22	2.30
Normalized	0.00	1.00	0.06	0.13	0.37
% Rebuild with Existing Utility*	0%	0%	0%	0%	0%
Normalized	0.00	0.00	0.00	0.00	0.00
Inverted	0.00	0.00	0.00	0.00	0.00
% Co-location w/ Existing T/L or other major utilities*	0.56	0.00	2.28	1.70	2.12
Normalized	0.25	0.00	1.00	0.75	0.93
Inverted	0.75	1.00	0.00	0.25	0.07
Miles of Co-location with Roads*	0.47	0.00	0.67	0.53	0.96
Normalized	0.49	0.00	0.70	0.55	1.00
Inverted	0.51	1.00	0.30	0.45	0.00
Number of Parcels	13.00	10.00	9.00	11.00	10.00
Normalized	1.00	0.25	0.00	0.50	0.25
Total Project Costs	$3,340,560	$3,654,400	$3,011,200	$3,395,840	$3,384,000
Normalized	0.51	1.00	0.00	0.60	0.58
SUM of UNWeighted Totals	**6.78**	**6.86**	**5.36**	**4.07**	**3.38**
RANK	**4**	**5**	**3**	**2**	**1**

Table 15: Raw Statistics and Normalized Statistics

Like the Alternate Corridors, each perspective has a five times emphasis. The Simple Average perspective has an equal amount of weight assigned to each perspective (33.3%). Each of the routes is ranked according to its values with respect to the individual environment being emphasized.

Emphasis on Engineering Environment

Engineering Emphasis	Weights	4	5	1	3	2
		Rte 1	Rte 2	Rte 3	Rte 4	Rte 5
Built	18%					
Feature		Unit	Unit	Unit	Unit	Unit
Relocated Residences (within 100' Corridor)	0.0%	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00
Proximity to Residences (300')	66.8%	0.00	0.50	1.00	0.50	0.00
Weighted		0.00	0.33	0.67	0.33	0.00
Proposed Developments	16.0%	1.00	0.00	1.00	0.00	0.00
Weighted		0.16	0.00	0.16	0.00	0.00
Proximity to Commercial Buildings (300')	10.9%	0.00	0.67	1.00	0.00	0.67
Weighted		0.00	0.07	0.11	0.00	0.07
Proximity to Industrial Buildings (300')	6.3%	1.00	0.00	1.00	0.20	0.00
Weighted		0.06	0.00	0.06	0.01	0.00
School, DayCare, Church, Cemetery, Park Parcels (#)	0.0%	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00
NRHP Listed/Eligible Struc./Districts (1500' from edge of	0.0%	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00
TOTAL	100.0%	0.22	0.41	1.00	0.35	0.07
WEIGHTED TOTAL		0.031	0.057	0.140	0.049	0.010
Natural	14%					
Natural Forests (Acres)	73.3%	1.00	0.42	0.00	0.42	0.42
Weighted		0.73	0.31	0.00	0.31	0.31
Stream/River Crossings	20.7%	1.00	0.33	0.00	0.33	0.33
Weighted		0.21	0.07	0.00	0.07	0.07
Wetland Areas (Acres)	0.0%	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00
Floodplain Areas (Acres)	6.0%	0.00	0.68	1.00	0.68	0.68
Weighted		0.00	0.04	0.06	0.04	0.04
TOTAL	100.0%	0.94	0.42	0.06	0.42	0.42
WEIGHTED TOTAL		0.132	0.059	0.008	0.059	0.059
Engineering	68%					
% Rebuild with Existing Utility*	0.0%	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00
% Co-location w/ Existing T/L or other major utilities*	79.0%	0.75	1.00	0.00	0.25	0.07
Weighted		0.60	0.79	0.00	0.20	0.06
Total Project Costs	21.0%	0.51	1.00	0.00	0.60	0.58
Weighted		0.11	0.21	0.00	0.13	0.12
TOTAL	100.0%	0.70	1.00	0.00	0.33	0.18
WEIGHTED TOTAL		0.507	0.720	0.000	0.235	0.126
SUM OF WEIGHTED TOTALS		0.669	0.836	0.148	0.343	0.197
RANK		4	5	1	3	2
* Inverted for calculations	Lowest Number is Best					

Table 16: Alternate Route Evaluation Matrix Emphasis on Engineering Environment

Emphasis on Natural Environment

Natural Emphasis	Weights					
		5	4	1	3	2
		Rte 1	Rte 2	Rte 3	Rte 4	Rte 5
Built	14%					
Feature		Unit	Unit	Unit	Unit	Unit
Relocated Residences (within 100' Corridor)	0.0%	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00
Proximity to Residences (300')	66.8%	0.00	0.50	1.00	0.50	0.00
Weighted		0.00	0.33	0.67	0.33	0.00
Proposed Developments	16.0%	1.00	0.00	1.00	0.00	0.00
Weighted		0.16	0.00	0.16	0.00	0.00
Proximity to Commercial Buildings (300')	10.9%	0.00	0.67	1.00	0.00	0.67
Weighted		0.00	0.07	0.11	0.00	0.07
Proximity to Industrial Buildings (300')	6.3%	1.00	0.00	1.00	0.20	0.00
Weighted		0.06	0.00	0.06	0.01	0.00
School, DayCare, Church, Cemetery, Park Parcels (#)	0.0%	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00
NRHP Listed/Eligible Stucs./Districts (1500' from edge of	0.0%	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00
TOTAL	100.0%	0.22	0.41	1.00	0.35	0.07
WEIGHTED TOTAL		0.031	0.057	0.140	0.049	0.010
Natural	72%					
Natural Forests (Acres)	73.3%	1.00	0.42	0.00	0.42	0.42
Weighted		0.73	0.31	0.00	0.31	0.31
Stream/River Crossings	20.7%	1.00	0.33	0.00	0.33	0.33
Weighted		0.21	0.07	0.00	0.07	0.07
Wetland Areas (Acres)	0.0%	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00
Floodplain Areas (Acres)	6.0%	0.00	0.68	1.00	0.68	0.68
Weighted		0.00	0.04	0.06	0.04	0.04
TOTAL	100.0%	0.94	0.42	0.06	0.42	0.42
WEIGHTED TOTAL		0.677	0.303	0.043	0.303	0.303
Engineering	14%					
% Rebuild with Existing Utility*	0.0%	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00
% Co-location w/ Existing T/L or other major utilities*	79.0%	0.75	1.00	0.00	0.25	0.07
Weighted		0.60	0.79	0.00	0.20	0.06
Total Project Costs	21.0%	0.51	1.00	0.00	0.60	0.58
Weighted		0.11	0.21	0.00	0.13	0.12
TOTAL	100.0%	0.70	1.00	0.00	0.33	0.18
WEIGHTED TOTAL		0.098	0.140	0.000	0.046	0.025
SUM OF WEIGHTED TOTALS		0.807	0.500	0.183	0.397	0.338
RANK		5	4	1	3	2
* Inverted for calculations	Lowest Number is Best					

Table 17: Alternate Route Evaluation Emphasis on Natural Environment

Emphasis on Built Environment

Built Emphasis	Weights					
		3	4	5	2	1
		1	2	3	4	5
Built	12%					
Feature		Unit	Unit	Unit	Unit	Unit
Relocated Residences (within 100' Corridor)	0.0%	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00
Proximity to Residences (300')	66.8%	0.00	0.50	1.00	0.50	0.00
Weighted		0.00	0.33	0.67	0.33	0.00
Proposed Developments	16.0%	1.00	0.00	1.00	0.00	0.00
Weighted		0.16	0.00	0.16	0.00	0.00
Proximity to Commercial Buildings (300')	10.9%	0.00	0.67	1.00	0.00	0.67
Weighted		0.00	0.07	0.11	0.00	0.07
Proximity to Industrial Buildings (300')	6.3%	1.00	0.00	1.00	0.20	0.00
Weighted		0.06	0.00	0.06	0.01	0.00
School, DayCare, Church, Cemetery, Park Parcels (#)	0.0%	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00
NRHP Listed/Eligible Strucs./Districts (1500' from edge of	0.0%	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00
TOTAL	100.0%	0.22	0.41	1.00	0.35	0.07
WEIGHTED TOTAL		0.161	0.293	0.720	0.250	0.052
Natural	14%					
Natural Forests (Acres)	73.3%	1.00	0.42	0.00	0.42	0.42
Weighted		0.73	0.31	0.00	0.31	0.31
Stream/River Crossings	20.7%	1.00	0.33	0.00	0.33	0.33
Weighted		0.21	0.07	0.00	0.07	0.07
Wetland Areas (Acres)	0.0%	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00
Floodplain Areas (Acres)	6.0%	0.00	0.68	1.00	0.68	0.68
Weighted		0.00	0.04	0.06	0.04	0.04
TOTAL	100.0%	0.94	0.42	0.06	0.42	0.42
WEIGHTED TOTAL		0.132	0.059	0.008	0.059	0.059
Engineering	14%					
% Rebuild with Existing Utility*	0.0%	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00
% Co-location w/ Existing T/L or other major utilities*	79.0%	0.75	1.00	0.00	0.25	0.07
Weighted		0.60	0.79	0.00	0.20	0.06
Total Project Costs	21.0%	0.51	1.00	0.00	0.60	0.58
Weighted		0.11	0.21	0.00	0.13	0.12
TOTAL	100.0%	0.70	1.00	0.00	0.33	0.18
WEIGHTED TOTAL		0.098	0.140	0.000	0.046	0.025
SUM OF WEIGHTED TOTALS		0.391	0.492	0.728	0.354	0.136
RANK		3	4	5	2	1
* Inverted for calculations	Lowest Number is Best					

Table 18: Alternate Route Evaluation Matrix Emphasis on Built Environment

Equal Consideration of Categories (Simple Average)

Simple Emphasis	Weights					
		5	4	2	3	1
		Rte 1	Rte 2	Rte 3	Rte 4	Rte 5
Built	33%					
Feature		Unit	Unit	Unit	Unit	Unit
Relocated Residences (within 100' Corridor)	0.0%	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00
Proximity to Residences (300')	66.8%	0.00	0.50	1.00	0.50	0.00
Weighted		0.00	0.33	0.67	0.33	0.00
Proposed Developments	16.0%	1.00	0.00	1.00	0.00	0.00
Weighted		0.16	0.00	0.16	0.00	0.00
Proximity to Commercial Buildings (300')	10.9%	0.00	0.67	1.00	0.00	0.67
Weighted		0.00	0.07	0.11	0.00	0.07
Proximity to Industrial Buildings (300')	6.3%	1.00	0.00	1.00	0.20	0.00
Weighted		0.06	0.00	0.06	0.01	0.00
School, DayCare, Church, Cemetery, Park Parcels (#)	0.0%	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00
NRHP Listed/Eligible Strucs./Districts (1500' from edge of	0.0%	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00
TOTAL	100.0%	0.22	0.41	1.00	0.35	0.07
WEIGHTED TOTAL		0.074	0.135	0.333	0.115	0.024
Natural	33%					
Natural Forests (Acres)	73.3%	1.00	0.42	0.00	0.42	0.42
Weighted		0.73	0.31	0.00	0.31	0.31
Stream/River Crossings	20.7%	1.00	0.33	0.00	0.33	0.33
Weighted		0.21	0.07	0.00	0.07	0.07
Wetland Areas (Acres)	0.0%	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00
Floodplain Areas (Acres)	6.0%	0.00	0.68	1.00	0.68	0.68
Weighted		0.00	0.04	0.06	0.04	0.04
TOTAL	100.0%	0.94	0.42	0.06	0.42	0.42
WEIGHTED TOTAL		0.313	0.140	0.020	0.140	0.140
Engineering	33%					
% Rebuild with Existing Utility*	0.0%	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00
% Co-location w/ Existing T/L or other major utilities*	79.0%	0.75	1.00	0.00	0.25	0.07
Weighted		0.60	0.79	0.00	0.20	0.06
Total Project Costs	21.0%	0.51	1.00	0.00	0.60	0.58
Weighted		0.11	0.21	0.00	0.13	0.12
TOTAL	100.0%	0.70	1.00	0.00	0.33	0.18
WEIGHTED TOTAL		0.234	0.333	0.000	0.109	0.059
SUM OF WEIGHTED TOTALS		0.622	0.609	0.353	0.364	0.223
RANK		5	4	2	3	1
* Inverted for calculations	Lowest Number is Best					

Table 19: Alternate Route Evaluation Matrix Emphasis on Equal Weights

Overall Scores & Ranks of Each Route

	Rte 1	Rte 2	Rte 3	Rte 4	Rte 5
Built	0.391	0.492	0.728	0.354	0.136
Engineering	0.669	0.836	0.148	0.343	0.197
Natural	0.807	0.500	0.183	0.397	0.338
Simple	0.622	0.609	0.353	0.364	0.223
	Rte 1	Rte 2	Rte 3	Rte 4	Rte 5
Built	3	4	5	2	1
Engineering	4	5	1	3	2
Natural	5	4	1	3	2
Simple	5	4	2	3	1

Table 20: Overall Scores and Ranks of Routes

Cost drivers per each perspective:

Engineering

100%- Cost

Built

69.6%- Relocated Residences
20.5%- Proximity to Residences
9.9%- Avoidance Parcels

Natural

73.3%- Natural Forested Acres
20.7%- Stream/River Crossings
6.0%- Floodplain Acres

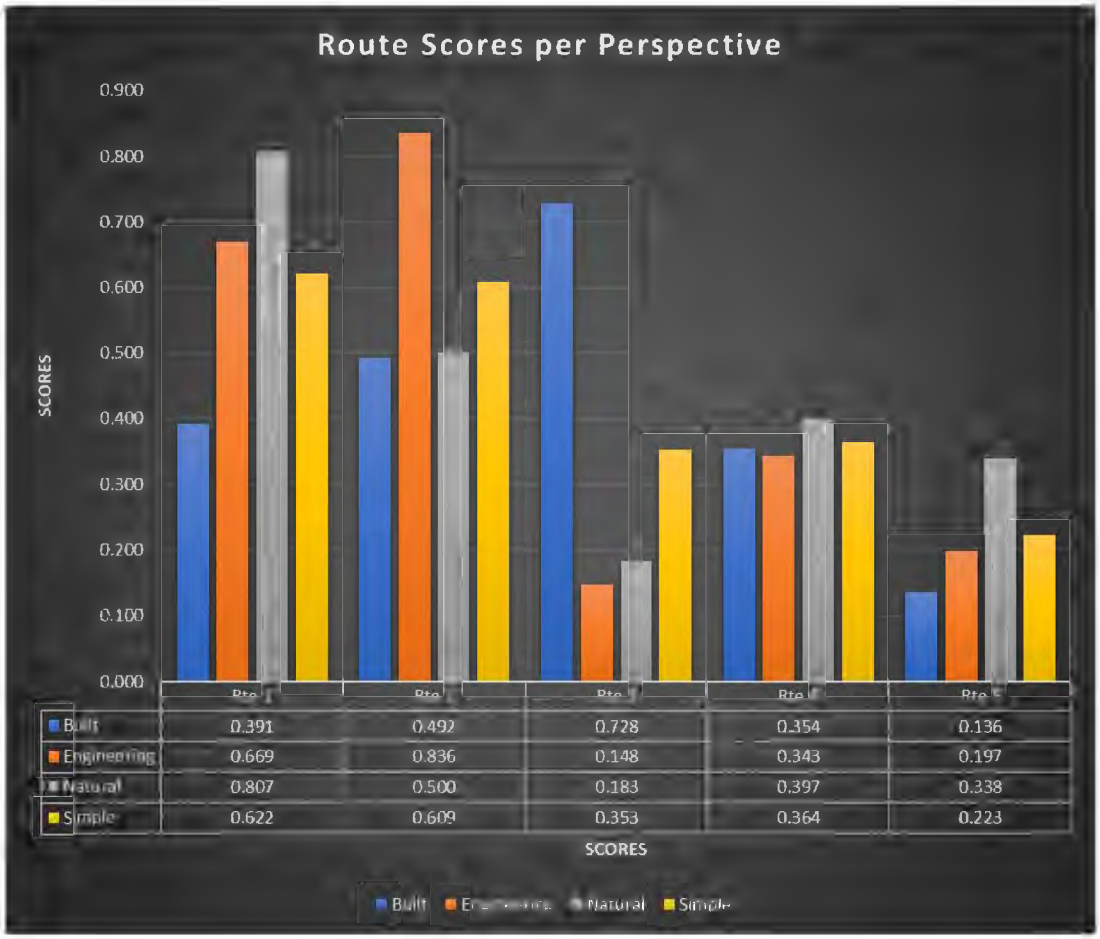


Figure 44: Route Comparison

EXPERT JUDGMENT (5)	1 = Low Impact	2 = Med. Impact	3 = High Impact				
Visual Issues	10%	0	0	0	0	0	0
Weighted		0	0	0	0	0	0
Community Issues	30%	0	0	0	0	0	0
Weighted		0	0	0	0	0	0
Project Management (Schedule, Cost)	20%	0	0	0	0	0	0
Weighted		0	0	0	0	0	0
Special Permit Issues	15%	0	0	0	0	0	0
Weighted		0	0	0	0	0	0
Construction/ Maintenance Accessability	15%	0	0	0	0	0	0
Weighted		0	0	0	0	0	0
Dist. Reliability	5%	0	0	0	0	0	0
Weighted		0	0	0	0	0	0
Environmental Justice	5%	0	0	0	0	0	0
Weighted		0	0	0	0	0	0
TOTAL							
	100%	0	0	0	0	0	0

Table 21: Expert Judgement

For some projects, the utility may utilize expert judgment to capture factors that are not present in the model. EKPC elected to forgo expert judgement ranking and utilize the calibrated model results.

Route Selection

At the conclusion of the Alternate Route Analysis, the top performing routes were reviewed by the EKPC project team. The result of this review concludes the selection of the Preferred Route. It is important to note that the GIS representation of the routes considered in these analyses may not exactly match the constructed line. Small adjustments may be made in the exact geographical location of the routes during the physical construction, as a result of real-world engineering and building activities.

As a conclusion to the project, EKPC has selected to move forward with Route 5 for the Marion 161 kV Transmission Line.

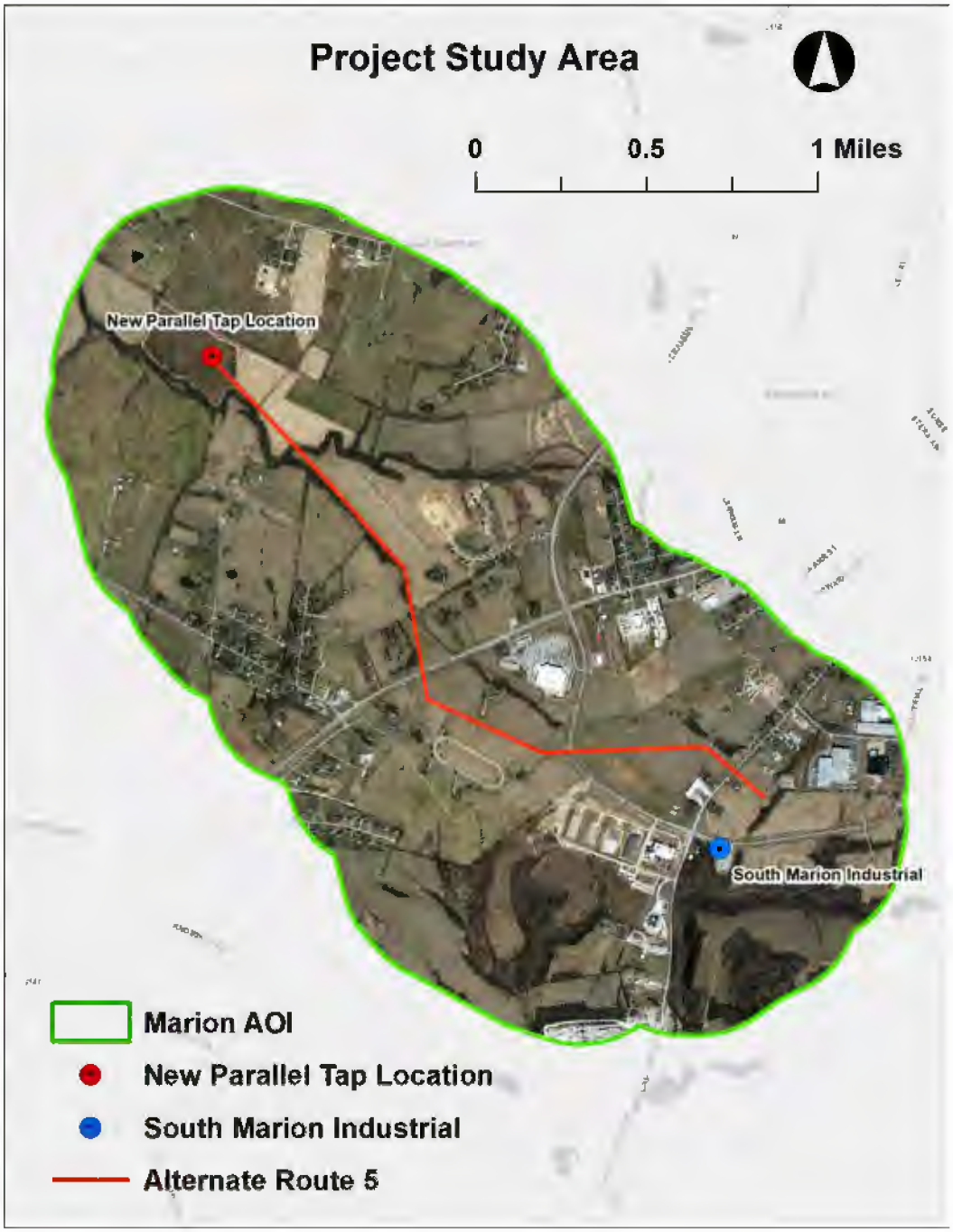


Figure 45: Alternate Route 3

PART XI: REFERENCES

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

"Kentucky Transmission Siting Methodology," Electric Power Research Institute, December 2007

U.S. Census Bureau State and County Quick Facts http://quickfacts.census.gov/qfd/index.html

2021 Google – Map data – "Street View" http://maps.google.com/

Kentucky Geological Survey, University of Kentucky http://www.uky.edu/KGS/geoky/regionbluegrass.htm

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

Wilgreen Lake, Madison County KY.
https://madisoncountyky.us/index.php/county-parks/wilgreen-lake

Memorandum to File

To: File
From: Lucas Spencer
Date: December 18, 2023

Re: Marion Co. Industrial Parallel Line and Mett's Tap Line – Expert Judgement

NV5 delivered the scores for the alternative routes on 12/14/2023 as part of the deliverables for both the Marion County Industrial Parallel Tap Line and the Mett's Tap Line Routing Studies. EKPC held a meeting to discuss the scoring from NV5.

Marion Co. Industrial Parallel Tap Line:

After reviewing the scores for the various routes, Alternative 5 was the lowest scoring (i.e. best scoring) route in the Simple environment as well as the built environment. It was the second best in both the engineering and natural environments, with the engineering score being very close to the best scoring engineering route (alternative 3).

Although alternative 3 was the best scoring in the engineering and natural environments, it was the lowest scoring route in the built environment and only the third best route in the simple environment.

With this in mind, the project team agrees that there is no need to utilize the expert judgement criteria to further funnel the results and that the EPRI-KY Routing methodology has objectively selected the best route.

Mett's Tap Line:

After reviewing the scores for the various routes, Alternative 5 was the lowest scoring (i.e. best scoring) route in the Simple environment, natural environment as well as the built environment. It was the fourth best in the engineering; this was driven by the line length.

Route 2 is the best scoring route from an engineering standpoint, but is the worst scoring route in the built environment. Route 2 was the third best route in the simple environment.

Route 6 was the 2nd best route in the built, simple and engineering environments but 5th best in the natural environment this is caused by the increased amount of tree clearing.

With this in mind, the project team agrees that there is no need to utilize the expert judgement criteria to further funnel the results and that the EPRI-KY Routing methodology has objectively selected the best route.

Attendees at the meeting as listed below:
Laura LeMaster
Lucas Spencer
Jake Dawn
Butch McCoy
Josh Young

Expert Judgement Memo – 10/30/2023

Attendees:

Jake Dawn
Mitchell Mosher
Ronnie Terrill
Trenton Sparks
Butch McCoy
Proctor Robinson
Chris Carpenter
Josh Young
Lucas Spencer

Memo: EKPC met on 10/30/2023 to discuss expert judgement criteria for both the new Mett's tap and the new Marion Industrial Parallel Line Tap. Below are the categories, definitions and weightings that were agreed upon by all in attendance. Lucas Spencer organized the meeting. We evaluated what categories would be needed prior to any route definitions taking place.

Marion Industrial Parallel Tap – Expert Judgement Criteria

Schedule Risk – Risk in schedule, not meeting energization date. – **10%**

Community Impact – Number of newly impacted landowners that do not currently have an EKPC easement traversing their property vs. landowners currently impacted. – **30%**

Constructability – Working within confined outage limits of 1 week (week to be defined in 2025) at South Marion Industrial, and minimizing hot work, less hot work would be preferred. Crossing existing transmission infrastructure would be bad for constructability. Number of distribution crossings, a lower number would be better. – **40%**

Visual Impact – The impacts to the communities within proximity to the new and existing transmission infrastructure, additional visual impact would be not preferred for this category. – **20%**

Mett's Tap – Expert Judgement Criteria

Visual Impact – Limiting viewshed impacts to the Lebanon National Cemetery. – **30%**

Public Impact – Limiting possible disruption to people in the area during construction & maintenance activities. Minimizing crossings at parking lots would be preferred. – **5%**
Industrial Park Impact – Limiting potential development within the industrial park would be less preferred. – **20%**

Constructability – Overbuilding less preferred. Fewer utility crossing preferred (overhead and underground). – **35%**

Schedule Risk – Risk of not meeting needed energization date. – **10%**

Exhibit 21

Affidavit and Notice of Mailing

VERIFICATION PURSUANT TO 807 KAR 5:120 SECTION 2(3)

The undersigned, Nick Comer, first being duly sworn, deposes and says that he is the External Affairs Manager of East Kentucky Power Cooperative, Inc., that he was responsible for mailing, first class mail, the notice of the proposed construction to each property owner, according to the Madison County property value administrator records, over whose property the transmission line right-of-way is proposed to cross. The notice was mailed on May 17, 2024, to the property owners at the owner's address as indicated by the Marion County property valuation administrator records. The notice contained the information required by 807 KAR 5:120 Section 2(3), including the Kentucky Public Service Commission's docket number, a description of the project, a map showing the proposed route of the transmission line, the address and telephone number of the Executive Director of the Kentucky Public Service Commission, a description of the property owners' rights to intervene in the proceeding and a the right to request a public hearing. A sample copy of the notice is attached to this Verification as well as a list of the property owners – names and address – to whom notice was sent.

NICK COMER

STATE OF KENTUCKY)
)sct
COUNTY OF CLARK)

Subscribed, sworn and acknowledged to before me by Nick Comer this 17 day of May, 2024.

NOTARY PUBLIC, STATE AT LARGE

MY COMMISSION EXPIRES 11/30/2025

GWYN M. WILLOUGHBY
Notary Public
Commonwealth of Kentucky
Commission Number KYNP38003
My Commission Expires Nov 30, 2025

EAST KENTUCKY POWER COOPERATIVE

May 17, 2024

Nally & Haydon Holdings LLC
40 Lucknow Ct
Bardstown KY 40004

Subject: Marion County - Metts 161-kilovolt transmission line & substation project

East Kentucky Power Cooperative (EKPC) soon will conduct a project to construct a new distribution substation and approximately 3.3 miles of new 161-kV transmission line in two sections in Marion County. Enclosed is a map displaying the route of the line. This is the same transmission line project that was the subject of a public open house meeting that was conducted on Feb. 29, 2024, in Lebanon, Ky.

An approximately 1-mile section of transmission line is planned from the proposed Metts Distribution Substation, to be built near the intersection of Metts Drive and Industrial Drive, southwest to EKPC's existing South Marion Industrial substation on Industrial Drive near the intersection with New Calvary Road (Route 208). Another section of new transmission line is planned to parallel an existing transmission line from north of U.S. 68, proceeding 2.3 miles southeast to EKPC's existing Marion County Industrial substation near New Calvary Road (Route 208). This project will help to maintain reliable electric service for Inter-County Energy Cooperative members by preventing overloading of electric grid infrastructure.

The transmission line will require a certificate of public convenience and necessity to be issued by the Kentucky Public Service Commission (PSC). This process will proceed on PSC Docket 2024-00108. EKPC plans to file the application on or about May 22, 2022. You have the right to intervene in these proceedings should you desire and to request a local public hearing. Should you have any questions concerning this process, please contact Linda C. Bridwell, Executive Director, Kentucky Public Service Commission, PO Box 615, 211 Sower Boulevard, Frankfort, Kentucky 40602-0615, telephone (502) 564-3940.

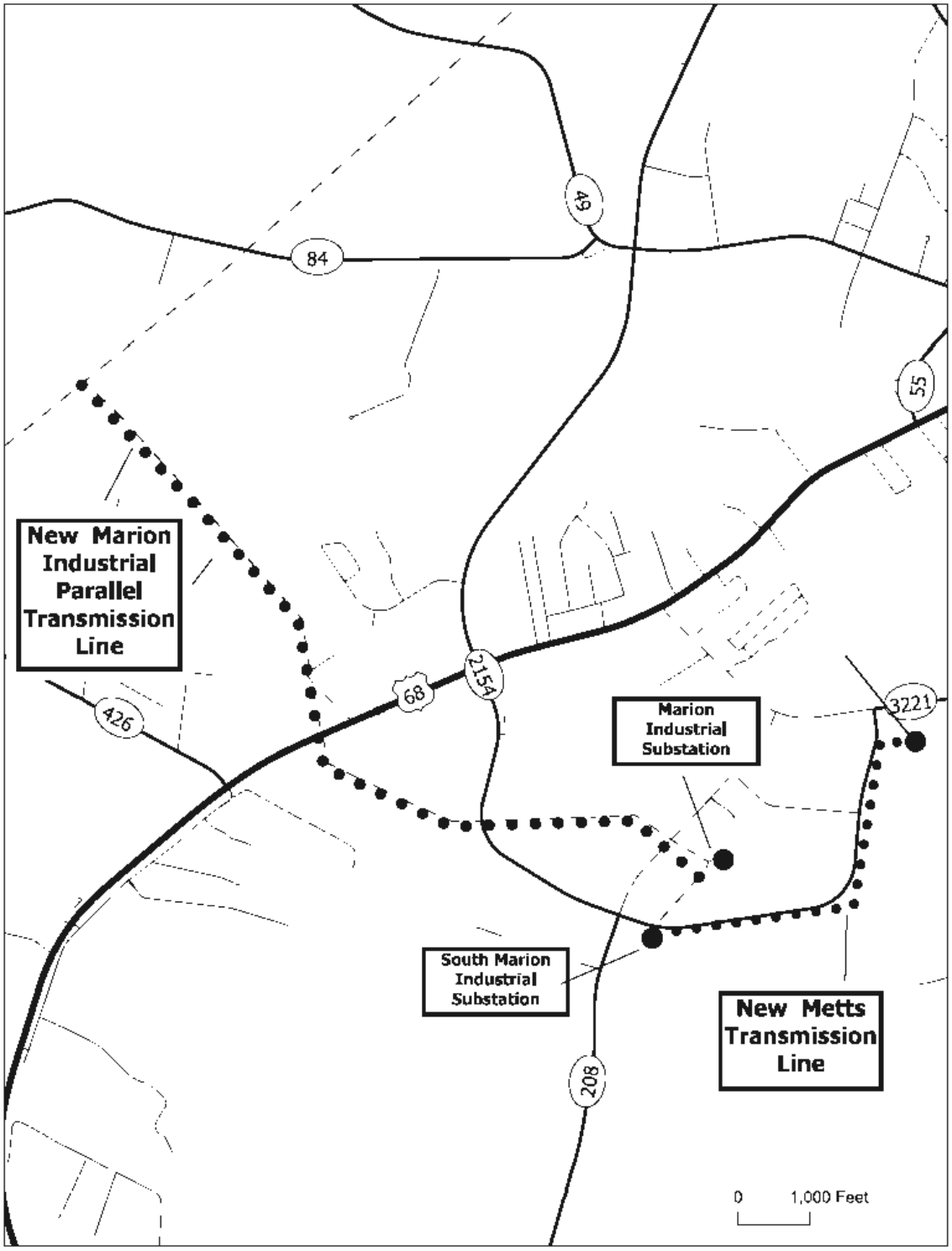
Sincerely,
Butch McCoy
Right of Way Agent

Enclosure: Map of line route

4775 Lexington Road 40391
P.O. Box 707, Winchester,
Kentucky 40392-0707

Tel. (859) 744-4812
Fax: (859) 744-6008
http://www.ekpc.com

MARION COUNTY - METTS TRANSMISSION LINE ROUTE



Metts Marion transmission line
Property owners notified of CPCN filing

OwnerName1	OwnerName2	Mailing address	CITY	ST	ZIP
Nally & Haydon Holdings LLC		40 Lucknow Ct	Bardstown	KY	40004
Marion County Industrial Foundation		223 N Spalding Ave Suite 300	Lebanon	KY	40033
NSU Corporation		755 Industrial Dr	Lebanon	KY	40033
Joy Global Underground Mining LLC	Attn: Tax Dept	401 E Greenfield Ave	Milwaukee	WI	53214
The Knolls LLC		655 Industrial Dr	Lebanon	KY	40033
Pattison Jim Development Inc	C/O Montebello Packing	650 Industrial Dr	Lebanon	KY	40033
Facility Support & Solutions LLC		4192 Hwy 44 E	Shepherdsville	KY	40165
Muse International Corp	C/O Curtis Maruyasu America Inc	665 Metts Dr	Lebanon	KY	40033
Nally & Haydon Holdings LLC		40 Lucknow Ct	Bardstown	KY	40004
Carl Edward & Margaret Bradshaw		480 Highway 208	Lebanon	KY	40033
Goodin Family Farms LLLP		17205 Creek Ridge Rd	Louisville	KY	40245
Hilpps Farms LLP		313 Koehler Dr	Lebanon	KY	40033
William P & Teresa G Thompson		2550 Campbellsville Hwy	Lebanon	KY	40033
James C & Sheila T Hanks et al		Po Box 456 Lebanon, Ky 40033	Lebanon	KY	40033
Joseph R & Margaret Hughes		2065 Campbellsville Hwy	Lebanon	KY	40033
Joseph Kirby & Nancy Blandford		2255 Campbellsville Hwy	Lebanon	KY	40033
Gary & Jackie Mattingly et al		100 Saint Joseph Rd	Lebanon	KY	40033
Mary Francis Hourigan		275 Gray St	Lebanon	KY	40033
Thomas Michael & Vicki Hughes		490 Shreve Ln	Lebanon	KY	40033
Randall Lawson		5120 Shortline Pike	Lebanon	KY	40033
Pam Brady		2184 Loretto Rd	Springfield	KY	40069
William R & Janice Gordon		415 Shreve Ln	Lebanon	KY	40033

February 9, 2024 Mailing
and
Open House Presentation

EAST KENTUCKY POWER COOPERATIVE

February 9, 2024

[NAME]
[ADDRESS]
[ADDRESS]

Dear [NAME],

Subject: Marion County - Metts 161-kilovolt transmission line & substation project

East Kentucky Power Cooperative (EKPC) soon will construct a new distribution substation and approximately 3.3 miles of new 161-kV transmission line in two sections in Marion County. An approximately 1-mile section of transmission line is planned from the proposed Metts Distribution Substation, to be built near the intersection of Metts Drive and Industrial Drive, southwest to EKPC's existing South Marion Industrial substation on Industrial Drive near the intersection with New Calvary Road (Route 208). Another section of new transmission line is planned to parallel an existing transmission line from north of U.S. 68, proceeding 2.3 miles southeast to EKPC's existing Marion County Industrial substation near New Calvary Road (Route 208). This project will help to maintain reliable electric service for Inter-County Energy Cooperative members by preventing overloading of electric grid infrastructure.

You are being contacted because records on file with the local property valuation administrator's office indicate you own property that could be affected by this project.

EKPC would like to hear your comments about this project. You are invited to an open house on **Thursday, February 29, from 3 p.m. to 7 p.m., at the Marion County Extension Office located at 416 Fairgrounds Road, Lebanon, KY**. The open house format is informal. You will be able to talk one-on-one with people from EKPC who are involved with the project. You can attend any time during the scheduled hours of the open house so we can hear from you and exchange information.

Enclosed are some informational materials about EKPC, our typical process for routing transmission lines and this specific project. You may want to read over these materials prior to our visit.

Please make arrangements to drop by and talk with us. We look forward to meeting you.

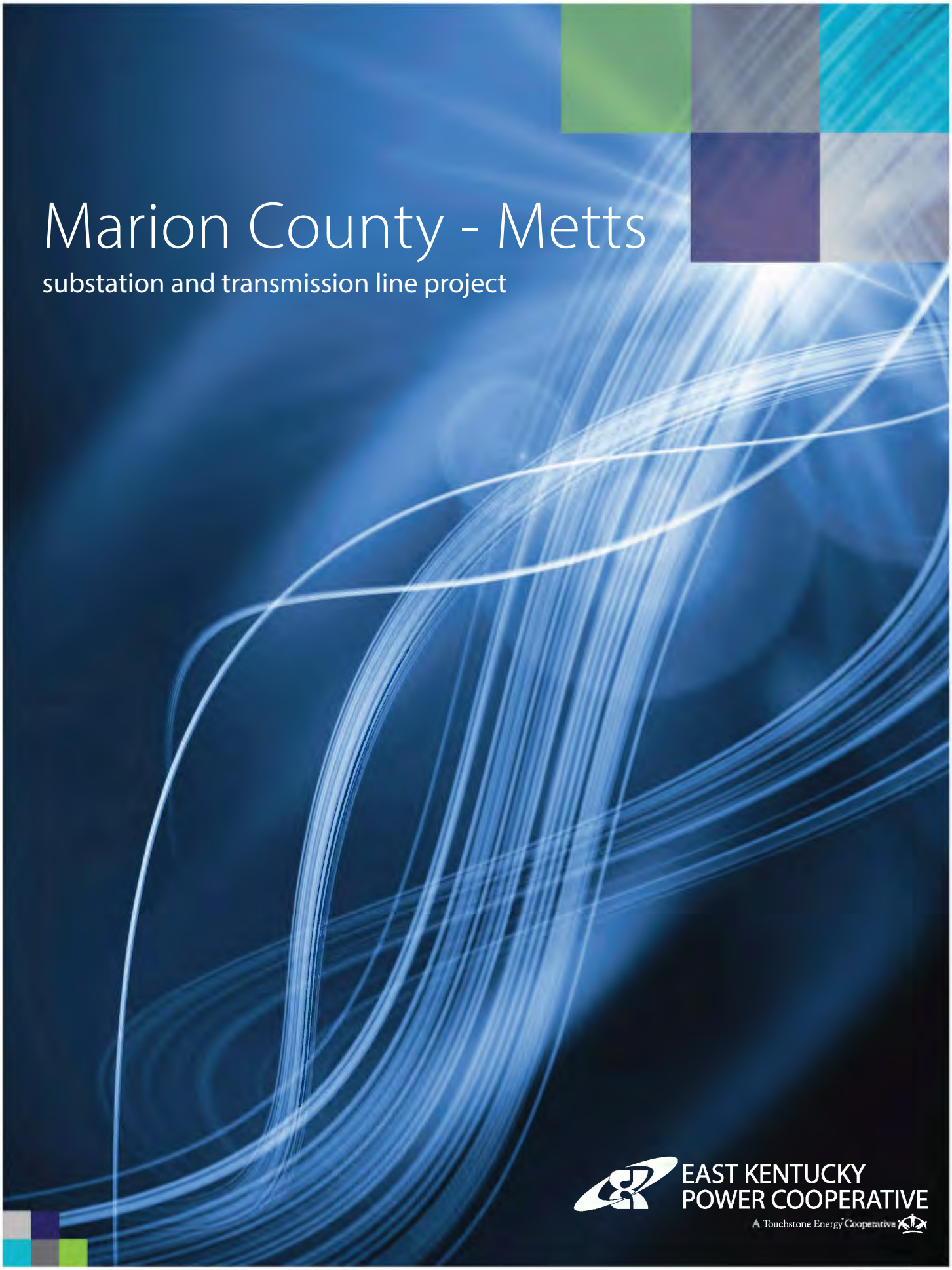
Sincerely,
Butch McCoy
Right of Way Agent

4775 Lexington Road 40391
P.O. Box 707, Winchester,
Kentucky 40392-0707

Tel. (859) 744-4812
Fax: (859) 744-6008
http://www.ekpc.com

Marion County - Metts

substation and transmission line project



EAST KENTUCKY
POWER COOPERATIVE

A Touchstone Energy® Cooperative

About Our Open House

Local property owners are encouraged to attend our Open House to help us gather information.

The Open House is a key way we keep property owners involved and informed every step of the way when building a transmission line.

Thank you for your cooperation as we work together.

About This Project

About the Marion County - Metts substation and transmission line project.
This is a planned project to construct a new distribution substation and approximately 3.3 miles of new 161-kilovolt electric transmission line in two sections; a 2.3-mile section is planned to parallel an existing transmission line. East Kentucky Power Cooperative (EKPC) plans to purchase 100 feet of right-of-way for sections directly paralleling EKPC's existing right of way, and 150 feet of right-of-way for the remainder.

Why does EKPC need to build this particular line?
This project will help to maintain reliable electric service for Inter-County Energy Cooperative members by preventing overloading of electric grid infrastructure.

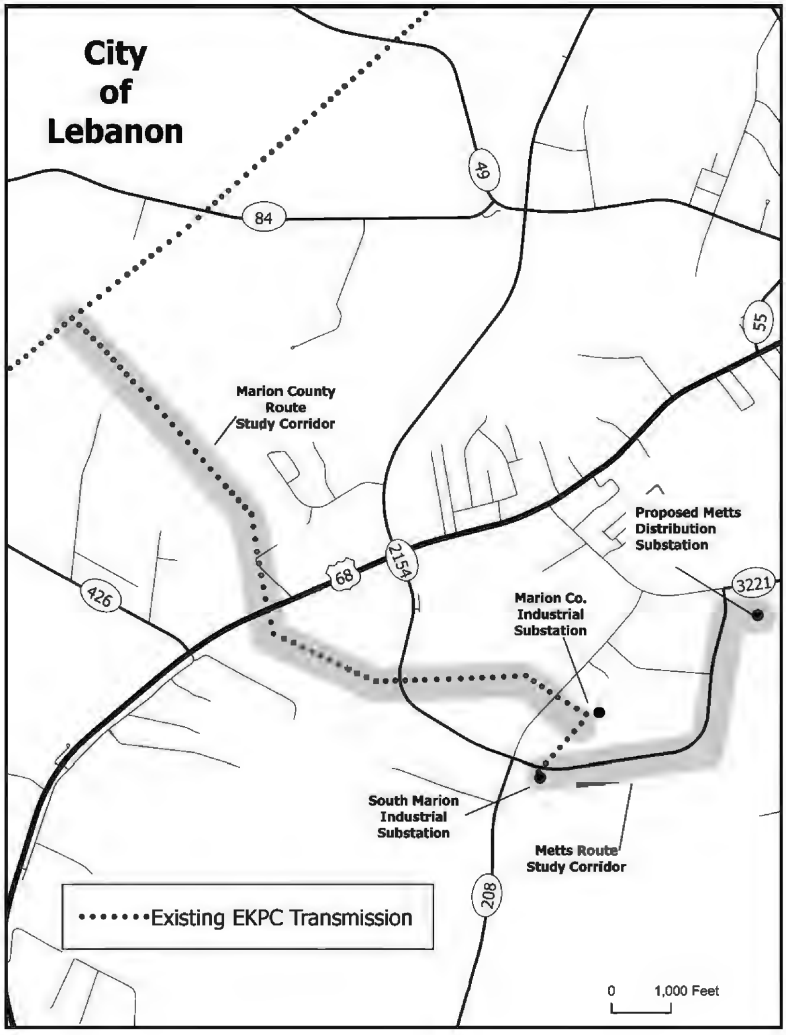
What approvals must be secured for this project?
The Kentucky Public Service Commission must grant a Certificate of Public Convenience and Necessity (CPCN) for this project to be constructed. The Rural Utilities Service, an agency that administers the U.S. Department of Agriculture's Rural Development Programs (USDA Rural Development), must ensure that EKPC meets appropriate environmental obligations including compliance with the National Environmental Policy Act, the National Historic Preservation Act and the Endangered Species Act.

Line Location

Where will the line be located?
East Kentucky Power Cooperative (EKPC) plans to construct approximately 3.3 miles of new 161-kV transmission line in two sections, as well as a distribution substation in Marion County.

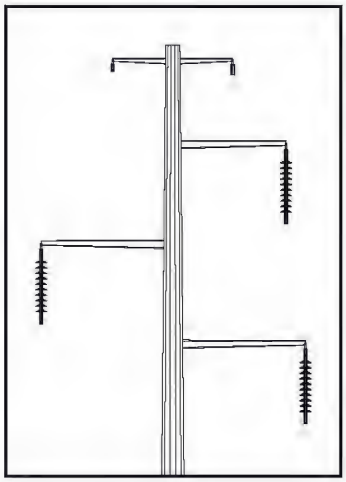
EKPC plans to construct the transmission line within the two study corridors displayed in the map below.

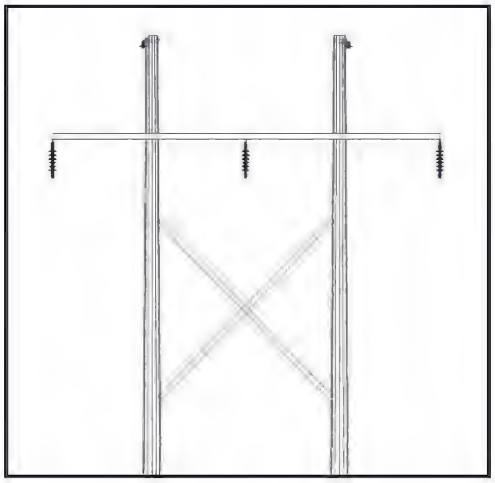
An approximately 1-mile section of transmission line is planned from the proposed Metts Distribution Substation, to be built near the intersection of Metts Drive and Industrial Drive, southwest to EKPC's existing South Marion Industrial substation on Industrial Drive near the intersection with New Calvary Road (Route 208). Another section of new transmission line is planned to parallel an existing transmission line from north of U.S. 68, proceeding 2.3 miles southeast to EKPC's existing Marion County Industrial substation near New Calvary Road (Route 208).



Line Appearance

What will the line look like?
This project will use a mix of single- and double-pole construction. Below are drawings of the typical structures that will be used for the project. EKPC plans to use galvanized steel poles for this project.





Project Schedule

Open House conducted	Feb. 29, 2024
Corridor mapping/surveying	February to March 2024
Centerline established	Late March 2024
Property owners notified	April 2024
File CPCN application	May 2024
Design complete	June 2024
Right-of-way negotiations	September to December 2024
Structure stakeout	March 2025
Construction	April to November 2025

About Us

Winchester-based East Kentucky Power Cooperative is a not-for-profit electric utility that generates and transmits energy to 16 Touchstone Energy Cooperatives across the state. These cooperatives distribute the energy to more than 1.1 million people in Kentucky. Together, we work to improve the quality of life of those we serve.

What a cooperative is
A cooperative is a not-for-profit business that is owned and democratically governed by its members. A co-op exists solely to serve its members.

What "not-for-profit" means
A not-for-profit cooperative is in business for the public good rather than for the financial benefit of an individual owner or stockholders.

Why we build power lines
Power lines are built to keep pace with growth in Kentucky. Power lines transport electricity like roads carry traffic. If there is too much traffic on a power line, though, the line overloads and people lose power. We build lines to avoid that problem.

Why we can't bury lines
While burying lines is more pleasing to the eye and protects them from ice and weather, the cost of burying lines is prohibitive. Line repairs are also extremely difficult and time consuming. It can cost as much as 10 times more to construct underground transmission lines.

The process we use to build lines
After the Open House, we'll finalize a centerline for the power line. Affected property owners will be notified. If your property is affected, we will seek permission to conduct a survey to confirm the centerline. Negotiations then begin on a payment to affected landowners for the right to run the line across their land. Our goal is always to minimize costs and the impact upon you and your community.

How we choose line routes
We use an objective methodology and computer model developed to strike a balance between a number of factors, including community impacts, geography, environmental impacts and costs. The factors considered in the model were developed with public input and we are able to incorporate public input as we refine the route location.

About rights of way
If your property is crossed by this project, EKPC will seek to purchase an easement that allows the cooperative to locate its poles and wires on your property, and to enter the property as needed for maintenance. The property owner will continue to own and use the property. The easement allows EKPC to clear and control trees within the right-of-way, as well as other trees that could interfere with transmission lines, and prevents structures from being constructed in the right-of-way.

How we value property
We conduct a market analysis of the area based on recent property sales and assess the impact the line would have on any particular property.

How we work with property owners
Our professionals will work with you respectfully, and we will work closely with each property owner who is affected by any phase of the construction. It is our goal to make sure that property owners are well-informed about the project and have ample opportunity to discuss it with us.

What about environmental impacts?
Our biologists do extensive work prior to project construction in order to assess the environmental impact. The biologists work to ensure EKPC minimizes and avoids impacting endangered plants and animals during line construction.

How property owners and local communities provide input
The input of the community and affected property owners is of primary concern. We host open houses to share and gather information, and we strive to keep property owners and others fully informed about construction projects. Pursuant to Section 106 of the National Historic Preservation Act of 1966, East Kentucky Power Cooperative, on behalf of USDA Rural Utilities Service, is seeking to identify persons who are interested in participating in the process for evaluating the potential effects of this proposed project on historic properties located in the project area that are listed or eligible for listing in the National Register of Historic Places. If you have a legal or economic relation to properties that will be affected by the proposed project, or if you have a demonstrable interest in the historic built and/or archaeological environment in the project area, you are invited to participate as a consulting party in the Section 106 review process. If you believe you meet these criteria and you wish to participate as a consulting party, please send a letter with your contact information and a statement of your specific interest in the historic properties review process, to Josh Young at josh.young@ekpc.coop or at East Kentucky Power Cooperative, 4775 Lexington Road, Winchester, KY 40391.

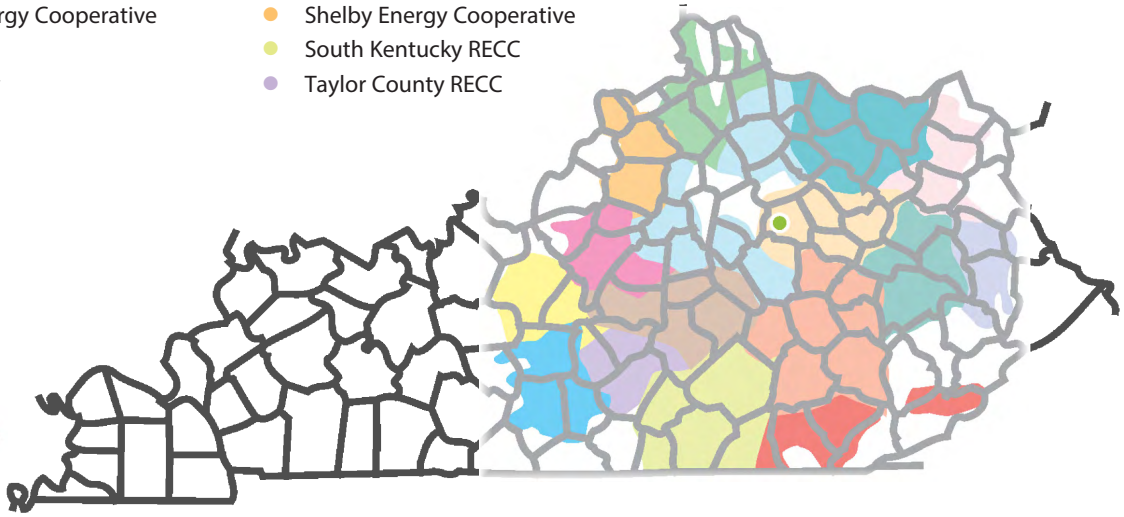
About Our System

East Kentucky Power Cooperative Service area
EKPC is a not-for-profit generation and transmission utility with headquarters in Winchester. EKPC generates electric power and transports it to 16 locally-owned cooperatives that distribute it to homes, farms, businesses and industries, serving 1.1 million people in 89 Kentucky counties. Together, EKPC and its owner-member cooperatives are known as Kentucky's Touchstone Energy Cooperatives.

EKPC's 16 owner-member cooperatives include:

- Big Sandy RECC
- Blue Grass Energy Cooperative
- Clark Energy Cooperative
- Cumberland Valley Electric
- Farmers RECC
- Fleming-Mason Energy Cooperative
- Grayson RECC
- Inter-County Energy
- Jackson Energy Cooperative
- Licking Valley RECC
- Nolin RECC
- Owen Electric Cooperative
- Salt River Electric Cooperative
- Shelby Energy Cooperative
- South Kentucky RECC
- Taylor County RECC

- EKPC headquarters



Kentucky's Touchstone Energy® Cooperatives
POWERED BY EAST KENTUCKY POWER COOPERATIVE

4775 Lexington Road, 40391
P.O. Box 707,
Winchester, KY 40392-0707
Telephone: 859-744-4812
Fax: 859-744-6008
www.ekpc.coop

Exhibit 22

Newspaper Notice

AFFIDAVIT OF PUBLICATION

The following affidavit is to be executed by an officer of the newspaper attesting publication of legal advertisements as required under an act of the Kentucky Legislature of 1958.

Denis House, Springfield, Kentucky, being first duly sworn that he is the Editor of The Lebanon Enterprise a newspaper printed and published in the state of Kentucky, County of Marion, and having a general circulation in the County of Marion, and that the advertisement of which annexed is a true copy has been published in said newspaper on the following dates via:

May 22, 2024

Signature of Officer

Subscribed and sworn to before me, a Notary Public, within and for the state and county afore said, by Denis House, to me personally known, this 22nd day of May, 2024. My commission expires the 26th day of December, 2026.

Signature of Attesting Official
Notary Public, Nelson County, KY

A tear sheet of the advertisement is attached

Records

PUBLIC RECORDS

ARRESTS

May 20

- Jordan Lee Raley, 28, operating a motor vehicle under the influence of substances, first offense, possession of marijuana, drug paraphernalia-buy/possess, inadequate silencer (muffler).

May 19

- Effie Jo Rakes, 42, three counts of public intoxication-controlled substances (excludes alcohol), failure to appear.

May 18

- Daniel Ray Livers Jr., 43, third-degree burglary, theft by unlawful taking or disposition from building $500 or more but under $10,000, reckless driving, possession of an open alcohol beverage container in motor vehicle prohibited, two counts of operating on a suspended or revoked operator's license, two counts of drug paraphernalia-buy/possess, operating a motor vehicle under the influence of alcohol .08, first offense (aggravative circumstance), two counts of operating a motor vehicle under the influence of alcohol, .08, second offense (aggravative circumstance).

May 17

- Dominick Reynolds, 34, first-degree trafficking in a controlled substance, first offense (less than 2 grams of methamphetamine), first-degree possession of a controlled substance, first offense (heroin), first-degree possession of a controlled substance, first offense (drug unspecified), second-degree escape (identify facility), third-degree assault-police/probation officer-identify weapon, tampering with physical evidence, first-degree possession of a controlled substance, third or greater offense (methamphetamine), second-degree criminal possession of a forged instrument (identify).
- Asheba Sharron Jones, 37, speeding 18 mph over the limit, failure to produce insurance card, failure of owner to maintain required insurance/security, first offense.

May 16

- Aaron Samson Anderson, 45, operating on a suspended or revoked operator's license, operating a motor vehicle under the influence of alcohol .08, second offense-aggravative circumstance, reckless driving.

May 15

- Patrick Latrey McNear, 25, failure to appear, serving parole violation warrant.
- Robin Crystal Owen, 62, failure to appear.
- Michael Steven Calhoun, 47, failure to appear.

May 14

- Gerald Campbell Abell, 44, parole violation (for technical violation).
- Chad Alan Bragg, 18, operating a motor vehicle under the influence of substances, first offense, speeding 18 mph over the limit, third-degree burglary, third-degree criminal mischief.

May 13

- Barry Gene Whitis, 62, first-degree possession of a controlled substance, second offense (methamphetamine), drug paraphernalia-buy/possess, rear license not illuminated.

LAND TRANSFERS

- Haydon Holdings, LLC to Lebanon Water Works Company, Inc., right of way agreement at or near the eastern side of St. Rose Pike, $1.00.
- Hilpp's Martary Properities, LLC, to Lebanon Water Works Company, Inc., right of way agreement at or near the northwest side of West Main Street in Lebanon, $1.
- Robin C. Reid, to Melanie Jane Reid, land on the east side of Shuck Street, $125,000.00.
- April Shewmaker nka April Montgomery and Keith Montgomery, and Ross Kent Shewmaker, to Patrick D. Hourigan, Tracts 1, 2, 3, 4, 5, 6 and 8 of the April Shewmaker and Ross Kent Shewmaker Farm Division, Deed of Correction.
- Patrick D. Hourigan to Johnny L. Smothers and Bethany Smothers, Tract 2 of the April Shewmaker and Ross Kent Shewmaker Farm Division, Deed of Correction.
- Patrick D. Hourigan to Stanley Smothers and Jamie Smothers, Tract 6 of the April Shewmaker and Ross Kent Shewmaker Farm Division, Deed of Correction.
- Charlotte Falvai to Jeffrey Baker and Sarah Baker, land on Old Cissell County Road and McCauley School Road, $33,000.00.
- Derek Christopher Downs to Bobbi J. Montgomery, Tract A per Plat of Bickett Cutout Plat, $30,000.00.
- Mattingly Estates, LLC, to Central Kentucky Soda Blasting & Construction, LLC, Lot 2 of E.S. Blandford Subdivision, $233,000.00.
- Vicky Rucker Hatchell aka Vickie Hatchel, Executrix of the Estate of June Carroll Rucker, aka June C. Rucker, Vicky Hatchel, Becky Clark and Tim Clark, Kara Hamilton and Todd Hamilton, and Steve Rucker and Kelly Rucker, First Party, to Dylan Hatchel, Second Party, Tract I: Lots 4, 5, 6, and a stripe of Lot 7 in Golf View Terrace; Tract II: Lot No. 3 and bounded by Lot No. 3 for 151 feet and Lot No. 4 for 49.5 feet, $180,000.00.

CALENDAR

KY 49 CLOSURE IN EFFECT

Realigning a segment of KY 49 (North Loretto Road) in Marion County will require closure of the road for approximately 60 days beginning on April 1. The section is between Mile Markers 20-22 along Cissels Creek. The closure includes intersections with Cowherd Lane and Sam Browning Road. A signed detour will be in effect using KY 84 and KY 327. Mobile message boards are in place along approaches to the area, notifying traffic of the upcoming closure.

KY 289 CLOSED DUE TO A VEHICLE IMPACT

Following an impact to the bridge guardrail and steel truss support structure, the bridge over Rolling Fork at Milepoint 2.8 just north of Jessietown in Marion County is closed until further notice. A detour is signed along KY 412 on the south side of the bridge. Access remains available to US 68 on the north side of the bridge.

LEBANON HOUSING AUTHORITY MEETINGS

The Lebanon Housing Authority holds monthly meetings of the Board of Commissioners on the fourth Monday of each month at noon. These meetings are held in the Board Room at the LHS at 101 Hamilton Heights. Meetings are open to the public.

FREE MOVIE EVENT ON SUNDAY EVENINGS

The free movie Sunday event of Season 4 of "The Chosen" episodes 5-8 at Lebanon Methodist Church, 236 N Spalding Ave, Lebanon, are on hold until further notice.

LEBANON FARMERS MARKET 2024 SEASON

The Lebanon Farmers Market will be open every Wednesday and Saturday from 8:00 a.m. until 12:30 p.m. starting May 1 and going through October 30. They not only offered produce but also honey, baked goods, candles, leather goods, crochet and quilted items, soaps, lotions, herbal teas, and more. They accept WIC/Senior Cards, cash, and checks, and some vendors accept Venmo and credit/debit cards.

LORETTO MEDICAL CLINIC OPEN HOUSE MAY 22

The Loretto Medical Center will hold an Open House on May 22 from 3 p.m. to 6 p.m. The clinic is located at 255 School Road in Loretto. The public is invited to meet Dr. Dennis and the volunteer staff. The Loretto Medical Center is a non-profit medical entity staffed by volunteer, unpaid personnel with the goal of providing high-quality, affordable, and accessible care. Patients will not be paid for services performed however, lab/x-ray and speciality consultation are entirely the responsibility of the patient. They are currently unable to treat pediatric patients less than 15 years old. Their current hours are 8:30 a.m. to noon on Wednesdays and Thursdays. You may call 270-865-2011 to schedule an appointment as walk-ins are seen as time allows.

UPCOMING ON-LINE JOB FAIRS

Let's Talk Online Job Fair

Hosted by Kentucky Career Center — Lincoln Trail

Tuesday, May 21

1 — 3:30 p.m.

Registration is required at www.LTCareerCenter.org/JobFair

Job seekers are invited to connect virtually with employers. Employers interested in participating are asked to contact Cathy Williamson at the Kentucky Career Center at (270) 300-2360 or cathy@workforceinit.com.

Let's Talk Online Job Fair

Hosted by Kentucky Career Center — Lincoln Trail

Tuesday, June 4

1 — 3:30 p.m.

Registration is required at www.LTCareerCenter.org/JobFair

Job seekers are invited to connect virtually with employers. Employers interested in participating are asked to contact Cathy Williamson at the Kentucky Career Center at (270) 300-2360 or cathy@workforceinit.com.

Let's Talk Online Job Fair

Hosted by Kentucky Career Center — Lincoln Trail

Tuesday, June 18

1 — 3:30 p.m.

Registration is required at www.LTCareerCenter.org/JobFair

Job seekers are invited to connect virtually with employers. Employers interested in participating are asked to contact Cathy Williamson at the Kentucky Career Center at (270) 300-2360 or cathy@workforceinit.com.

LTADD SENIOR CELEBRATION MAY 23

Senior Celebration hosted by Lincoln Trail Area Development District (LTADD) will be on Thursday, May 23 from 9 a.m.-2 p.m. Senior Celebration is an event held annually during Older American Month (May). This is a free event for seniors! This event will be hosted at the Pritchard Community Center at 404 South Mulberry Street in Elizabethtown. Senior Celebration will have various senior vendors, speakers, live entertainment, exercise, BINGO, door prizes, and much more. Lunch will also be provided. For more information call the LTADD at (270) 737-6082.

SEE **CALENDAR/PAGE A4**

COURT

FROM **PAGE A1**

as a vital element in the rejuvenation of downtown Lebanon." He also had a petition with 716 signatures.

Currently, the building houses the Marion County Historical Society and its displays, but without heat or air conditioning, some of those displays could be damaged if another location isn't found or a new system is put in the building.

That concerns Rose Graves of the Historical Society.

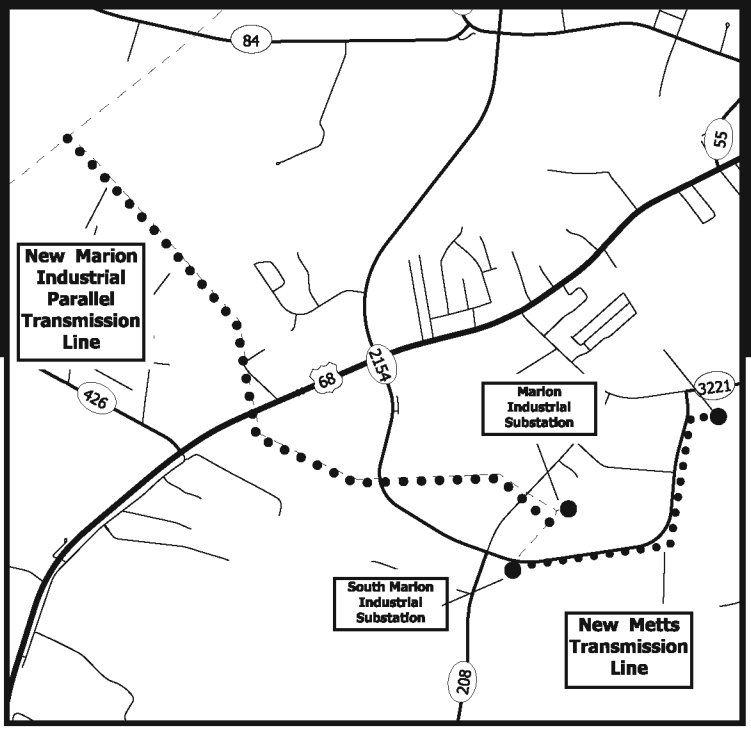
"Some of the collection had to be stored in different places because documents and photos were being damaged," Graves said. "All we are asking is where do we stand?"

Judge/Executive David Daugherty noted that a new boiler was installed in 2014, but has since developed a crack in it, forcing it to be turned off.

"We didn't expect that to happen, but to put another one in would cost a lot of money," Daugherty said. "That building

SEE **COURT/PAGE A4**

Public notice



East Kentucky Power Cooperative (EKPC) soon will conduct a project to construct a new distribution substation and approximately 3.3 miles of new 161-kV transmission line in two sections in Marion County.

An approximately 1-mile section of transmission line is planned from the proposed Metts Distribution Substation, to be built near the intersection of Metts Drive and Industrial Drive, southwest to EKPC's existing South Marion Industrial substation on Industrial Drive near the intersection with New Calvary Road (Route 208). Another section of new transmission line is planned to parallel an existing transmission line from north of U.S. 68, proceeding 2.3 miles southeast to EKPC's existing Marion County Industrial substation near New Calvary Road (Route 208). This project will help to maintain reliable electric service for Inter-County Energy Cooperative members by preventing overloading of electric grid infrastructure.

The transmission line will require a certificate of public convenience and necessity to be issued by the Kentucky Public Service Commission (PSC). This process will proceed on PSC Docket 2024-00108. EKPC plans to file the application on or about May 22, 2024. You have the right to intervene in these proceedings should you desire and to request a local public hearing. Should you have any questions concerning this process, please contact Linda C. Bridwell, Executive Director, Kentucky Public Service Commission, PO Box 615, 211 Sower Boulevard, Frankfort, Kentucky 40602-0615, telephone (502) 564-3940.

EAST KENTUCKY POWER COOPERATIVE

A Touchstone Energy® Cooperative

Notice of the February 29, 2024 Open House

AFFIDAVIT OF PUBLICATION

The following affidavit is to be executed by an officer of the newspaper attesting publication of legal advertisements as required under an act of the Kentucky Legislature of 1958.

Denis House, Springfield, Kentucky, being first duly sworn that he is the Editor of The Lebanon Enterprise a newspaper printed and published in the state of Kentucky, County of Marion, and having a general circulation in the County of Marion, and that thc advertisement of which annexed is a true copy has been published in said newspaper on the following dates via:

February 14 and 21, 2024

Signature of Officer

Subscribed and sworn to before me, a Notary Public, within and for the state and county afore said, by Denis House, to me personally known, this 14th and 21st day of February, 2024. My commission expires the 26th day of December, 2026.

Alice Walker

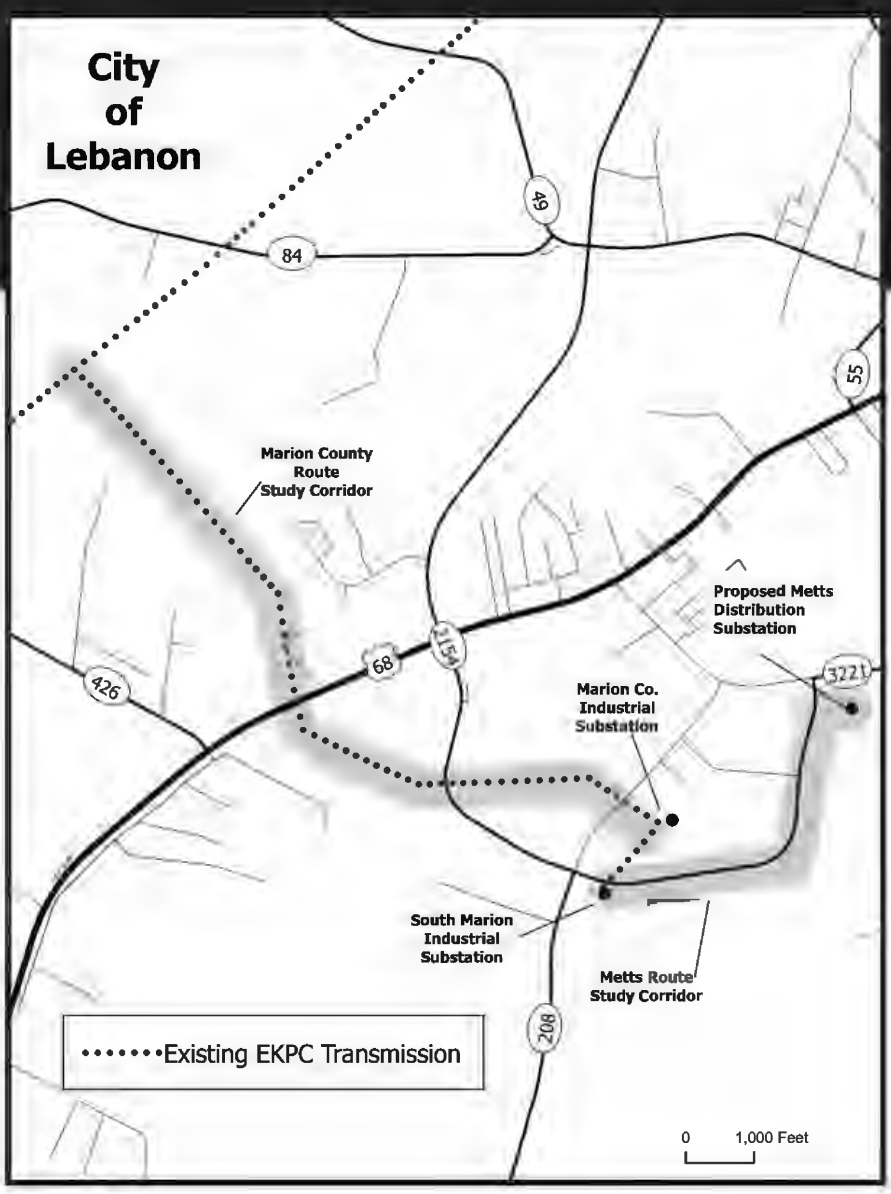
Signature of Attesting Official

Notary Public, Nelson County, KY

Alice Walker
Comm.# KYNP 63459

A tear sheet of the advertisement is attached

We want you involved . . .



… a new distribution substation and approximately 3.3 miles of new 161-kilovolt electric transmission line in two sections. An approximately 1-mile section of transmission line is planned from the proposed Metts Distribution Substation, to be built near the intersection of Metts Drive and Industrial Drive, southwest to EKPC's existing South Marion Industrial substation on Industrial Drive near the intersection with New Calvary Road (Route 208). Another section of new transmission line is planned to parallel an existing transmission line from north of U.S. 68, proceeding 2.3 miles southeast to EKPC's existing Marion County Industrial substation near New Calvary Road (Route 208). The line sections will be located within the study corridors shown above.

A public open house will be held Thursday, February 29, from 3 p.m. to 7 p.m., at the Marion County Extension Office located at 416 Fairgrounds Road, Lebanon, KY.

This project will help to maintain reliable electric service for Inter-County Energy Cooperative members by preventing overloading of electric grid infrastructure.

Pursuant to Section 106 of the National Historic Preservation Act of 1966, East Kentucky Power Cooperative, on behalf of USDA Rural Utilities Service, is seeking to identify persons who are interested in participating in the process for evaluating the potential effects of this proposed project on historic properties located in the project area that are listed or eligible for listing in the National Register of Historic Places. If you have a legal or economic relation to properties that will be affected by the proposed project, or if you have a demonstrable interest in the historic built and/or archaeological environment in the project area, you are invited to participate as a consulting party in the Section 106 review process. If you believe you meet these criteria and you wish to participate as a consulting party, please send a letter with your contact information and a statement of your specific interest in the historic properties review process, to Josh Young at josh.young@ekpc.coop or at East Kentucky Power Cooperative, 4775 Lexington Road, Winchester, KY 40391.

EAST KENTUCKY POWER COOPERATIVE

A Touchstone Energy® Cooperative

Exhibit 23

Testimony of Darrin Adams

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

IN THE MATTER OF:

ELECTRONIC APPLICATION OF EAST KENTUCKY POWER COOPERATIVE, INC. FOR CERTIFICATES OF PUBLIC CONVENIENCE AND NECESSITY FOR CONSTRUCTION PROJECTS IN MARION COUNTY, KENTUCKY AND OTHER GENERAL RELIEF	**)**	**CASE NO. 2024-00108**

DIRECT TESTIMONY OF DARRIN ADAMS ON BEHALF OF EAST KENTUCKY POWER COOPERATIVE, INC.

Filed: May 17, 2024

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

ELECTRONIC APPLICATION OF EAST KENTUCKY POWER COOPERATIVE, INC. FOR CERTIFICATES OF PUBLIC CONVENIENCE AND NECESSITY FOR CONSTRUCTION PROJECTS IN MARION COUNTY, KENTUCKY AND OTHER GENERAL RELIEF	)))))))	**CASE NO. 2024-00108**

VERIFICATION OF DARRIN ADAMS

STATE OF KENTUCKY)
)
COUNTY OF CLARK)

Darrin Adams, Director of Transmission Planning and System Protection for East Kentucky Power Cooperative, Inc., being duly sworn, states that he has supervised the preparation of his Direct Testimony and certain filing requirements in the above referenced case and that the matters and things set forth therein are true and accurate to the best of his knowledge, information and belief, formed after reasonable inquiry.

Darrin Adams

The foregoing Verification was signed, acknowledged and sworn to before me this 13th day of May 2024, by Darrin Adams.

Notary Public

GWYN M. WILLOUGHBY
Notary Public
Commonwealth of Kentucky
Commission Number KYNP38003
My Commission Expires Nov 30, 2025

Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS, AND OCCUPATION.

A. My name is Darrin Adams and my business address is East Kentucky Power Cooperative, Inc. ("EKPC"), 4755 Lexington Road, Winchester, Kentucky 40391. I am the Director of Transmission Planning & System Protection for EKPC.

Q. PLEASE STATE YOUR EDUCATION AND PROFESSIONAL EXPERIENCE.

A. I am a graduate of Transylvania University with a Bachelor of Arts degree in Liberal Studies, and a graduate of the University of Kentucky with a Bachelor of Science degree in Electrical Engineering. I am a licensed Professional Engineer in the Commonwealth of Kentucky and have 31 years of experience in the electric utility industry. I have been employed at EKPC since 2004, and have been responsible for transmission planning activities throughout my career at EKPC. Prior to my current position at EKPC, I served as a senior engineer, the Supervisor of Transmission Planning, the Manager of Transmission Planning, and the Director of Planning, Design, & Construction for Power Delivery. Prior to commencing employment with EKPC, I was employed at LG&E Energy/Kentucky Utilities ("LG&E/KU") for approximately 11 years in various roles in the transmission planning and operations areas of those companies.

Q. PLEASE PROVIDE A BRIEF DESCRIPTION OF YOUR DUTIES AT EKPC.

A. In my current role, I am responsible for overseeing the planning of the electric transmission line, transmission substation, and distribution substation facilities necessary to reliably and economically deliver energy to EKPC's Owner-Member systems. In addition to the planning of EKPC-owned facilities, I oversee coordination of transmission-development plans with other electric utilities and the PJM Interconnection Regional Transmission Organization ("PJM").

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE KENTUCKY PUBLIC SERVICE COMMISSION?

A. Yes, I have testified before the Commission on multiple occasions. Most recently, I provided filed direct testimony in Case No. 2022-00314, which involved EKPC's application for a Certificate of Public Convenience and Necessity ("CPCN") for the construction of transmission facilities in Madison County, Kentucky. I have also recently participated as a witness at Commission hearings related to EKPC's most recent two-year Fuel-Adjustment Charge review (Case No. 2023-00009) and EKPC's most recent Integrated Resource Plan (Case No. 2022-00098). Regarding cases involving an application for a CPCN for electric transmission lines, I have also testified in Case No. 2006-00463 (requesting a CPCN for the construction of the J.K. Smith-West Garrard 345 kV line in Clark, Madison, and Garrard Counties) and in Case No. 2005-00089 and Case No. 2005-00458 (both cases requesting a CPCN for construction of the Cranston-Rowan County 138 kV line in Rowan County). In addition to the direct testimony supplied in these cases, I have previously sponsored responses to data requests related to transmission-planning topics in numerous EKPC cases that have come before the Commission.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. My testimony will provide an explanation for the purpose and need for the proposed new Metts Drive 161-25 kV distribution substation ("Metts Drive Substation") and associated 161 kV tap line extension from EKPC's existing South Marion County Industrial 161 kV tap line ("Metts Drive 161 kV Tap"), as well as the proposed new 161 kV line section from the existing Marion County-Green County 161 kV line to the existing Marion County Industrial Substation ("Marion County Industrial 161 kV Tap Line Loop-In"). I will

describe the planning analysis that was performed to determine these needs and provide a description of the results of that analysis.

Q. ARE YOU SPONSORING ANY EXHIBITS?

A. Yes, I am sponsoring the report documenting the planning analysis as Attachment DA-1. This report was prepared under my direction and supervision.

Q. PLEASE DESCRIBE THE PROJECTS THAT EKPC IS UNDERTAKING AS PART OF THIS APPLICATION.

A. EKPC is proposing to construct the following: (1) Metts Drive 161 kV Tap, which will be a new 161 kV transmission line (length of 1.02 miles) extending from EKPC's existing South Marion County Industrial 161 kV tap line to the location of the planned Metts Drive Substation; (2) Marion County Industrial 161 kV Tap Line Loop-In, which will be a new section of 161 kV transmission line beginning at the location of the existing point of connection of the Marion County Industrial 161 kV Tap line to the Marion County-Green County 161 kV line and ending in the vicinity of the Marion County Industrial distribution substation (estimated length of approximately 2.35 miles). These Projects will accommodate the establishment of a new delivery point at the new Metts Drive Substation location for Inter-County Energy Cooperative Corporation (Inter-County) and support improved reliability of service to its customers in this area.

Q. PLEASE DESCRIBE THE NEED FOR THE TRANSMISSION SYSTEM IMPROVEMENTS.

A. Inter-County has identified a potential thermal overload of one of its feeders connected to this substation during peak-load conditions. In order to mitigate this feeder overload on an interim basis, Inter-County has shifted a significant number of consumers that were served

from the Lebanon Substation on this feeder to a feeder that is served from the Marion County Industrial Substation, which is approximately two miles southwest of the Lebanon Substation.

This load shift has deferred the forecasted transformer overload at the Lebanon Substation to 2029. If the load shift had not been done, the transformer would be forecasted to overload immediately based upon current substation load forecasts. In fact, the substation transformer would have experienced an overload in three of the last four actual winter periods. This interim load shifting mitigation is not a desirable long-term solution because the Marion County Industrial Substation's primary purpose is to serve industrial customers in that area. Service to residential customers from this substation subjects those customers to power-quality issues introduced by the non-linear nature of typical industrial electrical equipment. Therefore, EKPC has coordinated with Inter-County to develop a preferred solution to address the Lebanon Substation future loading concerns along with the InteCounty distribution-feeder loading concerns.

An additional consideration is the existing transmission reliability for service to the Marion County Industrial and South Marion County Industrial distribution substations. EKPC uses a megawatt-mile ("MW-mile") index to quantify relative reliability of radial service to loads. This value is calculated as the product of the peak MW demand of a substation and the length in miles of the radial transmission line serving the substation. EKPC generally considers transmission radial service to distribution substations acceptable if the total MW-mile index for the radial line does not exceed 100 MW-miles. The MW-mile index of the existing radial supply for the Marion County Industrial and South Marion County Industrial substations is 85.6 MW-miles. Therefore, the radial configuration is

currently acceptable, but will become an issue in the future as demand continues to grow for these substations. Also, additional load shifted to this radial feed (through either a new substation or shifting load from one substation to another via the distribution system) could result in the 100 MW-mile threshold being exceeded.

Two additional factors considered in the analysis are: (1) the age of the existing Lebanon Substation; and (2) the monthly payments made to Louisville Gas and Electric Company and Kentucky Utilties Company (LG&E/KU) by EKPC for Network Integration Transmission Service ("NITS") due to utilization of the LG&E/KU transmission system to deliver energy to the Lebanon Substation. The Lebanon Substation was originally constructed in 1955. The condition and reliability of this substation is expected to become a concern in the near future as the equipment continues to age. From a NITS perspective, EKPC estimates payment of approximately $340,000 to LG&E/KU for this transmission service provided for the Lebanon Substation in 2024. This value is expected to increase significantly on a year-to-year basis due to continued load growth on the Lebanon Substation as well as expected continued annual increases in the LG&E/KU NITS rate.

EKPC, in coordination with Inter-County, has developed a holistic plan for the area that will address all of these identified needs and concerns. This plan adds distribution substation capacity in the area, mitigates Inter-County's distribution-feeder loading, existing exposure of consumers to power-quality issues, reduces the MW-mile load-exposure index for consumers served from the 161 kV line in the area, addresses expected upcoming aging infrastructure concerns with the Lebanon Substation, and eliminates significant payments for transmission service for that substation.

Q. WHAT SPECIFIC ANALYSIS HAS BEEN PERFORMED TO DETERMINE THE NEED FOR THE TRANSMISSION SYSTEM IMPROVEMENTS IN THE AREA?

A. The details of the analysis that has been performed are documented in the report provided as Attachment DA-1 to this testimony. Pertinent data was reviewed to determine potential distribution-substation and distribution-feeder loading issues in the area, then potential solution-plan alternatives were developed to address these issues, and an economic analysis of these plans was performed to determine their relative overall costs.

Q. WHAT WERE THE POTENTIAL SOLUTION-PLAN ALTERNATIVES THAT WERE DEVELOPED TO ADDRESS THE NEEDS IN THE AREA?

A. Working with Inter-County to identify solution options, including beneficial locations for a new substation, EKPC developed six different solution-plan alternatives for the area. One of the alternatives considered was to upgrade the existing Lebanon Substation to address the substation loading issues. Two other alternatives evaluated involved constructing a new substation at a new location in the area that shifts some, but not all, load from the existing Lebanon Substation to the new substation. Two additional alternatives involved constructing a new substation at a new location in the area that would allow retirement of the existing Lebanon Substation. The final alternative considered involved constructing two new substations at new locations in the area, and would likewise allow retirement of the existing Lebanon Substation. The six solution-plan alternatives evaluated range in estimated total capital costs of $4.6 to $17.3 million. The range of the 30-year estimated Net Present Value ("NPV") costs of the alternatives, which include the expected NITS payments (if any) to LG&E/KU for transmission service to the Lebanon Substation (or a comparable replacement substation) is $20.5 to $26.8 million. Detailed information

regarding the solution-plan alternatives considered to address the needs in the area is provided in Exhibit DA-1.

Q. WHY WERE THE SELECTED PROJECTS CHOSEN AS THE PREFERRED SOLUTION TO ADDRESS THE SYSTEM NEEDS IN THE AREA?

A. The selected Projects address the projected Lebanon Substation distribution-transformer overload and the Inter-County distribution-feeder overload, and are the least-cost solution-plan for the area issues over a 30-year period. The location of the new Metts Drive Substation is better situated for Inter-County to provide reliable service to its members in the area, while preparing to serve additional electrical demand that is expected to emerge in this area. Additionally, replacing the existing Lebanon Substation with this new substation eliminates the eventual future need to address equipment condition issues as it continues to age. Also, eliminating the Lebanon substation in the near-term will reduce coordination activities between EKPC, PJM, and LG&E/KU transmission operators during system maintenance and restoration activities, thereby improving overall efficiency and reducing opportunities for delayed restoration and/or personnel errors. Finally, this solution-plan provides the best reliability improvement for the existing Marion County Industrial and South Marion County Industrial Substations in terms of the MW-mile exposure index. This solution-plan reduces the total MW-mile load exposure for the substations on the radial tap line to 27.3 MW-miles, a reduction of about 68% compared to the existing system. Therefore, the selected Projects are the most efficient and cost-effective solution, and provide substantial benefits for the electric system serving consumers in this area.

Q. HAS EKPC SUBMITTED THESE PROJECTS TO PJM FOR ITS REVIEW AS EKPC'S REGIONAL TRANSMISSION PLANNER?

A. Yes, EKPC submitted these projects to PJM as a Transmission Owner-initiated supplemental project based on a customer-service driver. The need for system improvements in the area was presented to the PJM stakeholder community at the PJM Subregional Regional Transmission Expansion Plan-Western Region ("SRRTEP-W") committee meeting on October 20, 2023. The solution projects that are identified in this Application were presented at the PJM SRRTEP-W committee meeting on November 17, 2023. Neither EKPC nor PJM received any stakeholder feedback regarding the need or the selected projects. PJM is currently in the process of performing its do-no-harm analysis to ensure that the selected projects do not create any violations of PJM planning criteria. Once this do-no-harm analysis is completed, EKPC will submit the projects to PJM for inclusion in EKPC's Local Plan and incorporation into PJM's Regional Transmission Expansion Plan ("RTEP").

Q. WHY HAS EKPC REQUESTED SEPARATE CERTIFICATES OF PUBLIC CONVENIENCE AND NECESSITY FOR THE METTS DRIVE 161 KV TAP AND THE MARION COUNTY INDUSTRIAL 161 KV TAP LINE LOOP-IN PROJECTS RATHER THAN REQUESTING A SINGLE CERTIFICATE FOR BOTH PROJECTS?

A. Both transmission line Projects are important components of providing significant reliability improvements for the electric system in the area. The Projects are linked, particularly since the addition of the Metts Drive 161 kV Tap and associated Metts Drive Substation greatly increase the MW-mile exposure for customers in the area. This

reliability degradation is addressed by the Marion County Industrial 161 kV Tap Line Loop-In Project. However, either Project could be completed singularly to provide electric-service improvement, at a reduced level, for consumers in the area. Our analysis has determined that the Metts Drive 161 kV Tap and associated substation are critical infrastructure additions necessary to address forecasted distribution-substation and distribution-feeder loading issues associated with the existing Lebanon Substation. Therefore, EKPC and Inter-County have determined that the Projects are needed as soon as feasible. Due to the increased outage exposure that this Metts Drive 161 kV Tap addition creates, EKPC believes that the Marion County Industrial 161 kV Tap Line Loop-In project is also needed to not only maintain, but greatly enhance, the reliability of service to customers served from substations connected to the existing 161 kV radial tap. EKPC would still be able and willing to construct the Metts Drive 161 kV Tap and associated substation if a CPCN is granted only for that transmission line Project, although this would be an undesirable outcome that would not provide the full reliability benefits that we believe are needed in this area.

Q. ARE THE PROJECTS THAT ARE INCLUDED IN THIS APPLICATION NECESSARY TO SUPPORT THE PLANNED NORTHERN BOBWHITE SOLAR GENERATING FACILITY, FOR WHICH EKPC HAS REQUESTED A CPCN IN CASE 2024-00129 CURRENTLY BEFORE THE COMMISSION?

A. No, the transmission and substation projects that are included in this application are unrelated to the Northern Bobwhite solar facility, and are not needed in order for that facility to connect to the EKPC transmission system and operate at full output capability. As I have explained in my testimony above, the Projects that are the subject of this

application are needed solely to address substation transformer and distribution feeder overloads associated with the existing Lebanon distribution substation and to improve the reliability of the transmission system serving customers at the Marion County Industrial Park, South Marion County Industrial Park, and the planned Metts Drive distribution substations.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

ATTACHMENTS

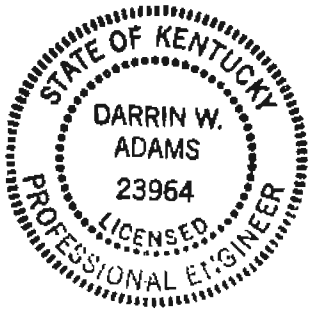
DA-1 Lebanon Area Planning Analysis Report

Attachment DA-1

Lebanon Area Planning Analysis Report

Prepared by EKPC Transmission Planning

May 2024



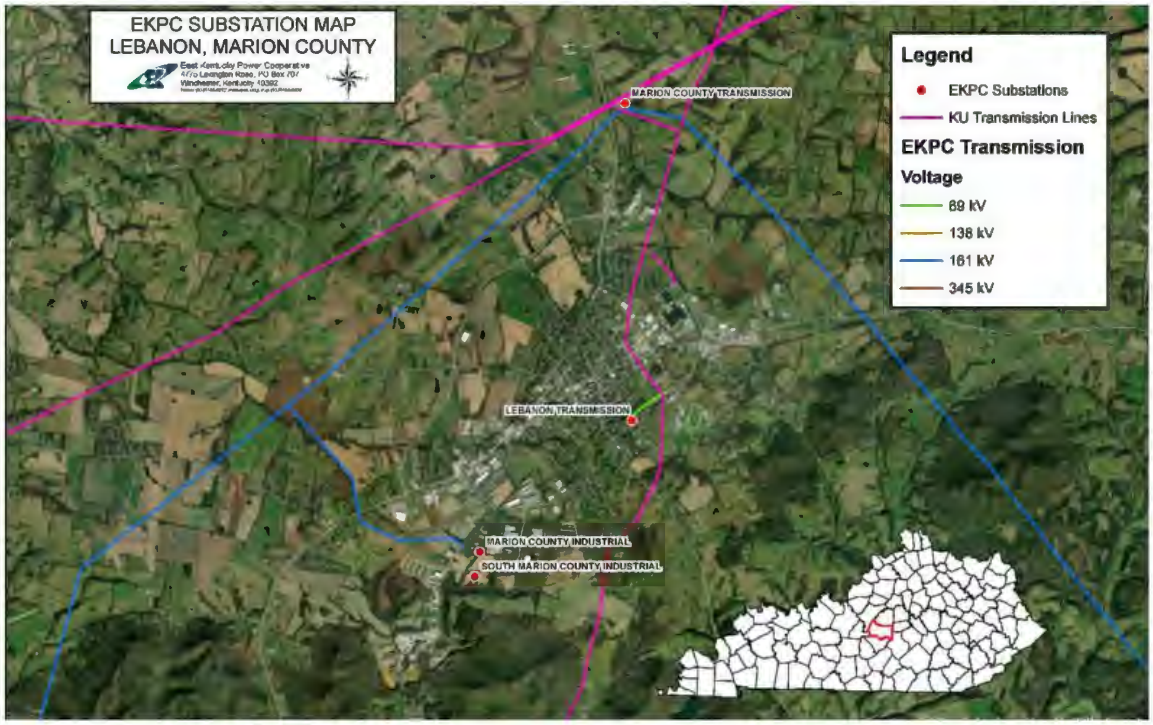
Lebanon Area Planning Analysis Report

Contents

1.0 Introduction

The East Kentucky Power Cooperative ("EKPC") and InterCounty Energy ("ICE") transmission/distribution system in Marion County, Kentucky was evaluated by the EKPC Transmission Planning Team in coordination with ICE personnel to determine future distribution substation and associated transmission system needs. A current transmission system map of the area is shown in Figure 1.1.

Figure 1.1: EKPC's Lebanon area transmission system map



The Marion County Industrial and South Marion County Industrial distribution substations are connected to the EKPC Bulk Electric System ("BES") via the Marion County – Green County 161 kilo-volt ("kV") circuit. Additionally, EKPC's Lebanon substation, which is located in the southern portion of the city of Lebanon, is connected radially to a Louisville Gas & Electric/Kentucky Utilities ("LG&E/KU") 69 kV line, and is served contractually as a Network Load taking Network Integration Transmission Service ("NITS") via the LG&E/KU Open Access Transmission Tariff ("OATT"). These three substations provide power to approximately 3,476 customers in Marion County via ICE's distribution system. A distribution system map showing the preferred system configuration of the area is shown in Figure 1.2.

Figure 1.2: ICE's Lebanon area distribution system

2.0 Area Transmission/Distribution System Background

The Lebanon 69 - 25kV distribution substation was constructed in 1955 and provides power to ICE customers via a 14 MVA ABB transformer manufactured in 1997. The EKPC Marion County – Green County 161 kV circuit was constructed in 1969 and did not provide direct service to ICE customers until the Marion County Industrial tap line was constructed in 1999 to source the Marion County Industrial 161 – 25 kV substation. Recently, in 2020 this tap line was extended to the South Marion County Industrial 161 – 13.8 kV substation due to service requirements for a new industrial customer in the area. The number of customers served and 2023 Winter 10% load probability forecast loads for these substations are shown in Table 2.1.

Table 2.1 Customer Counts and Winter Peak Loads

Substation Name	Number of Customers	Forecasted Peak Loading
Lebanon	2362	17.49 MW
Marion County Industrial	1113	10.49 MW
South Marion County Industrial	1	27.10 MW

3.0 EKPC Planning Criteria

Annually, EKPC transmission planning evaluates all distribution substation equipment to determine system needs based on a 10% load probability forecast. EKPC's transformer rating methodology for distribution substations is based on the **IEEE C57.92-1981. "IEEE Guide for Loading Mineral-Oil-Immersed Power Transformers Up to and Including 100 MVA with 55 C or 65 C Average Winding Rise"**. This guide being the basis, EKPC rates power transformers based on four-hour peak-load duration with normal loss of life of the transformer. Using this guide EKPC determines rating multipliers to establish

summer and winter ratings for liquid immersed forced air cooling transformers (OA/FA-65C). This is now identified as an ONAF transformer using standardized cooling description identifiers. Sections 3.1 and 3.2 below detail the summer and winter ratings methodology EKPC uses to rate distribution substation transformers. Along with facility ratings, EKPC Transmission Planning considers system reliability of distribution substation supply during evaluation of valid alternative solutions. Details of these reliability considerations can be found in Section 3.3.

3.1 Summer Rating

The summer rating for EKPC distribution substation transformers is based on an ambient temperature of 100 degree Fahrenheit, with assumptions of 80% equivalent load before peak load and 90% phase imbalance. The multiplier that is applied to the transformer maximum nameplate rating to determine the applicable summer rating is summarized in Table 3.1.

Table 3.1 Summer Ratings Methodology

Type	Multiplier @ 100F
OA/FA-65C	0.973

3.2 Winter Rating

The winter rating for EKPC distribution substation transformers is based on an ambient temperature of 32 degrees Fahrenheit, with assumptions of 90% equivalent load before peak load and 90% phase imbalance. The multiplier that is applied to the transformer maximum nameplate rating to determine the applicable winter rating is summarized in Table 3.2.

Table 3.2 Winter Ratings Methodology

Type	Multiplier @ 32F
OA/FA-65C	1.296

The summer and winter calculation of maximum transformer rated loading based on a 14 MVA OA/FA-65C transformer can be seen in Figure 3.2.

Figure 3.2 Calculation of summer and winter ratings for a 14 MVA OA/FA-65C transformer

$$Summer = 14\ (MVA) * \ 0.973 = \mathbf{13.622\ MVA}$$
$$Winter = 14\ (MVA) * \ 1.296 = \mathbf{18.144\ MVA}$$

3.3 Reliability Considerations

EKPC is committed to serving Owner-Members with safe, reliable and cost effective power to meet the needs of their customers. To minimize the duration and frequency of customer interruptions affected by a single contingency outage, EKPC considers the reliability of transmission supply to distribution substations during solution selection. The transmission radial supply to a distribution substation is generally considered acceptable if the tap "load exposure" index (TE) does not exceed 100 MW-miles. When this index is exceeded, multiple source supply should be considered to reduce this index below 100 MW-miles. The equation in Figure 3.3 illustrates the calculation of the TE index.

Figure 3.3: "Load Exposure" Index Calculation

$$TE = L\ (mi) * P\ (MW)$$
$$L = length\ of\ radial\ supply$$

$$P = Peak\ MW\ load\ supplied\ by\ radial\ supply$$

4.0 Planning Criteria Concerns

4.1 Transmission and Distribution Loading Concerns

The Lebanon substation transformer has experienced steady peak load growth and is forecasted to overload in the year 2029 based on EKPC's current load forecast, with a 10% probability load forecast of 18.25 MW in that year. EKPC develops on a biannual basis a system wide 20-year substation forecast that is based in part on historical loads for the preceding 10 years. The actual peak loads for the past 10 years and the 10% probability load forecast for the Lebanon substation for the next 10 years are shown in Table 4.1.

Table 4.1 Lebanon Substation Actual Loads & 2025-2034 Winter 90% Probability Load Forecast

Actuals											2022 90/10 Forecast									
2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34
13.22	13.00	13.21	14.23	16.77	14.08	12.34	12.94*	9.01†	11.70‡	12.90§	17.65	17.78	17.86	18.00	18.02	18.25	18.30	18.43	18.46	18.55

Proactive load shifts from Lebanon to Marion Co. Industrial in place to mitigate real time substation and distribution loading concerns.
Estimated Load Shifts Below

* 2020/21 – 5.62 MW

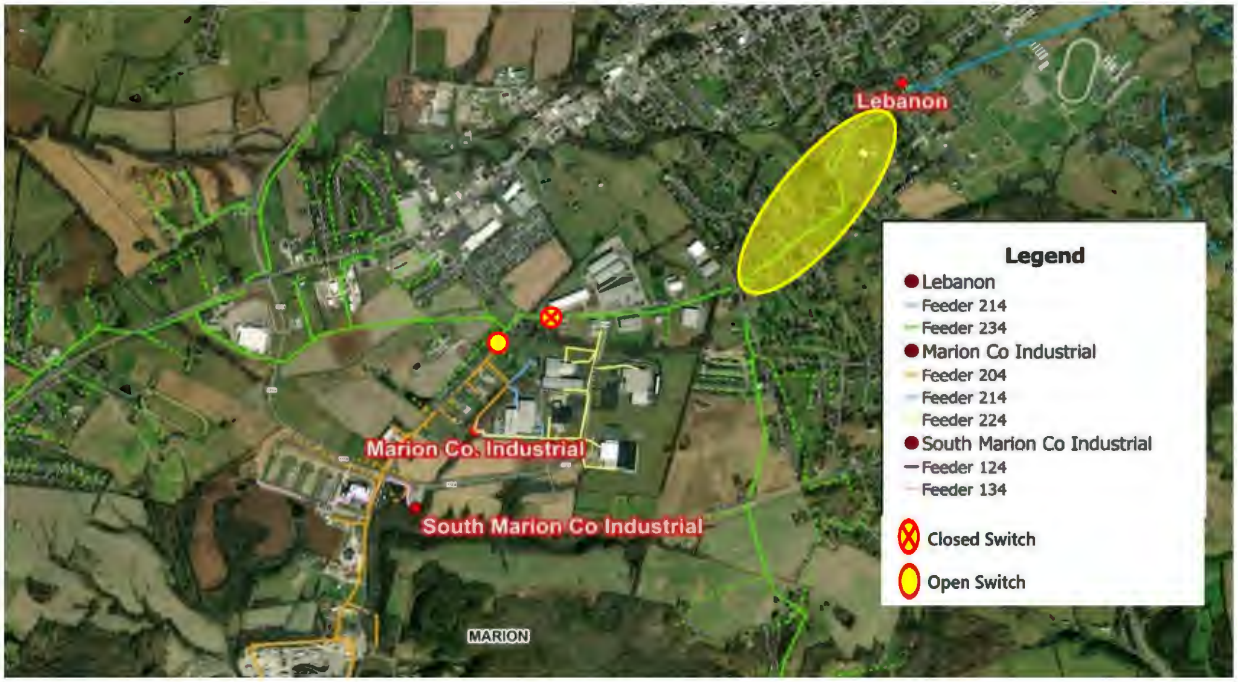
† 2021/22 – 6.11 MW

‡ 2022/23 – 7.82 MW

§ 2023/24 – 7.20 MW

The actual substation peak loads shown above during the winter seasons beginning in 2020/21 through present can be misleading due to proactive load shifts in place to prevent real-time overloads. The estimated load shifts noted are values at the time of the substation peak. Based on these load shifts, the power flows through the Lebanon substation transformer would have exceeded its winter rating in three of the past four winter-peak periods. LIkewise, the forecasted substation loads for future winter periods are under-forecasted because of the reduced actual loads for those periods that were fed into the forecast development process. ICE has submitted a project in its 2022-2025 Work Plan to Rural Utilities Service ("RUS") to address the Lebanon 234 feeder 1/0 AAC conductor that is expected to overload during peak conditions under the normal feeder configuration. This feeder exits the existing Lebanon substation and travels west toward Country Club Drive; at the intersection of Metts Drive and Country Club Drive the feeder splits and continues down Metts Dr. and Country Club Dr. The 234 feeder and section of 1/0 AAC that is expected to overload can be seen in Figure 4.1.

Figure 4.1 Lebanon Feeder 234 (Normal System)



An interim solution to mitigate this conductor overload has been to switch load from Lebanon Feeder 234 to Marion Co. Industrial Feeder 204. This solution can be seen below in Figure 4.2.

This solution is not desired as a long-term solution due to the Marion Co. Industrial substation serving primarily industrial customers. This exposes ICE residential customers to power quality issues such as flickering lights as industrial customers operate large non-linear loads. ICE prefers to restrict the number of residential customers served from this substation in order to limit the occurrence of power-quality issues experienced by those customers.

Figure 4.2 Interim Switching Solution

In order to mitigate potential failure of the ICE 1/0 AAC conductor due to exceeding thermal limits and to provide a long-term solution, ICE had planned to construct a double circuit feeder that would follow the route of Lebanon Feeder 234 exiting the substation (highlighted in Figure 4.1 above). This construction would replace the existing single-circuit feeder in order to address loading concerns and improve protection device coordination and reliability. The section of line experiencing overloads is in a heavily congested shared right of way ("REROW") with two LG&E/KU distribution feeders and one ICE distribution feeder. Adding an additional feeder in this REROW adds approximately 1.0 mile of line exposure for what would then be two ICE "express" circuits that serve no load for approximately 1.0 miles from the Lebanon substation. In addition, this would add complexity for ICE distribution REROW acquisition and design of the new feeder along this path. Therefore, ICE would like to evaluate other long-term solutions to address the distribution feeder loading issue. The existing facilities near the intersection of KY HWY 49 and Country Club Dr. can be seen in Figure 4.3.

Figure 4.3 Congested REROW KY HWY 49 & Country Club Drive

4.2 Reliability Concerns

The TE of the existing radial 161 kV tap line serving the Marion County Industrial and South Marion County Industrial substations is calculated using the coincidental 90% probability load forecast and is within acceptable ranges in accordance with EKPC reliability considerations with a TE of 85.6 MW-miles. Details of this calculation can be found in Section 5.7 in Table 5.7. The TE index will be exceeded with any reasonable amount of load added to the ~2.35 mile 161 kV radial line section. Any potential solution considered that results in exceedance of the recommended TE index results in an additional consideration to reduce this index by providing multiple source supply to some portion of the load served from this radial tap line.

Due to the distribution loading and reliability concerns plus the transmission reliability issues discussed above, EKPC and ICE have determined to evaluate distribution substation alternatives to provide a holistic solution that addresses all concerns.

5.0 Alternative Plan Development

Preliminary alternatives to address the loading concerns on both the Lebanon substation transformer and the distribution circuit serving ICE customers in western Marion County were identified and evaluated holistically based on feasibility, expected performance, reliability improvement, and estimated cost. These alternatives considered were:

- Alternative 1: Build a new 161-25 KV, 12/16/20 MVA distribution substation near Metts Dr. (“Metts Drive Substation”) and retire the existing Lebanon distribution substation. The new substation will be served by building approximately 1.0 mile of radial 161 kV line from the existing South Marion County Industrial substation location to the location of the new substation. Construct a new 161 kV line section extending from the existing Marion County Industrial/South Marion County Industrial tap point on the Marion County-Green County 161 kV line approximately 2.3 miles to the Marion County Industrial substation location in order to loop the 161 kV line in or near the Marion County Industrial substation. .
- Alternative 2: Build a new 161-25 KV, 12/16/20 MVA distribution substation along Adam Hughes Memorial Hwy, south of Walmart (”Adam Hughes Highway Substation”). The new substation will

tap the existing Marion County Industrial/ South Marion County Industrial 161 KV tap line 1.6 miles southeast of the current tap point on the Marion County-Green County 161 kV line. Construct a new 161 kV line section extending from the existing Marion County Industrial/South Marion County Industrial tap point on the Marion County-Green County 161 kV line approximately 1.6 miles to the location of the new Adam Hughes Highway substation in order to loop the 161 kV line in or near this substation. The existing Lebanon substation remains in service, but approximately 7 MW of load would be transferred from the Lebanon substation to the new Adam Hughes Highway substation.

- Alternative 3: Build a new 161-25 KV, 12/16/20 MVA distribution substation along Miller Pike near the location where the EKPC Marion County – Green County 161 kV line crosses that roadway ("Miller Pike Substation"). The new substation will tap the Marion County-Green County 161 KV line approximately 0.85 mile west of the Marion County Industrial/ South Marion County Industrial 161 KV tap point. The existing Lebanon substation remains in service, but approximately 7 MW of load would be transferred from the Lebanon substation to the new substation.
- Alternative 4: Upgrade the existing 11.2/14 MVA Lebanon transformer with a 12/16/20 MVA transformer.
- Alternative 5: Construct a new 69-25 kV, 12/16/20 MVA distribution substation near Metts Dr. connected to the LG&E/KU Taylor County-Lebanon KU 69 kV line via a 0.94 mile 69kV radial from a new tap point that is 0.5 miles south of LG&E/KU's Lebanon South substation. Retire the existing Lebanon distribution substation.
- Alternative 6: Build two new 161-25 KV, 12/16/20 MVA distribution substations and retire the existing Lebanon distribution substation. One new substation would be along Adam Hughes Memorial Hwy, south of Walmart ("Adam Hughes Highway Substation") and would tap the existing Marion County Industrial/ South Marion County Industrial 161 KV tap line 1.6 miles southeast of the current tap point on the Marion County-Green County 161 kV line. The second new substation would be near the intersection of KY HWY 68 and Short Line Pike ("Short Line Pike Substation") and would tap the existing EKPC Marion County - Casey County 161 kV line approximately 2.6 miles from the Marion County switching station. Construct a new 161 kV line section extending from the existing Marion County Industrial/South Marion County Industrial tap point on the Marion County-Green County 161 kV line approximately 1.6 miles to the location of the new Adam Hughes Highway Substation in order to loop the 161 kV line in or near this substation.

5.1 Alternative 1

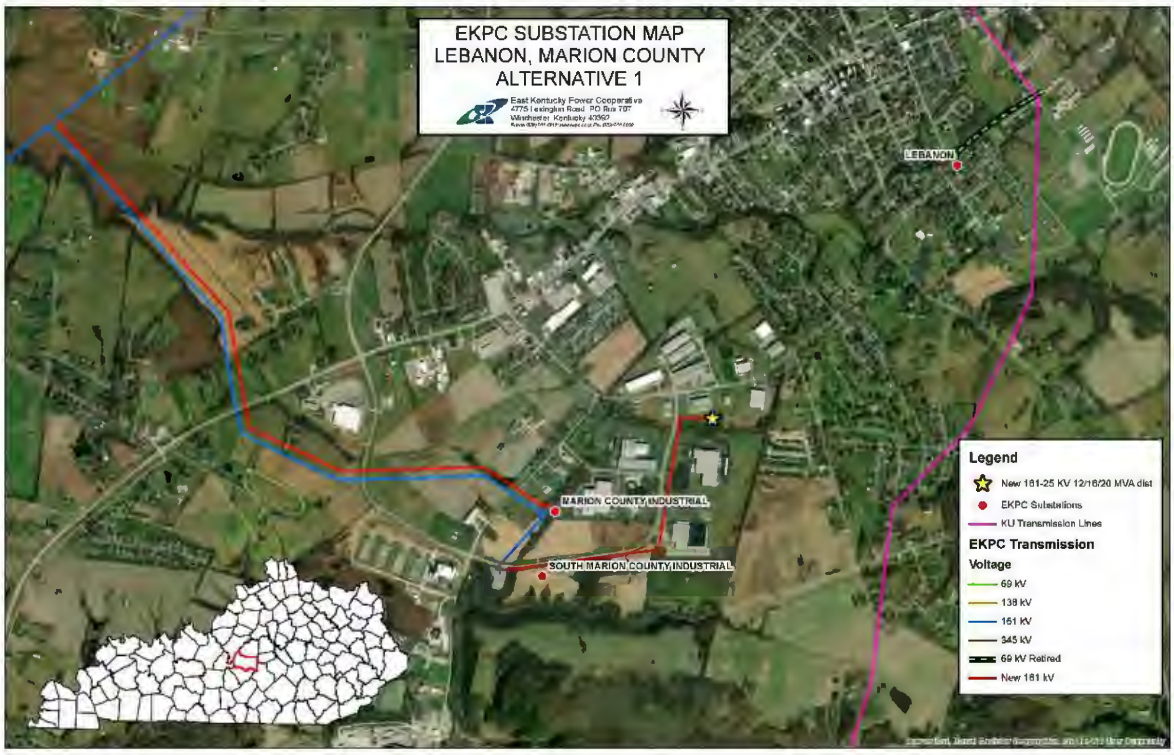
Alternative 1 proposes to construct a new 161-25kV, 12/16/20 MVA distribution substation ("Metts Drive Substation") near Metts Dr. on a green field site located approximately 1.0 mile southwest of the existing Lebanon substation. The new substation will be served by building a new radial 161kV line extending approximately 1.0 mile from the existing South Marion County Industrial substation location. Also, 2.3 miles of new 161 kV line section will be built from the existing Marion County Industrial/South Marion County Industrial tap point on the existing Marion County-Green County 161 kV line to loop in the Marion County Industrial substation in order to provide two-way transmission supply to that point. In addition, the existing Lebanon substation and associated interconnection with KU will be retired for this alternative. The following project components in Table 5.1 were identified for this alternative:

Table 5.1 Alternative 1 Projects

Alternative 1 Projects	Expected In-Service Date
Build a new 161-25 kV, 12/16/20 MVA distribution substation near Metts Dr.	2025
Construct a new 161kV line extension, extending from the South Marion County Industrial substation, estimated length is approximately 1.0 mile	2025
Construct a new 161kV line section from the Marion County Industrial/South Marion County Industrial tap point to loop into the Marion County Industrial substation, estimated length is approximately 2.3 miles	2025
Retire the existing Lebanon substation and associated 69kV interconnection with KU.	2025

The system configuration for Alternative 1 is shown in Figure 5.1.

Figure 5.1 Alternative 1 Configuration



5.2 Alternative 2

Alternative 2 proposes to construct a new 161-25kV, 12/16/20 MVA distribution substation along Adam Hughes Memorial Hwy, south of Walmart ("Adam Hughes Highway Substation") on a green field site located approximately 2.2 miles west of the existing Lebanon substation. The new substation will connect to the existing Marion County Industrial/ South Marion County Industrial 161 KV tap line approximately 1.6 miles southeast of the existing tap point on the Marion County-Green County 161 kV line. Also 1.6 miles of new 161 kV line section will be built from the existing Marion County Industrial/South Marion County Industrial tap point on the existing Marion County-Green County 161 kV line to loop the Marion County – Green County 161kV circuit into (or near) the new substation. The existing Lebanon substation will remain in service, but approximately 7 MW of load will be transferred to the new Adam Hughes Highway substation from the Lebanon substation. The following project components in Table 5.2 were identified for this alternative:

Table 5.2 Alternative 2 Projects

Alternative 2 Projects	Expected In-Service Date
Build a new 161-25 kV, 12/16/20 MVA distribution substation along Adam Hughes Memorial Hwy south of Walmart	2025
Construct a new 161kV line section from the Marion County Industrial/South Marion County Industrial tap point to loop into the new Adam Hughes Highway Substation, estimated length is approximately 1.6 miles	2025

The system configuration for Alternative 2 is shown in Figure 5.2.

Figure 5.2 Alternative 2 Configuration

5.3 Alternative 3

Alternative 3 proposes to build a new 161-25 KV, 12/16/20 MVA distribution substation on a green field site located approximately 3.6 miles west of the existing Lebanon substation, along Miller Pike ("Miller Pike Substation") near the location where EKPC's existing Marion County – Green County 161 kV line crosses that roadway. The new substation will tap the Marion County-Green County 161 KV line approximately 0.85 mile west of the existing Marion County Industrial/ South Marion County Industrial 161 KV tap point. The existing Lebanon substation will remain in service, but approximately 7 MW of load will be transferred to the new substation from the Lebanon substation. The following project components in Table 5.3 were identified for this alternative:

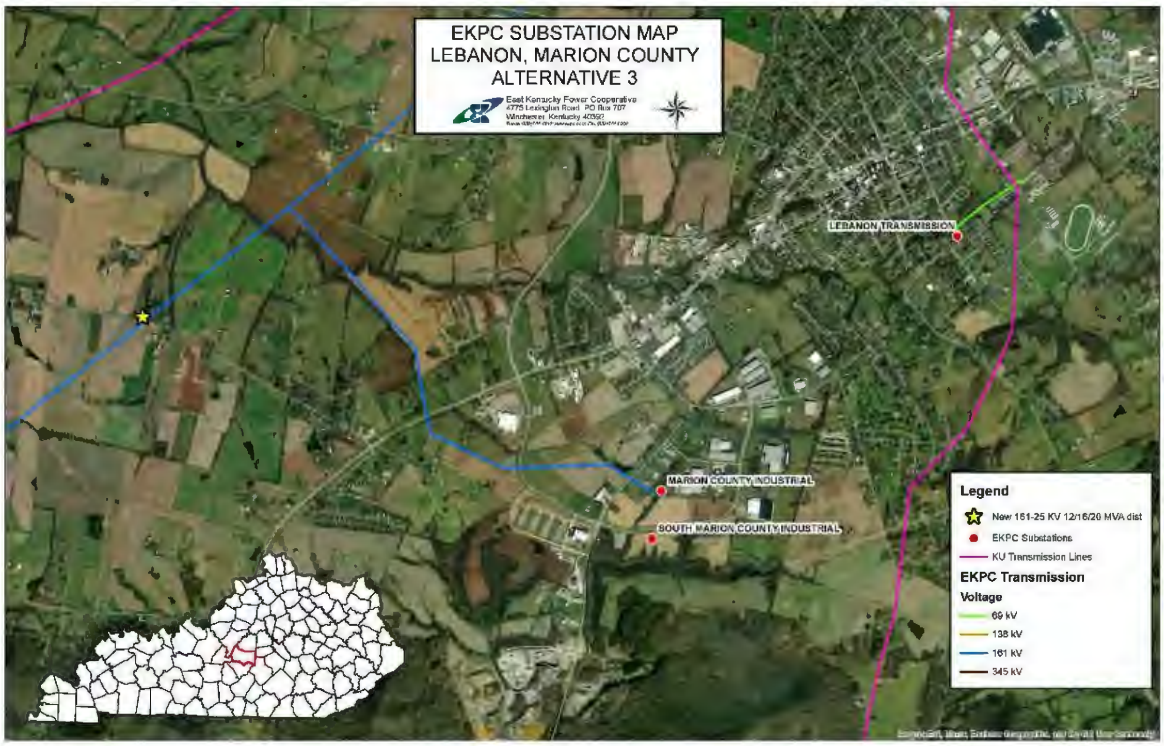
Table 5.3 Alternative 3 Projects

Alternative 3 Projects	Expected In-Service Date

Build a new 161-25 kV, 12/16/20 MVA distribution substation along Miller Pike ("Miller Pike Substation") near the EKPC 161 kV Marion County – Green County road crossing	2025

The system configuration for Alternative 3 is shown in Figure 5.3.

Figure 5.3 Alternative 3 Configuration



5.4 Alternative 4

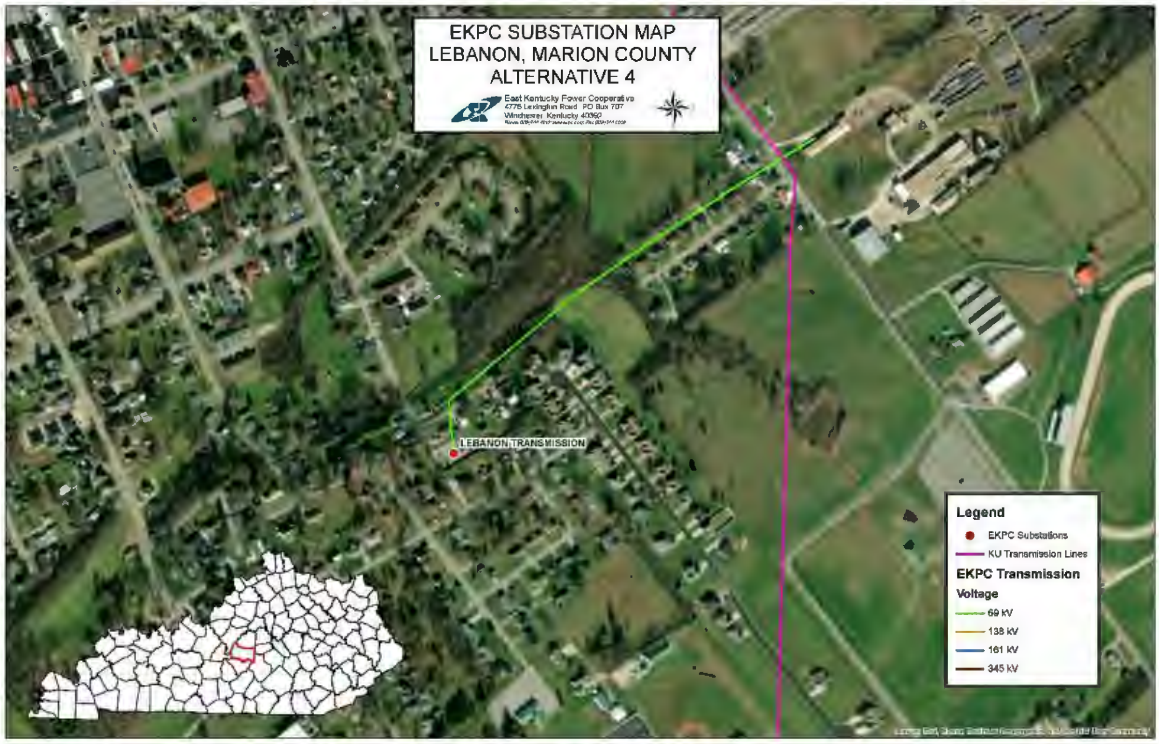
Alternative 4 proposes to upgrade the existing 11.2/14 MVA Lebanon substation transformer with a 12/16/20 MVA transformer, including necessary associated substation modifications. The following projects in Table 5.4 were identified for this alternative:

Table 5.4 Alternative 4 Projects

Alternative 4 Projects	Expected In-Service Date
Upgrade the existing 11.2/14 MVA Lebanon substation transformer with a 12/16/20 MVA transformer and associated substation modifications.	2025

The system configuration for Alternative 4 is shown in Figure 5.4.

Figure 5.4 Alternative 4 Configuration



5.5 Alternative 5

Alternative 5 proposes to construct a new 69 kV interconnection with KU and construct a new 69-25 kV, 12/16/20 MVA distribution substation near Metts Dr. ("Metts Drive Substation") on a green field site located approximately 1.0 mile southwest of the existing Lebanon substation. For this alternative the existing Lebanon distribution substation would be retired. The Metts Drive Substation will tap the existing LG&E/KU Taylor County - Lebanon KU 69 kV line approximately 0.5 mile south from the KU Lebanon South substation, and a new 0.94 mile radial tap line will be constructed. The following projects in Table 5.5 were identified for this alternative:

Table 5.5 Alternative 5 Projects

Alternative 5 Projects	Expected In-Service Date
Build a new 69-25 kV, 12/16/20 MVA distribution substation near Metts Dr. ("Metts Drive Substation") on a green field site.	2025
Construct a new 69 kV tap line from the KU Taylor County – Lebanon 69 kV line to the Metts Drive Substation (estimated length of 0.94 mi)	2025
Retire the existing Lebanon substation and associated 69kV interconnection with KU.	2025

The system configuration for Alternative 5 is shown in Figure 5.5.

Figure 5.5 Alternative 5 Configuration

5.6 Alternative 6

Alternative 6 proposes to construct two new 161-25kV, 12/16/20 MVA distribution substations on green field sites and retire the existing Lebanon substation and interconnection with LG&E/KU. One new substation would be along Adam Hughes Memorial Hwy, south of Walmart ("Adam Hughes Highway Substation"), located approximately 2.2 miles west of the existing Lebanon substation. This new substation would connect to the existing Marion County Industrial/ South Marion County Industrial 161 KV tap line approximately 1.6 miles southeast of the existing tap point of the Marion County-Green County 161 kV line. The second new substation would be near the intersection of KY HWY 68 and Short Line Pike ("Short Line Pike Substation"), located approximately 2.2 miles east of the existing Lebanon substation. This new substation would tap the Marion County – Casey County 161kV line approximately 2.6 miles from the Marion County substation. Also, approximately 1.6 miles of new 161 kV line section would be constructed from the existing Marion County Industrial/South Marion County Industrial tap point on the Marion County-Green County 161 kV line to the location of the new Adam Hughes Highway Substation in order to loop the 161 kV line into or near this substation. The following projects in Table 5.6 were identified for this alternative.

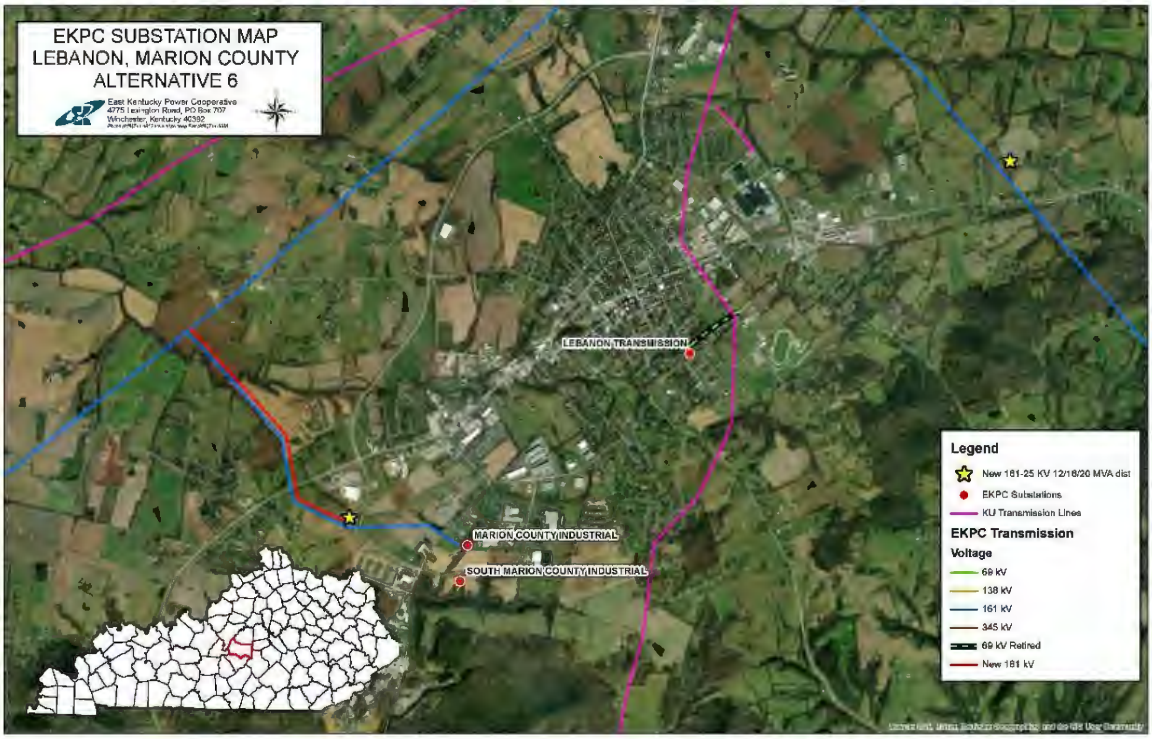
Table 5.6 Alternative 6 Projects

Alternative 6 Projects	Expected In-Service Date
Build two new 161-25 kV, 12/16/20 MVA distribution substations ("Adam Hughes Highway Substation" and "Short Line Pike Substation")	2025
Construct a new 161kV line section from the Marion County Industrial/South Marion County Industrial tap point to loop into the new Adam Hughes Highway Substation, estimated length is approximately 1.6 miles	2025

Retire the existing Lebanon substation and 69 kV interconnection with LG&E/KU.	2025

The system configuration for Alternative 6 is shown in Figure 5.6.

Figure 5.6 Alternative 6 Configuration



5.7 Other Considerations

Alternatives 1, 2 and 6 all include project components to loop in the radial supply line currently serving the existing Marion County Industrial and South Marion County Industrial substations. These alternatives were also considered without the loop in component; however, those permutations were eliminated from further consideration due to further degrading EKPC's ability to provide ICE members with reliable electric service as a result of exceeding the TE on the radial supply serving the existing substations plus the proposed new substation that would be connected to the radial 161 kV line in each of these alternatives. This 161 kV radial line tapped off the Marion County – Green County 161kV transmission circuit is currently approaching the maximum desired "load exposure" index ("TE") of 100 MW-miles without addition of any new substations/load to the radial line. Table 5.7 illustrates the current TE of the existing radial supply to these substations.

Table 5.7 Existing System TE

Substation	Peak Load (MW)	Radial Transmission Miles	MW-Miles	Total
Marion County Industrial	7.7	2.4	18.5	85.6
South Marion County Industrial	25.8	2.6	67.1	

By adding additional load to the Marion County Industrial/South Marion County Industrial 161 kV radial tap line in Alternatives 1, 2, and 6, the "load-exposure" index would be increased near or above the 100 MW-mile threshold, which increases both the likelihood and potential duration of interruptions due to a

single transmission contingency for ICE members in this part of Marion County. In addition, this configuration limits the ability to accommodate load growth on the substations supplied by this radial tap line when considering the TE index with load additions. The TE of each alternative without and with the loop-in component is listed in Table 5.8.

Table 5.8 TE of Additional Alternatives

Alt.	Substation	w/o loop-in				w/ loop-in				
		Peak Load (MW)	Radial Transmission Miles	MW-Miles	Total	Loop-in Miles	Peak Load (MW)	Radial Transmission Miles	MW-Miles	Total
1	Marion County Industrial	7.7	2.4	18.5	144.6	2.3	7.7	0.1	0.8	27.3
	South Marion County Industrial	25.8	2.6	67.1			25.8	0.2	5.2	
	Metts Dr.	16.4	3.6	59.0			16.4	1.3	21.3	
2	Marion County Industrial	7.7	2.4	18.5	96.8	1.6	7.7	0.8	6.2	32.0
	South Marion County Industrial	25.8	2.6	67.1			25.8	1	25.8	
	Adam Hughes Highway	7.0	1.6	11.2			7.0	0	0	
6	Marion County Industrial	7.7	2.4	18.5	96.8	1.6	7.7	0.8	6.2	32.0
	South Marion County Industrial	25.8	2.6	67.1			25.8	1	25.8	
	Adam Hughes Highway	7.0	1.6	11.2			7.0	0	0	

6.0 NITS Service via LG&E/KU Open Access Transmission Tariff ("OATT")

EKPC has approximately 60 substations served from the LG&E/KU transmission system as Network Loads taking Network Integration Transmission Service ("NITS") via the LG&E/KU OATT. These Network Loads require EKPC to financially compensate LG&E/KU for the use of its transmission system based on the actual load value served at each delivery point during the hour each month when all load served by the LG&E/KU transmission system peaks. The current posted charges associated with service for these loads can be seen in Table 6.1.

Table 6.1 NITS Rates (effective 6/1/2023)

NITS Rate ($/MW-month)	Schedule 1 ($/MW-month)	Schedule 2 ($/MW-month)	Total NITS Charge ($/MW-month)
$3,095.00	$89.06	$28.33	$3,212.39

These charges can be minimized or eliminated for one of these substations by shifting some or all load served by the substation from the LG&E/KU transmission system to the EKPC transmission system. When considering solution alternatives that result in different levels of Network Loads served from the LG&E/KU transmission system, EKPC factors in the NITS charges associated with the load for comparison purposes. The estimated annual charge is calculated using a 75% seasonal factor applied to a 50% load probability coincident peak forecast. The NITS rates listed in Table 6.1 above are applied to the load level at each delivery point at the time of the LG&E/KU system peak, which may not be coincident with the EKPC system peak. Therefore, EKPC assumes a 10% reduction to the forecasted substation peak load to account for diversification of EKPC loads from the LG&E/KU monthly system peak (90% diversification factor). An example annual NITS charge calculation for a 10 MW peak load served from the LG&E/KU transmission system can be seen in Figure 6.2.

Figure 6.2 Example NITS Calculation

$$Estimated\ Annual\ NITS\ Charge = 10MW * (\$3{,}212.39\ MW - month) * 0.75 * 0.90 * 12 = \$260{,}203.59$$

This annual cost is calculated beginning with the in-service year and totalized over a 30-year period using forecasted future loads and estimated annual increases in the LG&E/KU NITS charges. EKPC determines the compound annual growth rate of those NITS charges based on the historical growth rate of those charges when estimating these charges over the 30-year period. This allows EKPC to effectively quantify the relative costs/benefits of solutions that alter the amount of EKPC load served from the LG&E/KU transmission system.

7.0 Alternative Cost Estimate Comparison

The estimated total capital costs (2024 $), 30-year net present value cost (“NPV”) of LG&E/KU NITS charges for the Lebanon substation (2024 $) and 30-year NPV total cost (2024 $) dollars for the six alternatives considered to alleviate the Lebanon substation transformer and ICE distribution circuit loading concerns can be seen in Table 7.1 below. Additional breakdown of the estimated capital cost of each alternative is provided in Appendix A.

Table 7.1 Alternative Cost Comparison 2024 $’s (000s)

Alt.	Project Description	Estimated Capital Cost	Estimated 30-yr NITS NPV Cost	Estimated 30-yr NPV Total Cost

1	Build a new 161-25 KV, 12/16/20 MVA distribution substation near Metts Dr. ("Metts Drive Substation") and retire the existing Lebanon distribution substation. The new substation will be served by extending the South Marion County Industrial 161 KV tap line approximately 1.0 miles. Construct a new 161 kV line section extending from the existing Marion County Industrial/South Marion County Industrial tap point approximately 2.3 miles to the Marion County Industrial substation location.	$12,354	$0	$20,518
2	Build a new 161-25 KV, 12/16/20 MVA distribution substation along Adam Hughes Memorial Hwy south of Walmart ("Adam Hughes Highway Substation"). The new substation will tap the existing Marion County Industrial/ South Marion County Industrial 161 KV tap line approximately 1.6 miles southeast of the current tap point of the Marion County-Green County line. Construct a new 161 kV line section extending from the existing Marion County Industrial/South Marion County Industrial tap point approximately 1.6 miles to the new Adam Hughes Highway Substation. The existing Lebanon substation remains in service, but approximately 7 MW of load would be transferred from the Lebanon substation to the new Adam Hughes Highway Substation.	$9,894	$9,693	$26,183
3	Build a new 161-25 KV, 12/16/20 MVA distribution substation along Miller Pike ("Miller Pike Substation") near the EKPC 161 kV Marion County – Green County road crossing. The new substation will tap the Marion County-Green County 161 KV line approximately 0.85 mile west of the existing Marion County Industrial/South Marion County Industrial 161 KV tap point. The existing Lebanon substation remains in service, but approximately 7 MW of load would be transferred from the Lebanon substation to the new Miller Pike Substation.	$7,987	$9,693	$22,347
4	Upgrade the existing 11.2/14 MVA Lebanon substation transformer to a 12/16/20 MVA transformer and associated substation equipment modifications.	$4,626	$18,444	$25,107
5	Construct a new 69-25 kV, 12/16/20 MVA distribution substation near Metts Dr. ("Metts Drive Substation") and associated new 69 kV tap line (approximately 0.85 miles in length) connected to the LG&E/KU Taylor County-Lebanon KU 69 kV line at a new tap point that is 0.5 mile south of LG&E/KU's Lebanon South substation. Retire the existing Lebanon distribution substation.	$6,471	$18,444	$26,827
6	Build two new 161-25 KV, 12/16/20 MVA distribution substations and retire the existing Lebanon distribution substation. One new substation would be along Adam Hughes Memorial Hwy south of Walmart ("Adam Hughes Highway Substation") this new substation would connect to the existing Marion County Industrial/ South Marion County Industrial 161 KV tap line approximately 1.6 miles southeast of the existing tap point of the Marion County-Green County 161 kV line. The second new substation near the intersection of KY HWY 68 and Short Line Pike ("Short Line Pike Substation") would tap the Marion County - Casey Co 161 kV Line approximately 2.6 miles from the Marion County switching station. Construct a new 161 kV line section extending from the existing Marion County Industrial/South Marion County Industrial tap point approximately 1.6 miles to the new Adam Hughes Highway Substation location.	$17,245	$0	$26,225

Although Alternative 1 has the second highest total capital cost of the evaluated alternatives, it provides the most economical solution over a 30-year period when considering the reduced total operational cost due to eliminating the NITS charges for the Lebanon substation. Alternatives 2 through 5 each keep the Lebanon substation connection with the LG&E/KU transmission system, thereby requiring EKPC to continue to pay NITS charges for the power delivered to that substation, although some of these alternatives reduce the expected NITS charges by shifting some load from the Lebanon substation to a new substation that would be connected to the EKPC transmission system. Alternative 6 eliminates the NITS charges but has much higher total capital cost due to the construction of two new substations as opposed to only one in the other alternatives. For this reason, Alternative 1 allows EKPC and ICE to provide the most cost-effective solution to consumers in this area, and provides a holistic long-term approach to the issues present.

8.0 Conclusion

Considering the distribution-substation transformer loading concerns at the existing Lebanon substation (forecasted to overload in 2029), along with the ICE distribution feeder overload (as discussed in Section 4.1), a solution that addresses both problems is warranted. Addressing these concerns now positions EKPC and ICE to provided customers in this area of Marion County with reliable electric service in an economic manner. Providing ICE with a new delivery-point substation to the southwest of the existing Lebanon substation is a preferred solution to address the ICE distribution-circuit capacity concerns while preparing to serve additional electrical demand expected to manifest in the area.

EKPC's analysis shows that constructing a new substation served from the EKPC 161 kV Marion County-Green County transmission line (via the existing Marion County Industrial/South Marion County Industrial tap line) near Metts Drive provides the most economical solution to address the loading concerns of both EKPC and ICE, while enhancing reliability of service to consumers in the area. Transitioning the load served from the Lebanon substation from the LG&E/KU transmission system to EKPC's transmission system reduces necessary coordination between transmission operators during system maintenance and restoration operations, and eliminates the reliance on a foreign utility to provide transmission service to this ICE delivery point. In addition, serving the load from the EKPC transmission system significantly reduces the operational cost associated with the Lebanon substation by removing its NITS charges.

Furthermore, locating a new substation near Metts Drive relocates the existing substation outside of a residential neighborhood and allows for greater access to the site for both EKPC and ICE during system maintenance and restoration activities. This in turn provides ICE with the ability to better distribute load across its distribution feeders and enhance protection device coordination and reliability for its customers by eliminating the need to construct an additional distribution feeder in the heavily congested shared right of way along KY HWY 49 between Metts Drive and Country Club Drive as discussed in Section 4.1.

Therefore, EKPC Transmission Planning recommends constructing a new 161-25 KV, 12/16/20 MVA distribution substation near Metts Dr. and approximately 1.0 mile of 161 kV transmission line to serve the Metts Dr. substation, and retire the existing Lebanon distribution substation. Also, construction of a new 161 kV line section extending from the existing Marion County Industrial/South Marion County Industrial tap point, approximately 2.3 miles to the Marion County Industrial substation location to

reduce the TE of the existing radial tap line is recommended in order to avoid degrading reliability of service to the substations that will be served from this radial tap line.

Appendix

A. Estimated Capital Cost (000s)

Table A.1 Alternative 1 Cost Breakdown

Associated Project Description	Estimated Capital Cost (2025$)	Estimated 30-yr NPV (2024$)
New 161/25 kV, 12/16/20 MVA distribution substation on green field site near Metts Drive ("Metts Drive Substation").	$6,176	$8,246
Construct a 161 kV tap line extension from the Marion County Industrial/South Marion County Industrial tap line to the new Metts Drive Substation using 556 ACSR conductor operating at a temperature of 212 degrees F. (~1.0 mi)	$1,665	$3,349
Construct a new 161 kV line section from the existing Marion County Industrial/South Marion County Industrial tap point, extending to the Marion County Industrial Substation location, using 795 ACSR conductor operating at a temperature of 212 degrees F. (~2.3 mi)	$3,830	$7,702
Install a new 161 kV switch at the tap point for the new Metts Drive Substation	$297	$597
Retire the existing Lebanon Substation	$121	$115
ICE Distribution Cost associated with the new Metts Drive Substation	$242	$487
Retire the exiting 69kV tap line into Lebanon Substation	$23	$22
Total	$12,354	$20,518

Table A.2 Alternative 2 Cost Breakdown

Associated Project Description	Estimated Capital Cost (2025$)	Estimated 30-yr NPV (2024$)
New 161/25 kV, 12/16/20 MVA distribution substation on green field site near Adam Hughes Memorial Highway ("Adam Hughes Highway Substation").	$6,176	$8,246
Transmission line loop-in work to route the existing Marion County Industrial/South Marion County Industrial tap line into the new Adam Hughes Highway Substation.	$811	$1,632
Construct a new 161 kV line section from the existing Marion County Industrial/South Marion County Industrial tap point, extending to the new Adam Hughes Highway Substation location, using 795 ACSR conductor operating at a temperature of 212 degrees F. (~1.6 mi)	$2,664	$5,358
ICE Distribution Cost associated with the new Adam Hughes Highway Substation	$242	$487
Lebanon Substation continued O&M costs	N/A	$688
EKPC NITS Charges for the existing Lebanon substation	N/A	$9,693
Lebanon 69kV Tap line continued O&M Cost	$94	$79
Total	$9,894	$26,183

Table A.3 Alternative 3 Cost Breakdown

Associated Project Description	Estimated Capital Cost (2025$)	Estimated 30-yr NPV (2024$)
New 161/25 kV, 12/16/20 MVA distribution substation on green field site near Miller Pike ("Miller Pike Substation").	$6,176	$8,246
Transmission line loop-in work to route the existing Marion County-Green County 161 kV line into the new Miller Pike Substation.	$811	$1,632
ICE Distribution Cost associated with the new Miller Pike Substation	$999	$2,009
Lebanon Substation continued O&M costs	N/A	$688
EKPC NITS Charges for the existing Lebanon substation	N/A	$9,693
Lebanon 69kV Tap line continued O&M Cost	$94	$79
Total	$7,987	$22,347

Table A.4 Alternative 4 Cost Breakdown

Associated Project Description	Estimated Capital Cost (2025$)	Estimated 30-yr NPV (2024$)
Rebuild the existing Lebanon substation to the EKPC standard 12/16/20 MVA substation.	$3,778	$4,191
ICE Distribution Cost associated with maintaining the existing Lebanon distribution substation delivery point	$848	$1,705
Lebanon Substation continued O&M costs	N/A	$688
EKPC NITS Charges for the existing Lebanon substation	N/A	$18,444
Lebanon 69kV Tap line continued O&M Cost	$94	$79
Total	$4,626	$25,107

Table A.5 Alternative 5 Cost Breakdown

Associated Project Description	Estimated Capital Cost (2025$)	Estimated 30-yr NPV (2024$)
New 69/25 kV distribution substation on green field site near Metts Drive ("Metts Drive Substation").	$4,238	$5,659
Construct a new 69 kV tap line from the KU Taylor County – Lebanon 69 kV line (~0.85 mi) using 266 ACSR conductor operating at a temperature of 212 degrees F.	$834	$1,113
KU installs a three-way 69 kV switch at the connection point for the new tap line to the Metts Drive Substation	$1,035	$986
Retire the existing Lebanon Substation	$121	$115
Retire the exiting 69kV tap line into Lebanon Substation	$23	$22

ICE Distribution Cost associated with the new Metts Drive Substation	$242	$487
EKPC NITS Charges for the new Metts Drive substation.	N/A	$18,444
Total	$6,471	$26,827

Table A.6 Alternative 6 Cost Breakdown

Associated Project Description	Estimated Capital Cost (2025$)	Estimated 30-yr NPV (2024$)
New 161/25 kV, 12/16/20 MVA distribution substation along Adam Hughes Memorial Hwy, south of Walmart ("Adam Hughes Highway Substation"), located approximately 2.2 miles west of the existing Lebanon substation.	$6,176	$8,246
New 161/25 kV, 12/16/20 MVA distribution substation near the intersection of KY HWY 68 and Short Line Pike ("Short Line Pike Substation"), located approximately 2.2 miles east of the existing Lebanon substation.	$6,176	$8,246
Transmission line loop-in work to bring the existing transmission line into the "Adam Hughes Highway Substation"	$811	$1,632
Transmission line loop-in work to bring the existing transmission line into the "Short Line Pike Substation"	$811	$1,632
Construct a new 161 kV line section from the existing Marion County Industrial/South Marion County Industrial tap point, extending to the new Adam Hughes Highway Substation location, using 795 ACSR conductor operating at a temperature of 212 degrees F. (~1.6 mi)	$2,664	$5,358
ICE Distribution Cost associated with the "Adam Hughes Highway Substation"	$242	$487
ICE Distribution Cost associated with the "Short Line Pike Substation"	$242	$487
Retire the existing Lebanon Substation	$121	$115
Retire the exiting 69kV tap line into Lebanon Substation	$23	$22
Total	$17,245	$26,225