Schedule DS-01

ROUTING STUDY

Limestone Ridge Transmission Line

April 2021

Prepared for:

Ameren Transmission Company of Illinois

By

HDR, Engineering Inc.

Schedule DS-01

Table of Contents

List of Figures

List of Tables

List of Appendices

A. List of Data Sources
B. Permit Matrix
C. State and Federally List Species
D. Detailed Proposed Route Maps

1. Introduction and Project Description

The Limestone Ridge Transmission Line (the Transmission Line) is a 138-kilovolt (kV) electric transmission line that will connect the new Wittenberg Substation in Perry County with the new Whipple Substation in Cape Girardeau County. The Transmission Line and the new substation in Cape Girardeau County are referred to as the Limestone Ridge Project (the Project).

HDR Engineering, Inc. (HDR), on behalf of Ameren Transmission Company of Illinois (ATXI), prepared this routing study to document the process used to identify the Proposed Route for the Project. The process was undertaken by the "Routing Team," which comprised staff from both HDR and ATXI. The Routing Team was composed of a diverse group of professionals from the following technical disciplines: environmental, stakeholder outreach, engineering, system planning, real estate, and construction.

2. Overview of Integrated Route Selection and Stakeholder Outreach Process

Starting in March 2020, the Routing Team began the integrated route selection and stakeholder outreach process for the Project. A strategic communication and outreach plan was developed in early 2020. It created a foundation for the Routing Team to pursue an open stakeholder outreach effort, providing numerous opportunities for landowners, community representatives, agencies, and non-governmental organizations to be involved in the routing process.

The integrated route selection and stakeholder outreach process was an iterative process with successive phases of routing analysis and outreach that began with a large geographic area and broad stakeholder involvement. As route development progressed, the affected geography and stakeholders were continually refined, and with each refinement, the level of analysis became more detailed.

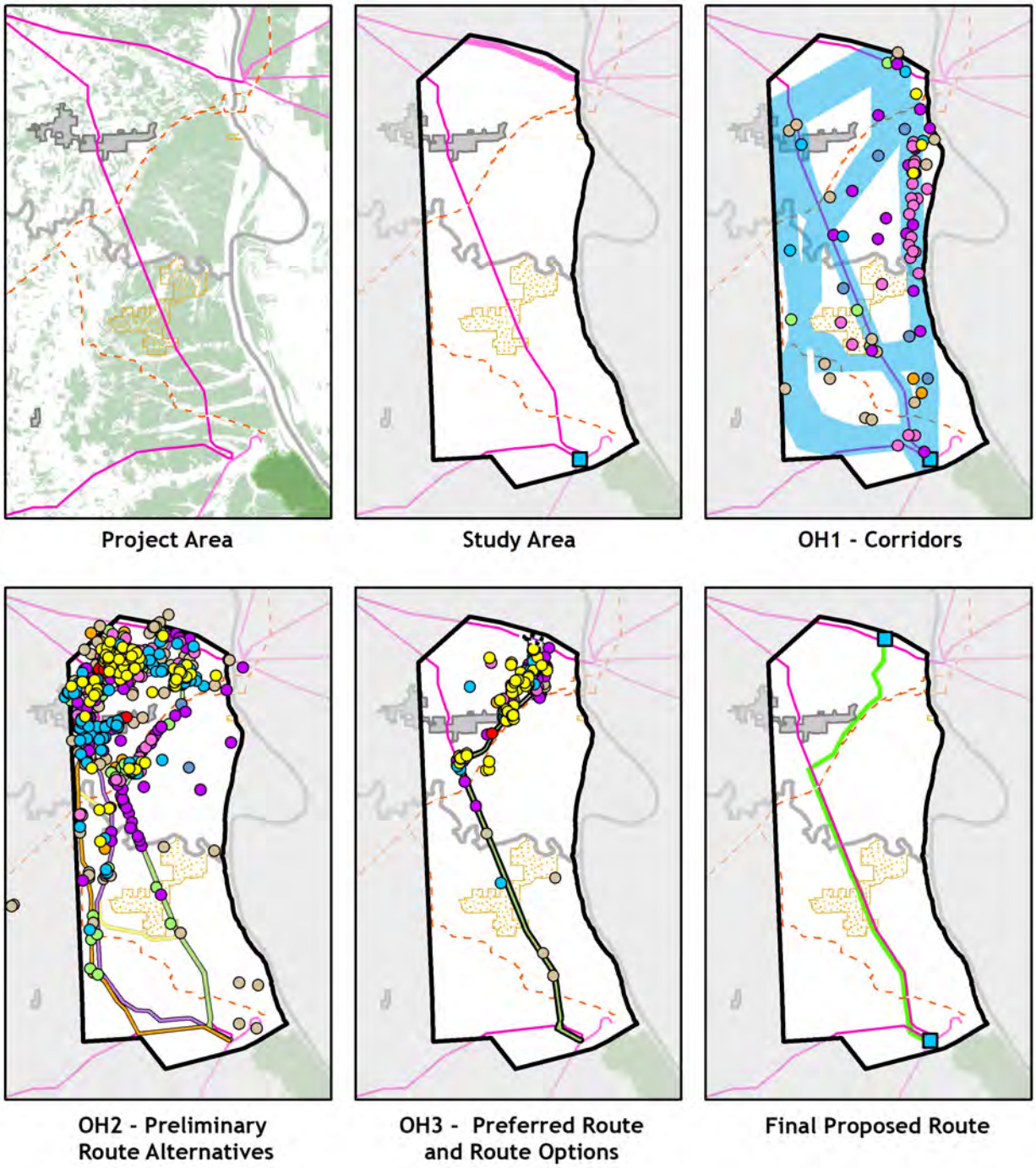
The phases of the route selection process included the following:

1. Study Area Identification,
2. Potential Route Corridor Development
3. Potential Route Alternative Identification
4. Proposed Route Identification.

ATXI held a Community Representative Form (CRF) between the Project Area Identification and Potential Route Corridor Development. ATXI then held three rounds of Open Houses between the Potential Route Alternative Identification and Proposed Route Identification phases. Figure 1 depicts the phases of route selection and stakeholder outreach.

The Proposed Route is the route that the Routing Team believes optimally meets the Routing Criteria by best minimizing potential impacts to Sensitivities, taking advantage of Opportunities, and adhering to Technical Guidelines and Statutory Requirements.

Figure 1. Integrated Route Selection and Stakeholder Outreach Process



3. Route Selection Process

3.1 Overview of Route Selection Process

The phases of the route selection process detailed in this study are as follows:

1. Study Area Identification - The Routing Team identified the Project Area through delineation of an area between the Project endpoints that would allow for a study of a geographically diverse range of potential routes. The Study Area was shared with agencies at the CRF meeting June 2020.
2. Potential Route Corridor Development – narrowed corridors were developed that utilize opportunities and removed areas where transmission line development was not feasible. These corridors were shared with agencies and public (open house1) in August 2020 for input.
3. Potential Route Alternative Development - An extensive network of route segments was identified largely within the route corridors. The route segments were then comparatively evaluated to identify the most advantageous segments. Potential Route Alternatives were identified by creating end-to-end routes from the remaining route segments. The Potential Route Alternatives were generally 600 feet wide. ATXI solicited feedback on the Potential Route Alternatives from community representatives, landowners, and other stakeholders at the targeted agency meetings and Open Houses in Oct 2020. Comments received at these meetings and through other outreach tools were considered by the Routing Team during the next stage of route development.
4. Proposed Route Development - A final route with several potential route options was developed based on feedback from stakeholders and members of the public. An attempt was made to minimize impacts to sensitivities while providing an economically feasible route. The final route with options was shared with agencies and public (open house3) in January 2021.
5. Final Route Identification - The Routing Team considered comments received; and refined and finalized the Proposed Route.

3.2 Routing Criteria

The Routing Team developed the Routing Criteria for the Project based on previous transmission line experience, ATXI standards and policies, federal and state regulations, and stakeholder feedback. The Routing Criteria guided the route selection process. The following are definitions of key terms related to the Routing Criteria.

- Sensitivities – Natural or man-made environmental resources or conditions that might limit transmission line development. Some Sensitivities are subject to licensing or permitting requirements, or regulatory restrictions (e.g., nature preserves), while others present challenges that would be very difficult or impractical to mitigate (e.g., restricted airspace around public airports). Not all Sensitivities are equally affected by the development. Sensitivities include, for example, the following: land use constraints such as residences, agriculture, religious facilities, and schools; federal, state, and local environmental areas; other environmental areas such as sensitive habitats or areas identified by private conservation organizations; cultural resources such as national landmarks and

archaeological sites; and public infrastructure such as airports, and aeronautical and commercial telecom structures.

- Opportunities – Pre-existing linear infrastructure or features such as existing linear corridors (existing rights-of-way, roads, transmission lines, and public land survey system divisions of land) along which transmission line development is potentially compatible and where impacts to Sensitivities may be reduced by following these features.
- Technical Guidelines – The specific engineering, cost, and construction-related requirements and objectives of the Project (e.g., minimizing the length of the line and minimizing the number of dead-end structures).
- Statutory Requirements – The approvals, licenses, or permits required by law for engaging in a certain activity. An example of a permit required by law is the requirement for a permit from the U.S. Army Corps of Engineers for impacts to wetlands or waters of the U.S.
- Measures – The metrics used to assess impacts to individual Sensitivities, utilization of specific Opportunities, and assessments of impacts relevant to the Technical Guidelines. A Sensitivity, Opportunity, Technical Guideline, or Statutory Requirement may have only one or a range of Measures.
- Routing Criterion – An objective that helps to minimize impacts to a Sensitivity, maximize the use of an Opportunity, or adhere to a Technical Guideline or Statutory Requirement. A Routing Criterion is generally evaluated through the use of one or a range of Measures. For example, a Routing Criterion with the goal of minimizing impacts to residences (a Sensitivity) has Measures of the number of residences within 75 feet, 150 feet, 300 feet, 500 feet, and 1,000 feet of the potential route centerline.
- Routing Criteria – The total body of the entire Routing Criterion (goals and Measures as related to the Sensitivities, Opportunities, and Technical Guidelines) contemplated together and used for judgment in determining a preference for any route. Although the Measures of each Routing Criterion are quantitative, the evaluation of (potentially competing) criteria against each other is generally qualitative and is inherently specific to a particular project area.

The list of Sensitivities, Opportunities, and Technical Guidelines developed by the Routing Team for the Project are included in Table 1.

Not all Sensitivities listed in Table 1 are present in the Project Area. Listing a feature as a Sensitivity does not imply that it must be avoided but that minimizing impacts to a Sensitivity is a goal of the routing process. The total list of Routing Criteria was not static throughout the process; rather, the Routing Team considered additional Sensitivities throughout the process identified by stakeholders.

Opportunities were reviewed for the Project and considered in conjunction with potential Sensitivities. In some areas, existing linear infrastructure offered corridors along which a transmission line might be located with less disruption to the natural and human environment. In other areas, opportunities to parallel existing right-of-way (ROW) did not offer pathways in the direction desired, were too narrow or irregular in width and direction, or were surrounded by relatively high concentrations of other Sensitivities. For example, high concentrations of Sensitivities are typically found in urban areas.

Technical guidelines are also specific to each project. The Technical Guidelines provided the Routing Team with technical limitations related to the design, ROW requirements, or reliability

concerns. The Technical Guidelines for the Project, which are listed in Table 1, were identified through 1) technical expertise of Ameren staff responsible for the reliable and economic construction, operation, and maintenance of the Project, and other electric system facilities; 2) applicable codes and standards, including the National Electrical Safety Code (NESC); 3) North American Electric Reliability Corporation (NERC) reliability standards; and 4) Ameren and industry best practices.

Table 1. Sensitivities, Opportunities, and Technical Guidelines

Sensitivity	
General Land Use and Land Cover	
Residences	Irrigation Systems
Non-Residential Buildings and Structures	Mines / Quarries / Karsts / Caves
Parcels and Landowners	Planned Development (county / city plans)
Aerial Fertilizer and Herbicide Application Ability	Private Airports / Airstrips
Agricultural Land and Conflicts	Public Airports / Heliports
Cemeteries	Recreation Areas
Commercial / Industrial Development	Religious Facilities
Communication Towers	Safety Regulations (fireworks manufacturers, gas stations, other electrically sensitive areas)
Contaminated Areas	Scenic Byways
Daycares	Schools
Forest and Commercial Timber	Sensitive Crops (e.g., organic farms, orchards, etc.)
Grassland	USDA Classified Farmland (prime farmland)
Hospitals	VOR (aeronautic navigation facilities – clear zone)
	Wells (oil and gas, water)
Federal / State / County Lands and Resources	
Missouri Department of Conservation	National Wild and Scenic Rivers
Forest Preserves or Conservation Opportunity Areas	Prairie Restoration Areas
US Fish and Wildlife Service	
Non-Governmental Organization (NGO) Lands and Conservation Areas	
Conservation Areas (e.g., The Nature Conservancy, Sierra Club, local conservation organizations)	Resource Easement Lands
Sensitive Habitat, Critical Habitat, and Protected Species	
Threatened, Endangered, and Special Status Species (known occurrence areas and habitat)	Designated Critical Habitat
Water Resources	
Rivers / Streams / Creeks (impaired or otherwise)	Water Bodies (Lakes / Ponds / Reservoirs)
Flood zone	Wetlands
Cultural Resources	
National Register of Historic Places (listed)	National Natural or Historic Landmarks
Known Archaeological Sites	Traditional Cultural Properties
Historic Sites, Buildings, and Structures	Burial Areas (prehistoric or historic)
Historic Landscapes / Trails	
Opportunities	
Roads	Pipelines
Railroads	Property Lines
Transmission Lines	Field Lines
Public Land Survey System (section lines, half section lines, etc.)	
Technical Guidelines	
Minimize route length	Minimize crossing of existing transmission lines

Ensure adequate access for construction and maintenance activities	Minimize impractical construction requirements (e.g., steep slopes)
Comply with horizontal and vertical clearance requirements	Minimize non-standard designs
Maintain required or sufficient setbacks from roads and highways	Minimize underbuild or double circuit arrangements with existing electrical infrastructure
Minimize dead-end and angle structures	Minimize and maintain sufficient setback from pipelines

3.3 Data Collection

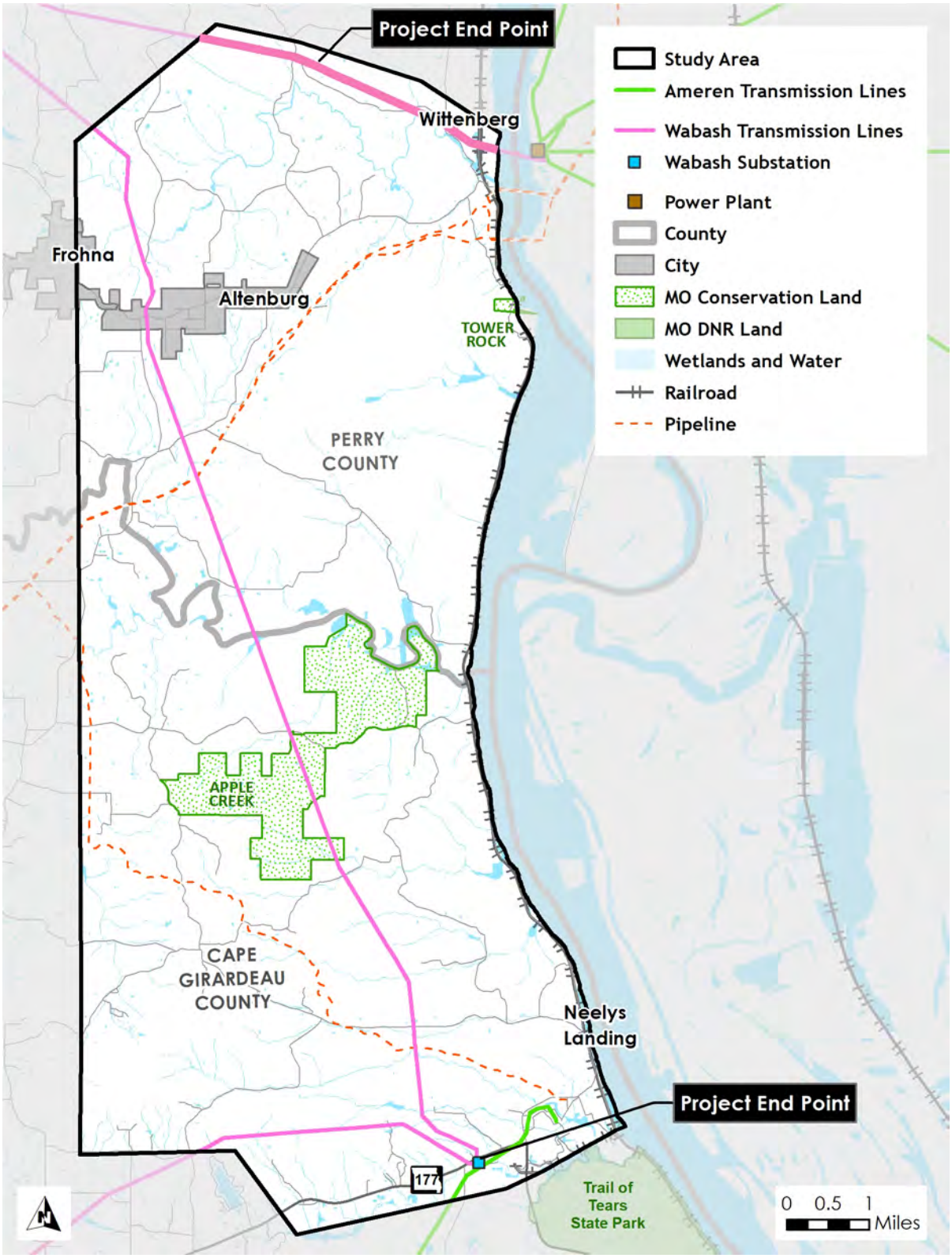
The Routing Team started collecting data in March 2020 to identify Sensitivities and Opportunities, and to better understand the Project Area. Data collection was an ongoing effort throughout the route selection process. Sources included online repositories; federal, state, and local agencies; aerial photo interpretation; field reconnaissance; and stakeholder comments. Field reconnaissance was conducted from public roads throughout the route selection process. Appendix A includes a list of data collected for the Project and the data sources.

3.4 Study Area Identification

The Routing Team identified the Project Area through delineation of an area between the Project endpoints that would allow for a study of a geographically diverse range of potential routes. The Project endpoints include a new substation (Wittenberg) near Wittenberg, Missouri along an existing 138 kV line (sited by WVPA), and new substation (Whipple) adjacent to Ameren's Trail of Tears substation in Cape Girardeau County. The two Project endpoints generally form the north and south boundaries of the Project Area. The eastern extent of the Project Area extends along the Mississippi River. The western extent of the Project Area extends north south approximately 5-7 miles west of the Mississippi River. The western extents were delineated to allow for identification of a potential routes that avoid crossing Apple Creek Conservation Area while also balancing the tradeoff of creating potential routes that would backtrack (e.g., proceed west then from Wittenberg, back east to Whipple) and be significantly longer than others. Significantly longer routes typically have a higher potential for impacts to Sensitivities and are typically more expensive to construct. The Study Area is approximately 6.6 miles by 14.7 miles (72 square miles). The Study Area is depicted in Figure 2.

Following the identification of the Study Area, ATXI and the Routing Team held a virtual Community Representative Forum (CRF) to introduce the Project to key stakeholders and solicit information from them as it relates to the Routing Criteria and Study Area. In particular, the Routing Team sought information about Sensitivities and potential routing Opportunities in the Project Area. The CRFs are discussed in more detail in The Outreach Summary attached to Emily Hyland's Outreach Testimony.

Figure 2. Study Area



3.5 Potential Route Corridor Development

Route Corridors were developed using a Geographic Information System (GIS) to overlay Opportunities (e.g., roads, transmission lines, section lines, and property lines) and Sensitivities (e.g., residences, airports, streams, and wetlands). The Routing Team focused the development of the route corridor in areas that provided Opportunities, minimized length and cost and minimized potential impacts to existing sensitivities.

Figure 2 depicts the areas that were initially considered for route corridors within the Study Area. The corridors took advantage of existing opportunities (roads, railroads, pipelines, etc..) while eliminating some areas where there was a concentration of known Sensitivities and no Opportunities. Area eliminated included:

- Central parts of Cape Girardeau County area – concentration of homes and no feasible Opportunities, and large tracts of Apple Creek Conservation Area not adjacent to existing Opportunities
- Areas within and adjacent to Altenburg – concentration of residences and building associated with the city

During Route Corridor Development, the northern substation location was not fixed, and the Routing team considered routes along the existing 138 kV line.

After initial agency review, further routing team review and a more specific northern endpoint determination, Ameren removed areas from consideration. These areas have high concentration of sensitivities or the opportunities that are present and were found not be feasible alternatives. Areas removed included:

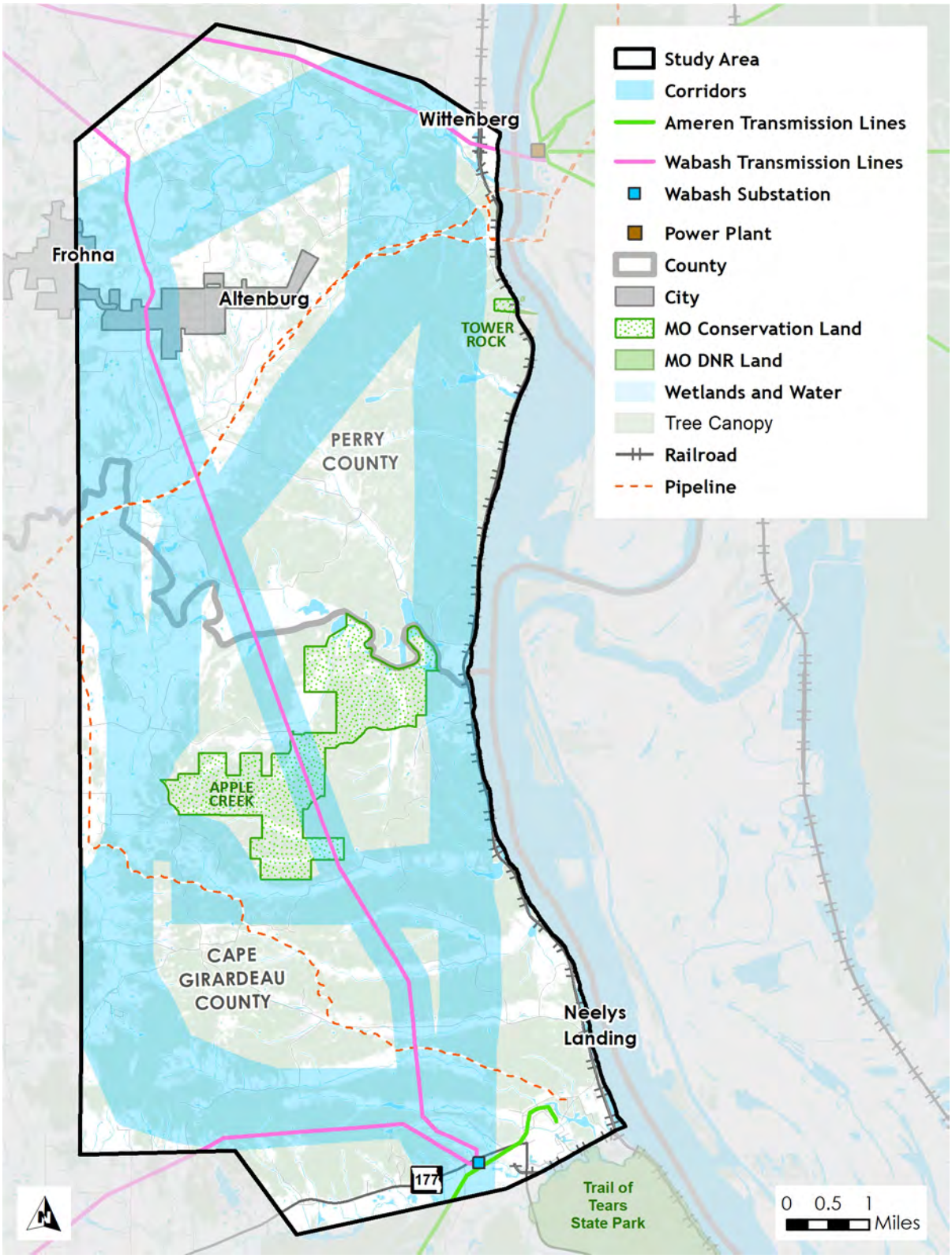
- The far eastern edge near the railroad that follows the Mississippi River was removed from consideration due to steep terrain and proximity to the river and sensitive resources
- Far southern section – opportunities are not feasible given the residences and increased length
- Far northwest section – few opportunities and the area was deemed not feasible after the substation location was defined
- Areas along the pipeline south of Altenburg – this area was removed during this phase but was added back in later after additional routing information was collected.

Figure 3 depicts the three general route corridors, with several crossover corridors that were developed. The corridors were generally one mile wide and provided some opportunities while attempting to minimize known sensitivities. Areas close to the Mississippi River were removed due to terrain, sensitive species and visual impacts.

The East Corridor would provide the shortest path between the two endpoints, but also includes more forested and high slope areas, more potential for sensitive species and important bid habitat associated with the Mississippi River Migratory Flyway. It is closer to the Mississippi River and has few existing opportunities to utilize. It has the fewest residences of all the corridors

The Central corridor generally follows an existing 69 kV line which runs southeast to Northwest through the Study Area. The existing transmission line provides an existing opportunity to follow which would decrease the impacts to the existing landscape and not create a new break in the

Figure 3. Corridors



forest. The area is still heavily forested especially in the southern two-thirds of the Study Area. In addition, the central corridor would pass through the City of Altenburg and more dense residential areas.

The West Corridor goes west from the south endpoint then north along the western edge of the Study area. The corridor has less forested and high slope areas Sensitivities and does have some existing roads Opportunities that are generally aligned in a north/south direction. However, this corridor has more residences and farms and would run between Frohna and Altenburg.

3.6 Proposed Route Alternative Development

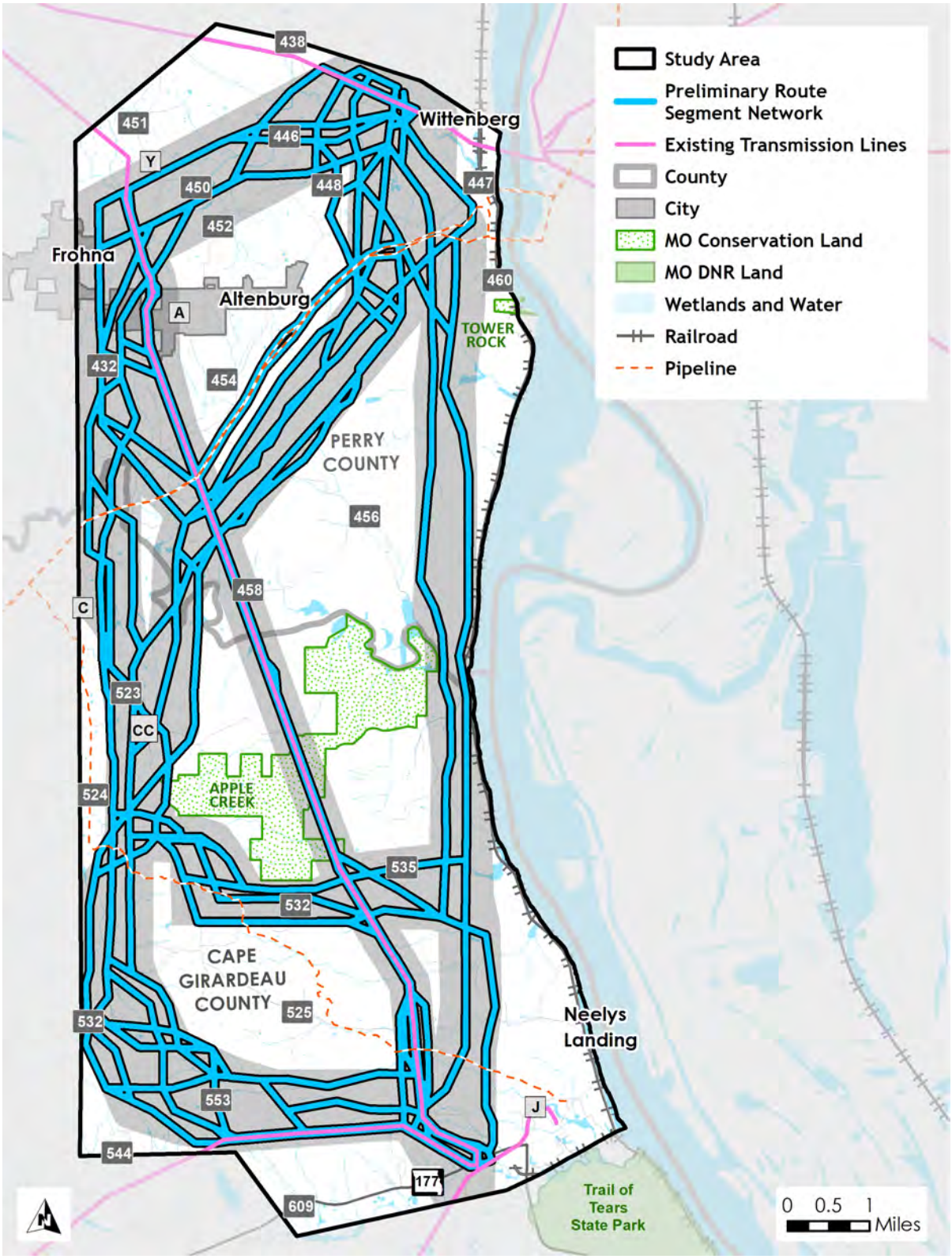
3.6.1 Route Segment Network Identification

After the Proposed Route Corridors were identified and information solicited from stakeholders at the 1st open house in August, the next step in the route selection process was to identify an extensive network of route segments within the Project Area and route corridors in which numerous potential routes could be compared and evaluated.

This process involved using a Geographic Information System (GIS) to overlay Opportunities (e.g., roads, transmission lines, section lines, and property lines) and Sensitivities (e.g., residences, airports, streams, and wetlands). The Routing Team focused the development of the route segment network in areas that provided numerous Opportunities while also having lower concentration of Sensitivities. If certain Opportunities were oriented in a direction that conflicted with the Project direction (i.e., southwest to northeast), they were usually not included in the route segment network. Municipalities were often not included as these areas typically have a high concentration of Sensitivities. Where routes intersected, or where the type of Opportunity the route paralleled changed, a node was established. The portion of a route in between each node is called a “route segment.” In some instances, route segments were included that did not follow an Opportunity if that segment would allow for a straighter route or appear to have a potential to minimize overall impacts to Sensitivities.

Figure 4 depicts the more than 476 route segments that were identified for the route segment network. In general, route segments were identified throughout most of the route corridors. Route segments within the eastern corridor were dropped due to high concentration of sensitivities sensitive species, forest resources, steep topography and proximity to the Mississippi River and Tower Rock.

Figure 4. Route Segment Network



3.6.2 Preliminary Route Alternative Identification

Once the route segment network was identified, the Routing Team then performed an analysis of potential impacts associated with the route segments. Measures were used to comparatively assess the potential impacts of each of the route segments. The first step at this stage was to compare groups of smaller routes (contiguous route segments typically two to five miles in overall length) that had common start and end points.

The routes that best minimized potential impacts to Sensitivities and best met the Routing Criteria in these comparisons were carried forward, and the other(s) were removed from further consideration.

This comparative evaluation of routes continued until the route segment network was reduced to the best routes remaining across the Project Area. In general, this included three routes (Green, Purple and Orange) in a north-south direction across the Project Area, with connector segments in various locations. The route connectors provided ability to use a portion of one of the preliminary route alternatives and switch to another route as the Routing Team received additional data.

These Potential Route Alternatives that were carried forward for further review were presented to stakeholders and landowners (as 600 ft wide corridors) during the Phase 2 Open Houses and agency outreach.

Areas removed from consideration included:

- The eastern corridor was removed from consideration and no preliminary route alternative was a carried forward due limited access for construction and maintenance, heavily contiguous forested habitat, very steep terrain, and concerns raised from both Federal and State resource agencies to a route close to the Mississippi River.
- The Existing 69 kV corridor was removed just north of the intersection of Highway C and PCR 432 because of the proximity of homes and other development where the corridor traverses the City of Altenburg.

Table 2 shows general route statistics related to the defined route alternatives. Figure 5 depicts the Potential Route Alternatives. General characteristics of the routes are as follows:

- **Green Route**
  - Shorter
  - Follows the existing transmission line and generally follows an existing pipeline
  - Crosses the Apple Creek Conservation area
  - More forest impacts
  - Steeper terrain
  - Fewer road crossed
- **Purple Route**
  - Longer than the Green Route
  - No significant following of existing infrastructure
  - Avoids Apple Creek Conservation Area
  - Closer to more populated areas and homes
  - Less steep terrain
  - Close to an existing heliport along Hwy C between Cities of Altenburg and Frohna

- **Orange Route**
  - Longer than the Green Route
  - No significant following of existing infrastructure
  - Avoids Apple Creek Conservation Area
  - Closer to more populated areas and homes
  - Community concern for proximity to heliport between Cities of Altenburg and Frohna
  - More Prime or State Farmland soils

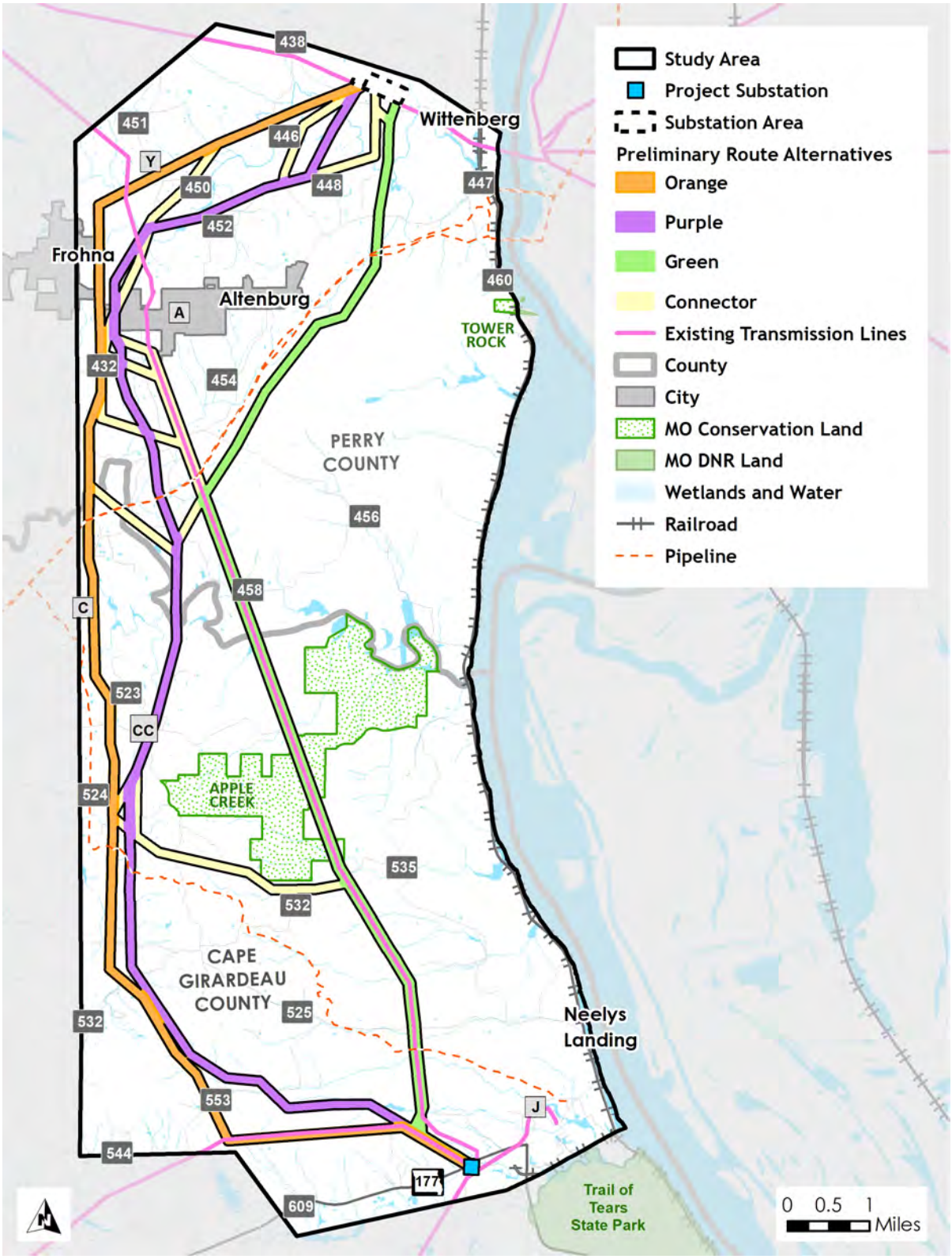
.

Table 2. Engineering, Setting and Construction Summary - Preliminary Route Alternatives

Routing Criterion	Measure (unit)		Orange	Purple	Green
Length	Miles		18.6	17.8	14.9
Length Adjacent 69kV	Miles		3.16	0.96	8.80
Steep Slopes	Length Crossing Slopes > 25 deg.	(mile)	6.3	4.7	7.7
Crossings	Road		15	16	8
	Streams		21	23	16
Land Cover	Forested (within 600ft PRA)	(acres)	597.2	474.8	668
Community Feature	Homes within 1000ft*	(count)	53	49	29
Community Feature	Non-Residences within 1000ft*	(count)	140	120	75
Soils	Prime or State Importance (within 600ft PRA)	(acres)	530.6	333.2	182

***1000ft distance is based upon the PRA centerline which is larger than the 600th wide route.**

Figure 5. Preliminary Route Alternatives



3.7 Proposed Route Selection

3.7.1 Identification of Proposed Route

IDENTIFICATION OF PROPOSED ROUTE AND ROUTE OPTIONS

The next step of route selection was to identify the Proposed Route from the Potential Route Options. This was done through a continued comparative evaluation of the remaining routes within the Potential Route Alternatives and from considering route related feedback from stakeholders and landowners received at the Phase 2 Open Houses and agency input (Section 4.3).

During the stakeholder engagement, additional sensitivities were discovered along the Purple and Orange Alternatives especially in the area north of Frohna and Altenburg. The route alternatives were already longer, were closer to more homes and farmsteads and had a greater impact on agriculture. Stakeholders identified an existing heliport just east of the Purple Alternative near Hwy C that was not recorded in several aviation databases.

In addition, the segment of the Green route that extended northeast from the existing 69 kV line was moved to the north to minimize impacts on potential development and forest resources and to avoid steep terrain, limited access and increased erosion issues. Through the stakeholder engagement identified a newly created parcel and plans for a new home. Moving the alignment north also minimizes the potential impact to the viewshed from Altenburg.

Route Options and Connectors were added in the northern section east of Altenburg to provide flexibility in determining a route that minimizes impacts to sensitivities and addresses landowner concerns. Route Connectors are localized route segments that allow for maneuverability between parts of the Route Options.

The Routing Team determined that the Green with the new Route Options best minimize potential impacts to Sensitivities, take advantage of Opportunities, and adhere to Technical Guidelines and Statutory Requirements. Table 3 shows the general route statistics related to the Proposed Route and route options. Figures 5 and 6 depict the preliminary Proposed Route and Route Options.

Table 3. Engineering, Setting and Construction Summary

Proposed Route and Route Options

Routing Criterion	Measure (unit)		Green	Red	Pink	Teal
Length	Miles		12.6	2.6	2.7	3.1
Steep Slopes	Length Crossing Slopes > 25 deg.	(mile)	6.0	1.2	1.0	1.4
Crossings	Road		8	4	2	2
	Streams		20	1	1	3
Land Cover	Forested (within 600ft)	(acres)	500	103	99	131
Soils	Prime or State Importance (within 600ft)	(acres)	232	27	6.0	13
Community Feature	Homes within 1000ft*	(count)	24	7	5	5
Community Feature	Non-Residences within 1000ft*	(count)	72	18	22	29

Figure 5. Proposed Route and Route Options

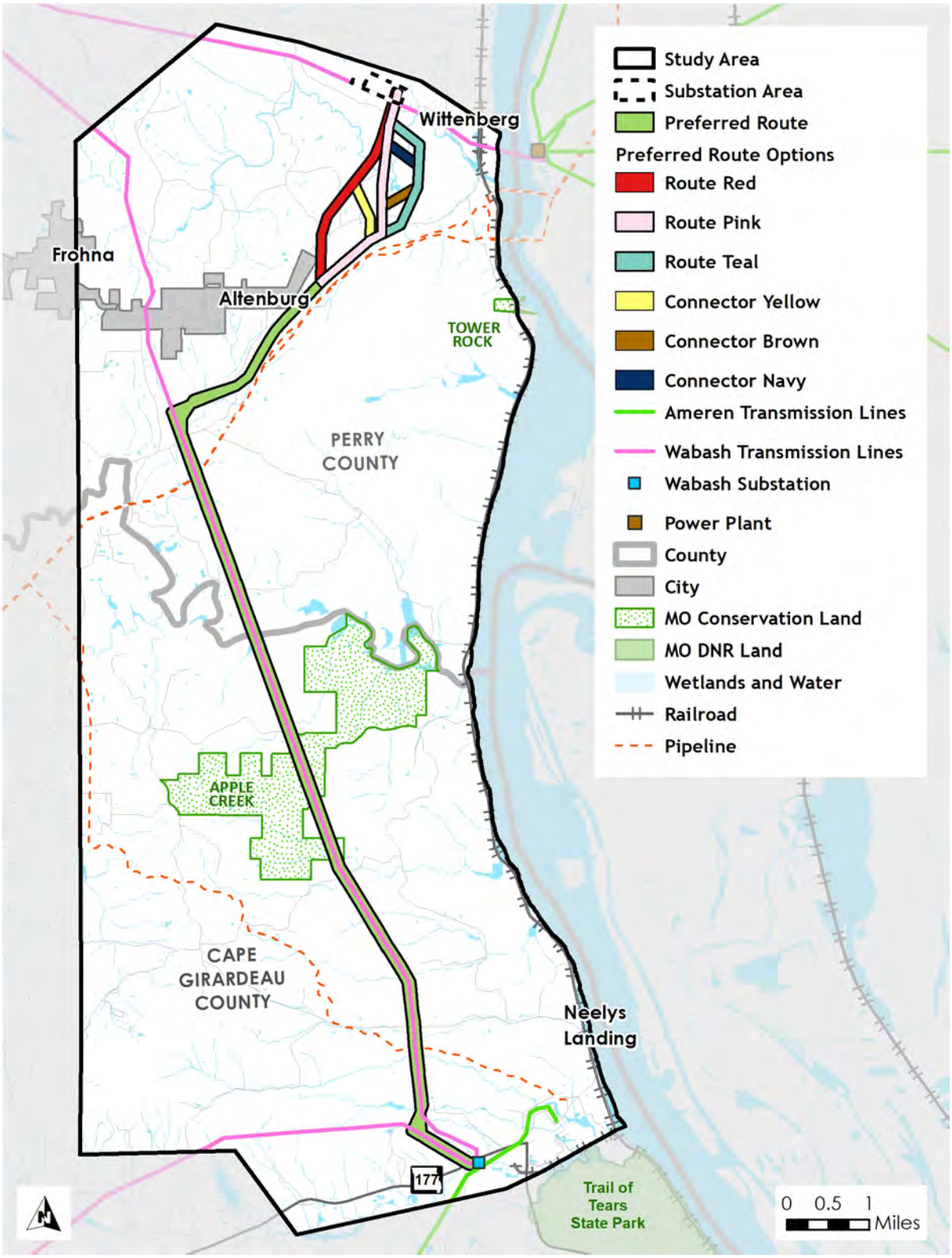
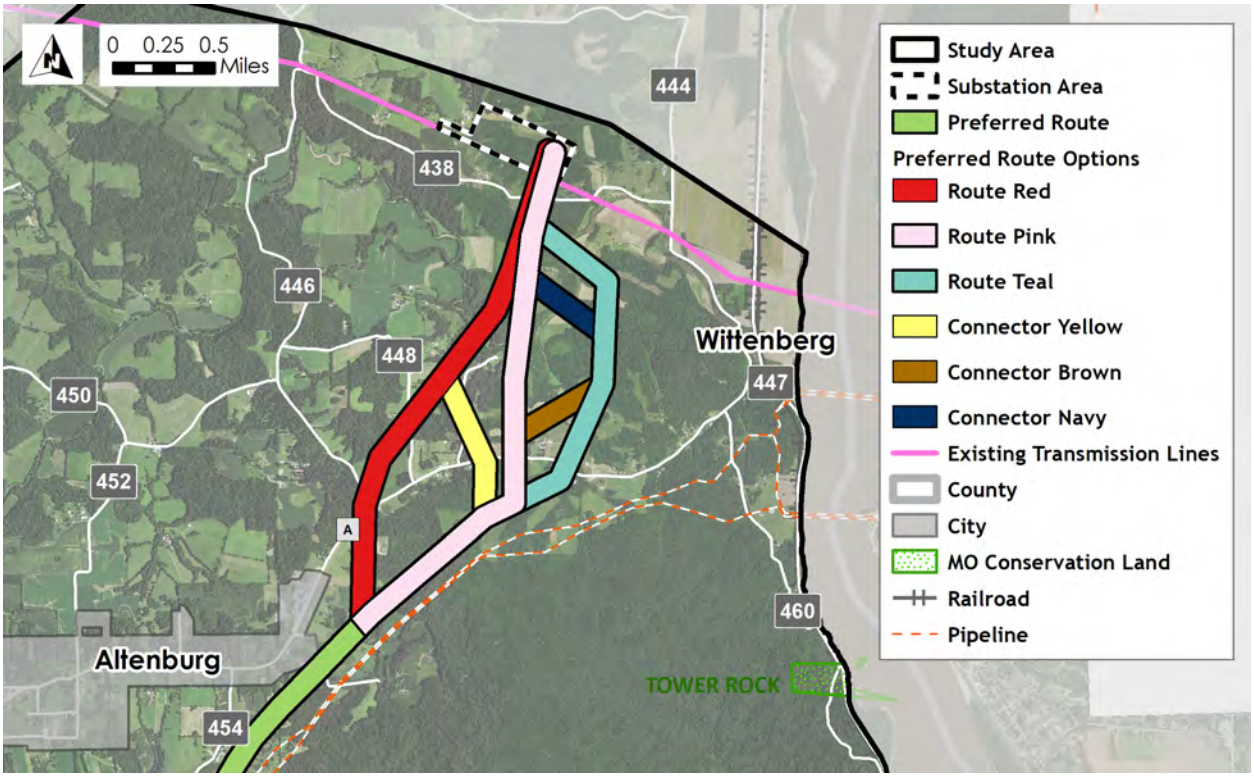


Figure 6. Proposed Route Options



FINALIZATION OF PROPOSED ROUTE

The Proposed Route and Route Options were presented to the stakeholders and landowners at the Phase 3 Open Houses. The Routing Team reviewed and considered feedback and refined the Route Options to incorporate the comments where feasible and where the changes would further minimize overall impacts to Sensitivities.

The Routing Team determined that following the west side of the existing 69 kV line had the least impacts. In the Apple Creek Conservation Area, a shooting and archery range, is located on the west side of the existing 69 kV line. The existing 69 kV line and the Proposed Route would be shifted to the east to minimize impacts to this outdoor facility. (Figure 7). Along this stretch the western edge of the ROW for the new line would be coincident with the existing 69 kV ROW.

The Routing team made several alignment changes where the Proposed Route generally parallels the existing pipeline to provide more distance to existing homes, minimize impacts on agricultural activities while providing sufficient distance from the pipeline (Figure 8).

As the Proposed Route turns north to the new Wittenberg substation, the Routing team reviewed several different route options as described above. The teal, brown and navy route options and connectors were removed because they traversed significant floodplain areas and were expected to have greater impacts on biological and cultural resources. To further understand the potential geological conditions on the red, yellow and pink route options and connectors, Ameren perform targeted geotechnical borings (Figure 9). This information assisted in developing the Proposed route.

Figure 7. Proposed Route Along Gun Club

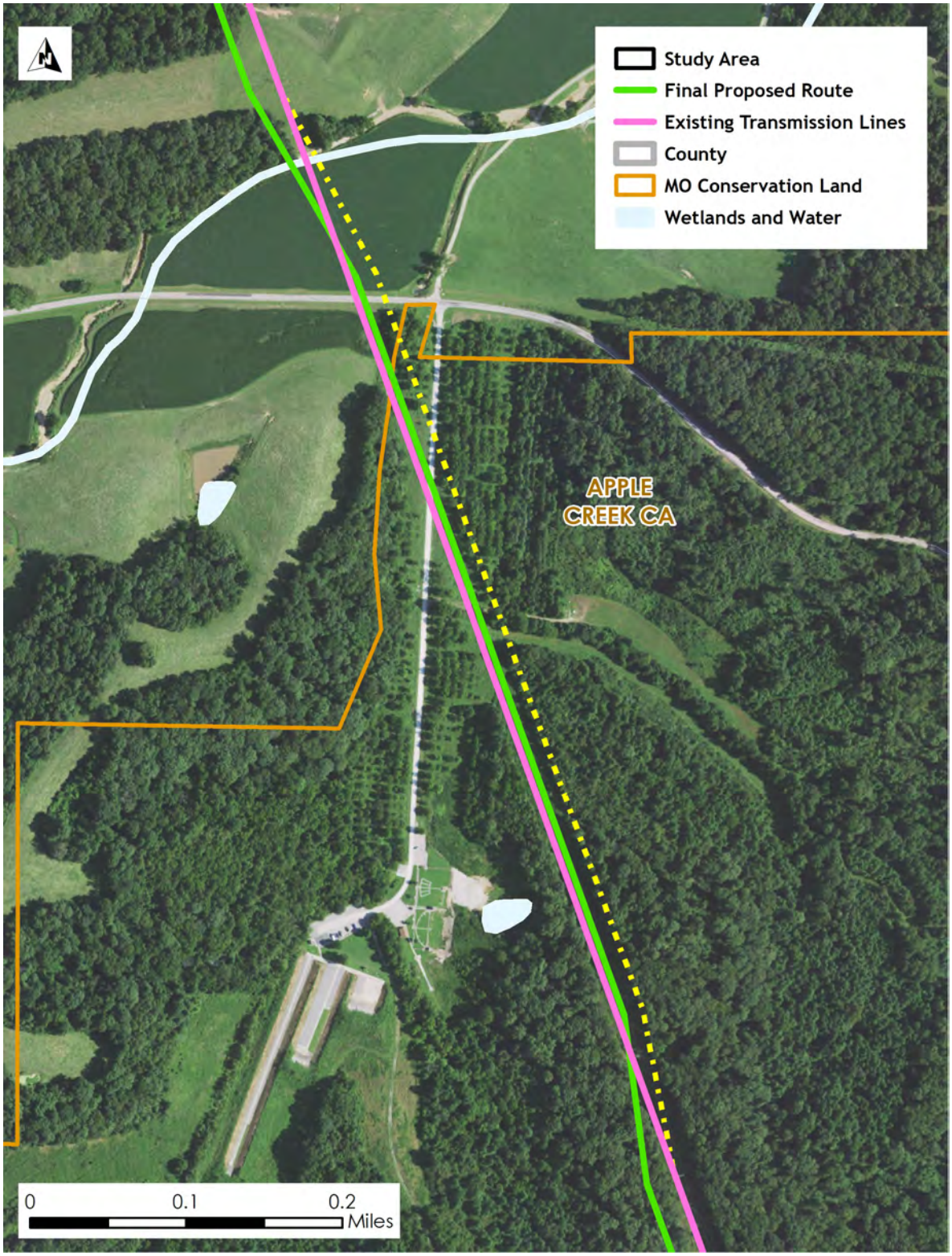


Figure 8. Proposed Route Northeast of 69kV

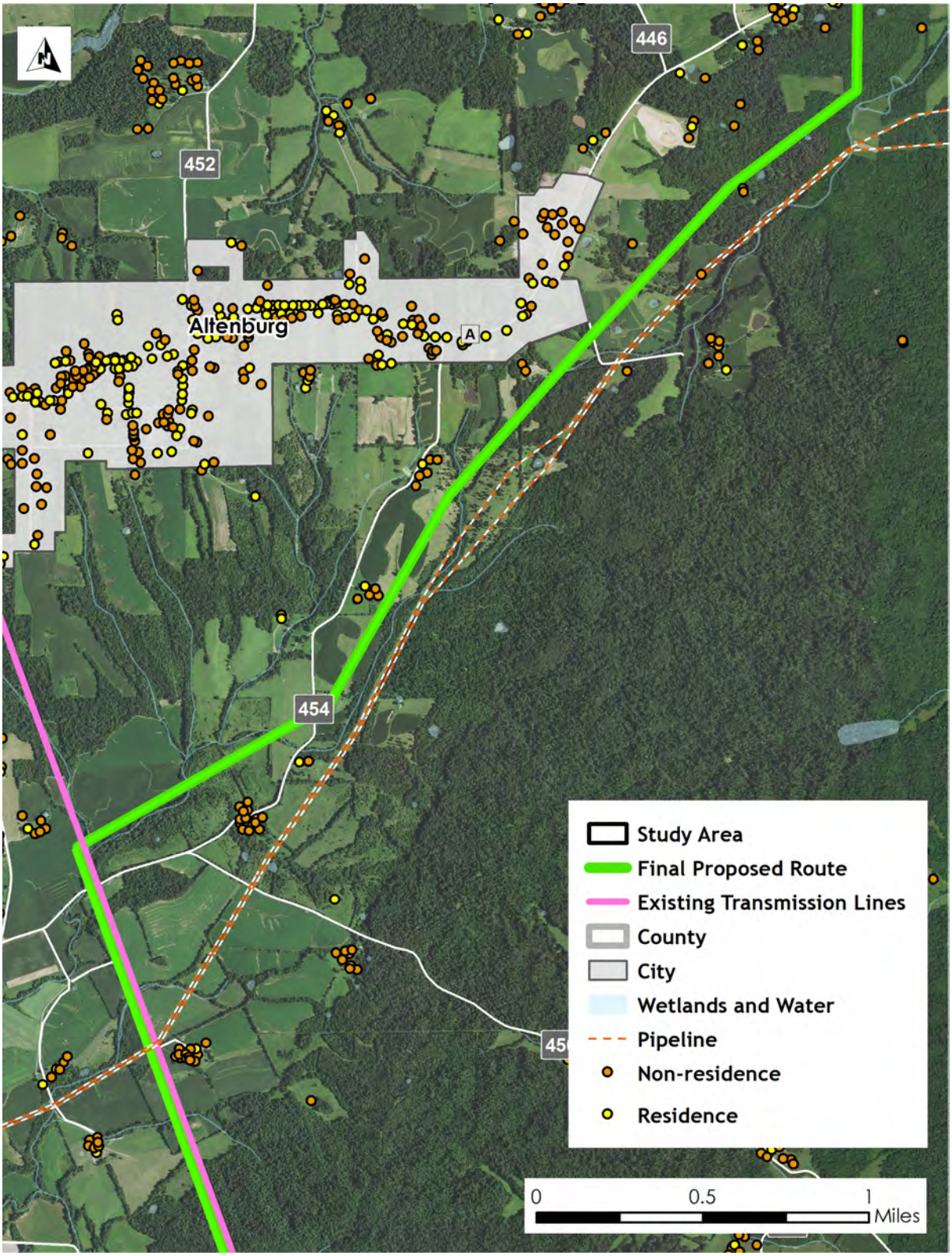


Figure 9. Proposed Route and Route Options Geotech Borings

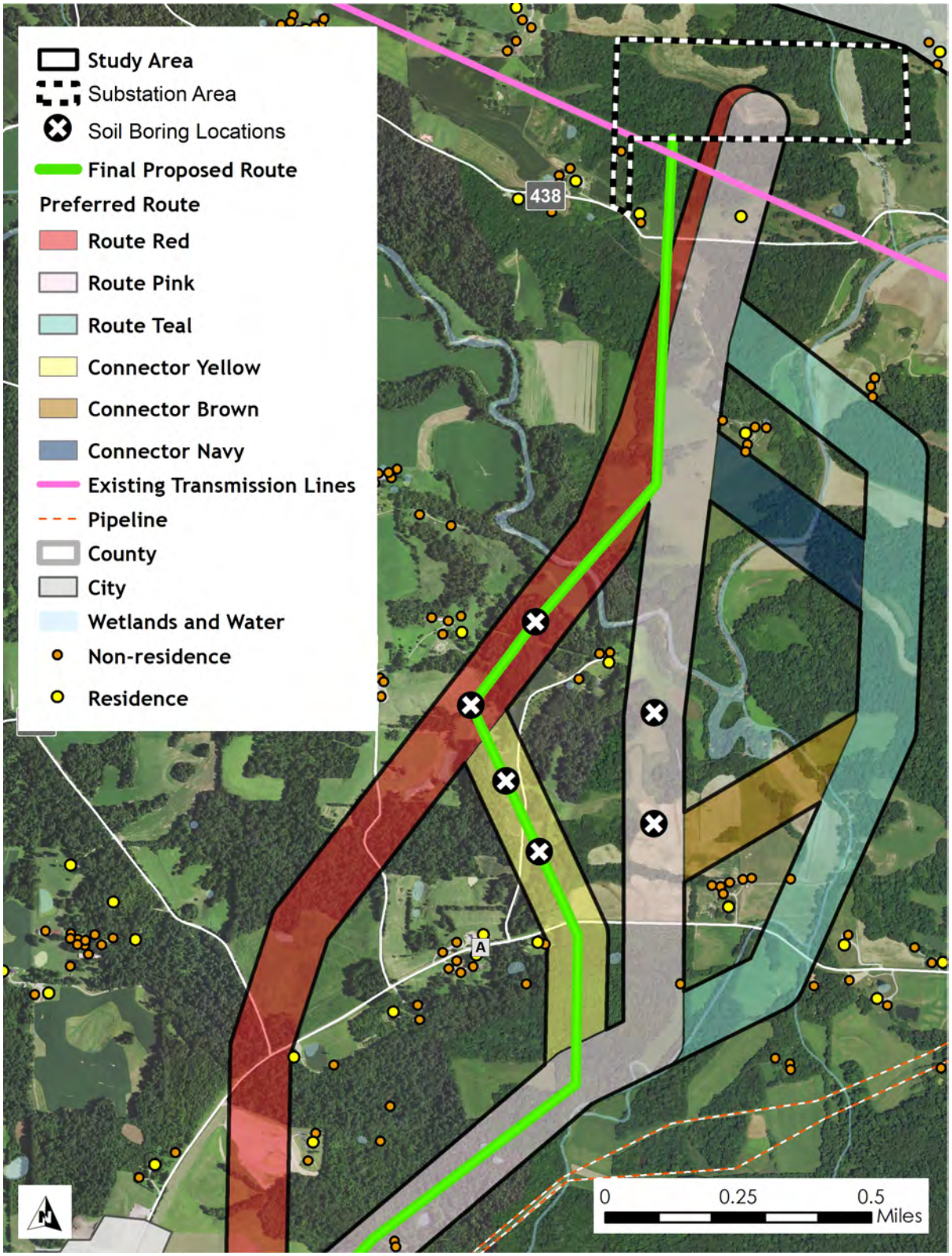
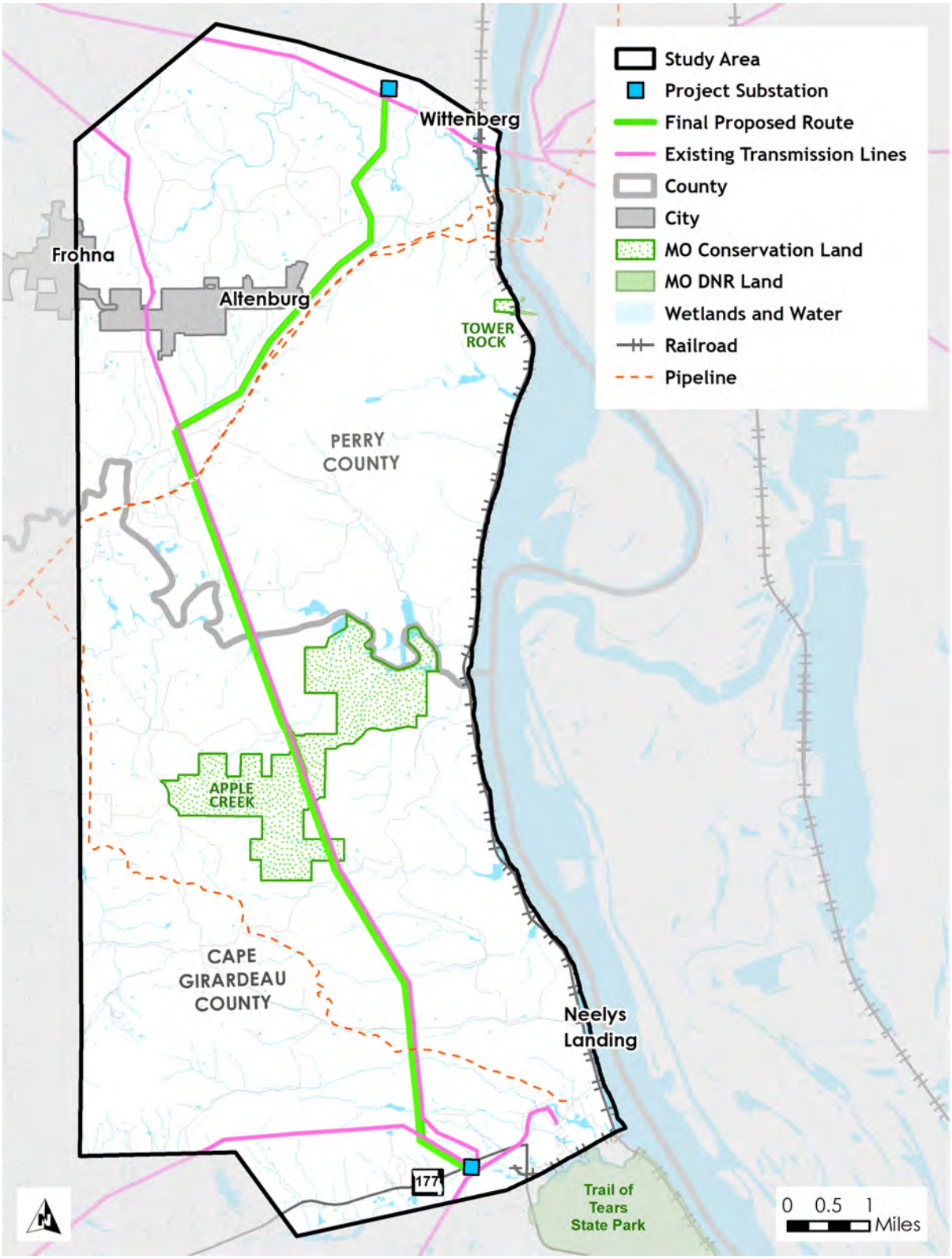


Figure 10 shows the Proposed route. The final route begins at the new Whipple Substation at the southeast corner of State Highway 177 and County Highway V and turns north northwest following the south side of an existing 69 kV line (adjacent ROWs) for approximately 3,500 feet before turning north for approximately 1,400 feet then following the west side of a existing 69 kV line. The proposed line would then follow the west side of the 69 kV line generally north northwest for approximately 4.4 miles. At this point, the proposed line would shift to the east 90 feet and assume the ROW of the existing 69 kV line, which would be moved the east and rebuilt. The shifted lines would run north northeast for approximately 0.75 mile before shifting back to the original alignment. The proposed line would continue northwest on the west side of the existing 69 kV line for approximately 3.8 miles to a point approximately 700 feet north of PCR 454 (Dresden Road). At this point the line would turn 90 degrees to the northeast and follow the north side of the unnamed tributary of Apple Creek. The line would continue northeast generally paralleling Dresden Road and an existing pipeline for approximately 3.3 miles before turning north for 0.3 mile to County Highway A, then northwest for 0.45 miles. The line would then northeast for 0.54 miles before turning north for 0.64 miles to the proposed site of the new Wittenberg substation. The final route is 15.1 miles long.

Figure 10. Proposed Route



3.7.2 Evaluation of the Proposed Route

The Routing Team performed a detailed analysis of the Proposed Route to identify potential impacts to sensitivities. A permit matrix is included in Appendix B that identifies the potential federal, state and local permit and approvals that will be required for the project. Table 4 lists a summary of the engineering and construction factors for the Proposed Route.

ENGINEERING, AND CONSTRUCTION SUMMARY

Length

The Proposed Route is 15.1 miles.

Right-of-Way Required

The ROW width required for the Project is 125 feet. Generally, where the Proposed Route parallels existing infrastructure, the new ROW will be adjacent to the existing ROW. However, where the Proposed Route shifts to the east to minimize impacts to the Apple Creek Shooting and Archery Range, the Propose Route line will share up to 15 feet of ROW with the re-aligned 69 kV line. The Proposed route will require approximately 229 acres of ROW.

Angle Structures

Angle structures were split into four categories: light angles (1–15 degrees), medium angles (15–35 degrees), medium angles (35–60 degrees), and heavy angles (>60 degrees). Typically, as the angle of the turn at a structure increases, a larger structure and foundation diameter will be required. Typically, a deeper foundation is also required. The Proposed Route has 18 light angles, 3 medium angles, 3 medium heavy angles and 5 heavy angles.

Steep Slopes

The Proposed Route crosses approximately 7.4 miles of steep slopes (>25 degrees). The crossing of steep slopes may potentially increase construction and maintenance costs; however, a final assessment cannot be made until surveys have been completed, the line designed, and access to the structure locations assessed by construction staff.

Infrastructure Crossings

Existing infrastructure crossings (e.g., pipelines, railroads, roads, and transmission lines) was will require permits or agreements with the owners and may require additional engineering and construction requirements at each crossing. The Proposed Route will cross one state highway, several county highways, three transmission lines, and 3 pipelines.

Table 4 provides a summary of the cost, engineering and construction factors for the Proposed Route.

Table 4. Cost, Engineering, and Construction Summary

Routing Criterion	Measure (unit)	Proposed Route	
Length	Miles	15.1	
Angle Structures	Light (1-15 deg.)	(count)	18
	Medium (15-30 deg.)		3
	Light Heavy (30-60 deg.)		3
	Heavy (>60 deg.)		5
Steep Slopes	Length Crossing Slopes > 20 deg.	(mile)	7.4
Infrastructure Crossings	Pipeline	(count)	3
	Railroad		0
	Road		11
	Transmission Line		3

EXISTING OPPORTUNITY USE

Existing Linear Infrastructure and Right-of-Way

Paralleling existing linear infrastructure typically provides an opportunity to minimize potential impacts to Sensitivities near the feature, as well as potentially minimize the amount of new ROW required. The Proposed Route parallels existing transmission infrastructure for approximately 9.6 miles and parallels two pipelines for 2.45 miles south of PRC 454 (Dresden Road). Although paralleling pipelines and transmission lines can have benefits, it may also require additional engineering and construction costs.

Existing Divisions of Land

While paralleling other divisions of land, such as property lines and field lines, does not provide an opportunity to minimize the amount of new ROW required, it may still provide an opportunity to minimize potential impacts to Sensitivities. For example, placement of transmission structures along a field line may minimize impact to farming operations. The Proposed Route parallels field lines for approximately 0.54 miles.

The total Opportunity paralleling length (roads, railroads, field lines, and property lines) is approximately 12.6 mile or 83% of the length.

Table 5 provides a summary of existing Opportunity use by the Proposed Route.

Table 5. Existing Opportunity Use Summary

Routing Criterion		Measure (unit)	Proposed Route
Length		Miles	15.1
Existing ROW Paralleling	Railroad	Length Paralleled (miles)	0.0
	Road		0.0
	Pipeline		2.45
	Transmission Line		9.6
	Total ROW Paralleling	Length Paralleled (miles)	12.05
		Length Paralleled (percentage)	79.8%
Other Opportunity Paralleling	Property Line	Length Paralleled (miles)	0.0
	Field Line		0.54
Total Opportunity Paralleling (Road, Railroad, Property Lines, and Field Lines)		Length Paralleled (miles)	12.59
		Length Paralleled (percentage)	83%
Non-Opportunity Use	Cross-Country (non-diagonal)	Length (miles)	2.51

RESIDENCES, NON-RESIDENTIAL STRUCTURES, AND LANDOWNERS

Residences

Residences were identified through aerial imagery interpretation, field review from public roads and from comments from stakeholders. No residences are located within 150 feet of the Proposed Route. There is one residence within 150–300 feet, and nine residences within 300-500 feet and 19 residences within 500-1000 feet of the Proposed route The majority of the residences within 500–1,000 feet of route are near the southern substation near MO Highway 177 in Cape Girardeau County and in Perry County along PCR 454 up to the Whittenburg Substation area.

Non-Residential Structures

Residences were identified through aerial imagery interpretation, field review from public roads and from comments from stakeholders. Only one non-residences are located within 150 feet of the Proposed Route. There are nine non-residential structures within 150–300 feet, and 16 non-residential structures within 300-500 feet and 76 non-residences within 500-1000 feet of the Proposed Route. Non-residential structures are not typically allowed to remain within the ROW of a transmission line. Non-residential structures include billboards, small sheds, and a barn.

Landowners and Parcels

The ROW for the Proposed Route crosses 48 distinct landowners and 70 parcels.

Table 6 provides a summary of the residences, non-residential structures, landowners, and parcels along the Proposed Route.

Table 6. Residences and Non-Residential Structures Summary

Routing Criterion	Measure (unit)		Proposed Route
Residences (distance interval from route centerline)	0-75’	(count)	0
	75-150’		0
	150-300’		1
	300-500’		9
	500-1,000’		19
Non-Residential Strcuture (distance interval from route centerline)	0-75’	(count)	0
	75-150’		1
	150-300’		9
	300-500’		16
	500-1,000’		76
Landowners	Crossed by ROW		48
Parcels			70

MISCELLANEOUS LAND USE FEATURES

Airports and Navigational Aids

Airport and navigational aids facility initial information was obtained from the Federal Aviation Administration (FAA), AirNav, and Our Aiports. The data from the FAA included public and FAA registered private airports, as well as the location of navigational aids. The data from stakeholders and landowners included an emergency helipad located on the north side of Highway A on the east side of the water treatment plant driveway between Cities of Altenburg and Frohna.

The Altenburg emergency helipad is within two miles of the Proposed Route. The route is located in a valley, approximately 140 – 180ft in lower elevation than the helipad location. No public airports or navigational aids, such as Very High Frequency (VHF) Omni Directional Radio Range (VOR) facilities, are located within three miles of the Proposed Route, thus no impacts to either are anticipated.

Scenic Byways

The Proposed Route do not cross any designated national or state scenic byways.

Cemeteries

Several cemeteries were identified with through parcel ownership, landmark databases and public comments. Three cemeteries (TB McCain, Foster and Private) were located within 0.5 mile of the Proposed Route.

Religious Facilities

There are no religious facilities within 0.5 miles of the Proposed Route.

Daycares

No licensed daycares are within 0.5 mile of the Proposed Route. Information was reviewed from Missouri Department of Health and Senior Services and Homeland Information Foundation Level Data (HIFLD) data based were reviewed.

Golf Courses

No golf courses are within 0.5 mile of the Proposed Route.

Hospital / Medical Care Facility

No hospitals or medical care facilities are located within 0.5 mile of the Proposed Route.

Local Park or Recreation Land

The City of Altenburg and the East Perry County Fairgrounds and Concordia Log Cabin College are within 1 mile of the Proposed Route. The route does follow an existing 69 kV line through Apple Creek Conservation area near an existing gun shooting and archery range.

Schools

There are no schools located within 0.5 mile of the Proposed Route. The Altenburg Elementary school is over a mile away located within the city limits of Altenburg.

Communication Towers

No communication towers are within 500ft of the Proposed Route.

Mines and Quarries

There are no active mines or quarries within 0.5 mile of the Proposed Route. There are four past surface producer or occurrence within 0.5 mile of the route.

Contaminated Sites

There are two known contaminated sites within 0.5 mile of the Proposed Route. Both are located along State Highway 177 east of the southern substation location.

Table 7 provides a comparison of land use features along the Proposed Route.

Table 7. Miscellaneous Land Use Features Summary

Routing Criterion	Measure (unit)		Proposed Route
Scenic Byways	Crossed	(count)	0
Cemeteries	Within ½ Mile		3
Religious Facilities			0
Daycares			0
Golf Courses			0
Hospitals / Medical Care Facilities			0
Schools			0
Local Parks or Recreation Lands	Within ½ Mile		2
Communication Towers	Within 500’		0
Mines & Quarries	Within ½ Mile		4
Contaminated Sites	Within ½ Mile		2

LAND COVER, LAND USE, AND PLANNED DEVELOPMENT

Land Cover

Land cover data from the USGS National Land Cover Dataset (NLCD) was used to assess the land cover types crossed by the Proposed Route. NLCD land cover classes were combined to form six general land cover classes, including aquatic environment, barren, cropland, developed, forested, and grassland. These classes also typically indicate the land uses crossed.

Forested land will require all trees will be cleared from the ROW. Permanent direct impacts to cropland will be limited to the foundation of the transmission line structures; however, indirect impacts such as restricting aerial application of pesticides or herbicides may also occur. Direct impacts to irrigation systems from the Project are discussed later. Permanent direct impacts to

grassland will be limited to the foundations of the transmission structures. An indirect impact would include potential burning restrictions that could inhibit grassland management practices. No impact to aquatic resources is expected since it is anticipated that no structures will be placed or work conducted within streams or waterbodies. Impacts to developed land cover would include the requirement for the removal of any existing structures and prohibition of the placement of any new structures within the ROW.

Table 8 provides a comparison of the acreage of each land cover type crossed by the Proposed Route.

Table 8. Land Cover Summary

Routing Criterion		Measure (unit)	Proposed Route
Land Cover[1]	Aquatic Environment	Area within ROW[2] (acreage)	0.7
	Barren		1.4
	Cropland		89.8
	Developed		7.3
	Forested		127.9
	Grassland		1.9

[1] – Land cover data was obtained from the National Use Land Cover (NLCD). Aquatic environment classes include Emergent Herbaceuous Wetlands, woody wetlands and surface water classes. Cropland classes include cultivated crops and hay field or other agricultural classes. Grassland classes include herbaceous lands. Forested classes include deciduous, coniferous, upland and partial canopy, and floodplain forest. Developed classes include high density, low / medium density, and urban open space. Barren class represents barren lands.

[2] – The ROW width will be 125 feet.

AGRICULTURE

U.S. Department of Agriculture Classified Farmland

Prime farmland is a designation by the U.S. Department of Agriculture (USDA) used to define land (soil) that has the best physical and chemical characteristics for producing food, feed, forage, fiber, and oil seed crops. “Prime farmland if drained” is soil that has the same characteristics as prime farmland if it has been drained, which is typically done through tile drainage systems. “Farmland of statewide importance” is farmland or unique farmland that is also highly productive but with physical and chemical characteristics that are not as good as prime farmland. “Unique farmland” is soil that 1) is used for a specific high-value food or fiber crop; 2) has a moisture supply that is adequate for the specific crop (the supply is from stored moisture, precipitation, or a developed-irrigation system); and 3) combines favorable factors of soil quality, growing season, temperature, humidity, air drainage, elevation, aspect, or other conditions, such as nearness to market, that favor the growth of a specific food or fiber crop.

There is no prime farmland, 13.9 acres of prime farmland if drained and 31.1 acres of farmland of state importance within the ROW of the Proposed Route.

Table 9 provides a summary of agricultural lands within the Proposed Route.

Table 9. Agricultural Summary

Routing Criterion		Measure (unit)	Proposed Route
	Prime Farmland	Area within ROW[1] (acreage)	0
	Prime Farmland if Drained		13.9
	Farmland of State Importance		31.1
	Total of all Farmland Classes		45.0

[1] – The ROW width will be 125 feet.

RESOURCE LANDS

Federal Lands

There are no federal lands within the Project Area.

Federal Easements

There are no known federal easements (e.g., United States Fish and Wildlife Service [USFWS] or USDA Wetland Reserve Program) crossed by or within ¼ mile of the Proposed Route. The Proposed Route may cross USDA Conservation Reserve Program (CRP) easements or Healthy Forests Reserve Program (HFRP) ; however, the location of those easements is unknown as the information is confidential without landowners providing their consent to the USDA to have the information released. ATXI real estate agents will coordinate with landowners along the route approved by the PSC to determine whether the route crosses any CRP or HFRP easements. ATXI will also coordinate with landowners and the USDA Farm Service Agency and USDA Natural Resource Conservation Service so that the construction of the transmission line will comply with easement requirements.

Missouri Department of Conservation Lands

The Proposed Route crosses the Apple Creek Conservation area following an existing 69 kV line. 16.9 acres of ROW would be required within the conservation area. ATXI has been coordinating with the MDC and will seek the appropriate approvals prior to construction of the project. The Proposed Route would also run adjacent to a shooting and archery range within the conservation area; a local club operates at the range under an agreement with MDC. No direct impact to the gun club is expected as the Proposed Route would be no closer to the range than the existing 69 kV line. The Proposed Route avoids the MDC Tower Rock Nature Area.

Missouri State Park land

There are no state park lands within 0.25 mile of the Proposed Route. Trail of Tears State Park is over 0.75 miles to the southeast of an existing substation and is not expected to be impacted by the Project.

Local Conservation Land or Easements

There are no known local conservation lands or easements within ¼ mile of the Proposed Route.

Private Conservation or Recreation Lands

There are no known private conservation or recreation lands or easements within ¼ mile of the Proposed Route.

SENSITIVE HABITAT, CRITICAL HABITAT, AND PROTECTED SPECIES

Designated Critical Habitat

There is no designated critical habitat within ½ mile of the Proposed Route.

Federal Threatened and Endangered Species

There are no known occurrences of federally listed threatened or endangered species within ½ mile of the Proposed Route based on information obtained from the Missouri Department of Conservation Natural Heritage Program. A review of the United States Fish and Wildlife (USFWS) Information for Planning and Consultation (IPaC) identified the following species have been documented within Perry and Cape Girardeau Counties: gray bat, Indiana Bat, northern long-eared bat, grotto sculpin (cave fish), pallid sturgeon, Curtis' pearlymussel. The only documented habitat for grotto sculpin is five large cave systems located over 9 miles to the northwest from the Proposed Route. Once a route is approved by the Missouri Public Service Commission (PSC), ATXI will coordinate with USFWS regarding species or habitat surveys that may be required.

State Threatened and Endangered Species

There are no known occurrences of state-listed threatened or endangered species within ½ mile of the Proposed Route. The lake sturgeon and crystal darter were recorded as known occurrences in the MDC Natural Heritage Program review of the study area and the Virginia pennywort, a species of conservation concern has been found in the Apple Creek Conservation Area but greater than a mile from the Proposed Route. Once the Route is approved by the PSC, ATXI will coordinate with MDC regarding necessary habitat surveys or best management practices that may be necessary to protect the species. A recorded eagle nest has been recorded greater than ½ mile but less than 1 mile from the Proposed Route.

See Appendix C for a list of state and federally listed species occurrences near the Proposed Route.

HYDROLOGY

Wetlands

National Wetland Inventory mapped wetlands are located along creeks and streams that will be crossed by the Proposed Route. Based on an assumption of a maximum structure span of 1,000 feet, no structures are anticipated to be placed in wetlands near Apple and Brazeau creeks. ATXI will continue to coordinate with the U.S. Army Corps of Engineers (USACE) and will acquire any necessary permits for impacts to wetlands should they occur along the route approved by the PSC.

Streams and Waterbodies

The Proposed Route crosses named six streams (Opossum Creek, Turkey Creek, Neelys Creek, Lovejoy Creek, Apple Creek and Brazeau Creek) and several unnamed tributaries. The Proposed Route will cross 19 streams in total. None of these streams are considered Outstanding State Resource Waters (rivers, lakes, watersheds) or Outstanding National Resource Watersheds, or Cold Water Fisheries. One stream, a tributary of Apple Creek is crossed just north of PCR 454 where the route turns northeast has the designation of a Losing Stream. No transmission structures are anticipated to be placed in these waterbodies based on a maximum structure span of 1,000 feet.

Impaired Waters

Impaired waters are waters that have been determined to be too degraded or polluted to meet water quality standards. Brazeau Creek is considered an impaired water for E. Coli and has been on the

Missouri 303d list since 2012 Crossing of impaired waters may require additional storm water management practices during construction.

Floodplain

Floodplain data were acquired from the Federal Emergency Management Agency. Mapped floodplains are present along Opossum Creek, Turkey Creek, Neelys Creek, Lovejoy Creek, Apple Creek and Brazeau Creek. It was assumed that any crossing over 1,00 feet would require a transmission structure to be placed in floodplain and structures may need to be placed in the floodplain along Apple Creek and Brazeau creeks. ATXI will coordinate with Missouri Emergency Management Agency (SEMA) and county floodplain administrators to determine whether floodplain permits will be required for the route approved by the PSC. A total of 28.9 acres of the ROW is within floodplain and an estimated 4 poles will be placed in a floodplain (one south of PCR 458 and three north of PCR 454 where the route leaves the existing 69kV corridor).

Sink Holes

Karst areas are present in the Project Area and mapped sinkholes from 2018 Missouri Department of Geology identified a location within 500ft of the Proposed Route. Ameren completed targeted geotechnical investigations along the Propose Route. These studies did not identify sinkholes or karst concerns. Additional investigations will be completed prior to construction.

Table 10 provides a summary comparison of the hydrology along the Proposed Route.

Table 10. Hydrology Summary

Routing Criterion	Measure (unit)		Proposed Route
Non-Forested Wetlands	Within ROW[1]	(acreage)	2.9
	Structures Within	(count)	
Forested Wetlands	Within ROW[1]	(acreage)	0.6
	Structures Within	(count)	
Streams	Crossed	(count)	19
Outstanding Waters	Crossed	(count)	0
Waterbodies	Crossed	(count)	0
Impaired Streams	Crossed	(count)	1
Impaired Waterbodies	Crossed	(count)	1
Floodplain	Structures Within	(count)	4
Known Sink Holes	Area Within ROW[1]	(acreage)	0.0

[1] – The ROW width will be 125 feet.

CULTURAL RESOURCES

National Register of Historic Properties

No National Register of Historic Places (NRHP) sites are within the ROW of the Proposed Route. One site, Concordia Log Cabin College NRHP, sites is within 1.5 mile of Proposed Route and located within the City of Altenburg. ATXI will continue to consult with the Missouri SHPO to determine if additional surveys are required after the Proposed Route is approved by ATXI.

Archaeological Sites

Information regarding known archaeological sites was obtained by a qualified HDR archaeologist. This data only includes known archaeological sites identified in previous surveys, typically done for construction of other infrastructure such as roads or pipelines Where a route crosses or parallels this infrastructure, it will likely have a higher occurrence of known sites because of the extensive survey conducted. No known archeological sites would be within the ROW and 11 sites within 1 mile of the Proposed Route. Large portions of the Proposed Route have not been surveyed. Ameren has consulted with the Missouri SHPO and Native American Tribes to better understand what resources may be present and areas with a higher probability for finding archeological sites. River terraces along the larger creeks and ridges overlooking these water features may have a higher probability for encountering sites including prehistoric sites or burial mounds. It is anticipated that placement of transmission structures within known archaeological sites can be avoided based on current design parameters. ATXI will coordinate with the Missouri SHPO and Native American Tribes on survey requirements for the route approved by the PSC.

3.7.3 Selection of the Proposed Route

Based on the detailed comparative analysis of the Proposed Routes as described in Section 3.6.2, and further review of the route options, the Routing Team selected the Green Route as the Proposed Route. See Appendix D for detailed route maps.

The Green Route is the shortest and least cost route. It requires the least right-of-way and the fewest crossings of existing infrastructure; parallels the greatest length of existing right-of-way and Opportunities; impacts the fewest landowners, parcels, floodplains, and agricultural land, including designated prime farmland; is not within 0.5 miles of a known occurrence of any listed species; has the least impact to wetlands, including forested wetlands; crosses the fewest streams; and has no National Register of Historic Places (NRHP) sites within 1.5 miles.

Table 11 provides a summary of the characteristics of the Proposed Route.

Table 11. Proposed Route Summary

Criteria Type	Routing Criterion	Measure (unit)		Proposed Route
Engineering and Construction	Length	Miles		15.1
	Angle Structures	Light (1-15 deg.)	(count)	18
		Medium (15-30 deg.)		3
		Light Heavy (30-60 deg.)		3
		Heavy (>60 deg.)		5
	Steep Slopes	Length Crossing Slopes > 20 deg.	(feet)	7.4
	Infrastructure Crossings	Pipeline	(count)	3
		Railroad		0
		Road		11
		Transmission Line		3
Existing Opportunity Use	Existing ROW Paralleling	Railroad	Length Paralleled (miles)	0.0
		Road		0.0
		Pipeline		2.45
		Transmission Line		9.6
		Total ROW Paralleling	Length Paralleled (miles)	12.05

Criteria Type	Routing Criterion	Measure (unit)		Proposed Route
			Length Paralleled (percentage)	79.8%
	Other Opportunity Paralleling	Property Line	Length Paralleled (miles)	0
		Field Line		0.54
	Total Opportunity Paralleling (Road, Railroad, Property Lines, and Field Lines)		Length Paralleled (miles)	12.6
			Length Paralleled (percentage)	83.4%
	Non-Opportunity Use	Cross-Country (non-diagonal)	Length (miles)	0
		Cross-Country (diagonal)		2.5
Residence and Non-Residential Structures	Residences (distance interval from route centerline)	0-75’	(count)	0
		75-150’		0
		150-300’		1
		300-500’		9
		500-1,000’		19
	Non-Residential Structures	0-75’		0
	Landowners	Crossed by ROW		48
	Parcels			70
Miscellaneous Land Use Features	Religious Facilities and Cemeteries	Within ¼ Mile	(count)	3
	Local Parks or Recreation Lands			2
	Mines & Quarries	Within ¼ Mile		4
Land Cover	Aquatic Environment	Area within ROW	(acreage)	0.7
	Cropland			89.8
	Grassland			7.3
	Forested			127.9
	Non-Vegetative			1.9
Agriculture	USDA Classified Farmland	Prime Farmland	Area within ROW[1] (acreage)	0
		Prime Farmland if Drained		13.9
		Farmland of State Importance		31.1
		Total of all Farmland Classes		117
Resource Lands	MDC or DNR Lands	Crossed by ROW[1]	(count)	1
		Area Crossed by ROW[1]	(acreage)	16.9
		Within ¼ Mile of Route	(count)	1
Hydrology	Non-Forested Wetlands	Within ROW[1]	(acreage)	2.9
		Structures Within	(count)	0
	Forested Wetlands	Within ROW[1]	(acreage)	0.6
		Structures Within	(count)	0
	Streams	Crossed	(count)	19

Appendix A

List of Data Sources

Data Sources

Aerial Photography. USDA Farm Service Agency National Agriculture Imagery Program (NAIP), Missouri. 2020. Available online at: http://datagateway.nrcs.usda.gov/.

Archaeological Sites. Missouri Historic Preservation Agency. 2020

Audubon Important Bird Areas. https://www.audubon.org/important-bird-areas/cape-hills-02

Aviation Facilities. Federal Aviation Administration's Office of Aeronautical Information Services. Available online at: http://www.faa.gov/airports/airport_safety/airportdata_5010/menu/index.cfm#datadownloads, www.airnav.com, https://ourairports.com/data/ and HDR aerial photography review, public comments 2020.

Caves. Missouri Department of Natural Resources. 2018 Available online at: https://data-msdis.opendata.arcgis.com/ and msdis-archive.missouri.edu - /archive/Missouri_Vector_Data/Geological_Geophysical/

Cemeteries. ESRI Map data Cultural Landmark, ESRI US GNIS Cemetery, Cape Girardeau County Parcels, Perry County Parcels, public comments. 2020

Center Pivot Irrigators. HDR aerial photography review and HDR field work. 2020.

Century Farms. MO Dept of Ed. 2020 – 2021. Available online at: https://extension.missouri.edu/programs/century-farms/century-farms-program-history 2020, HDR Fieldwork and public comments 2020 – 2021.

Communication Towers. Federal Communications Commission. 2020. Available online at: http://wireless.fcc.gov/geographic/index.htm?job=licensing_database_extracts and https://hifld-geoplatform.opendata.arcgis.com/search

County Boundaries. Missouri Department of Education. 2019. Available online at: http://msdis-archive.missouri.edu/archive/Missouri_Vector_Data/TIGER_Data/TIGER2019/

Critical Habitat. U.S. Fish and Wildlife Service. 2020. Available online at: http://ecos.fws.gov/crithab/

Daycares. Missouri Department of Health and Senior Services available at : https://health.mo.gov/safety/childcare/find.php, ESRI Map data Cultural Landmark, ESRI US GNIS Daycares, and Homeland Infrastructure Foundation-Level Data available online at: https://hifld-geoplatform.opendata.arcgis.com/ 2020.

Electric Transmission Lines. Ameren, HDR field work, and HDR aerial photography review. 2020

Elevation, DEM. Center for Agricultural, Resource and Environmental Systems (CARES), U of MO. 2005. Available online at: http://msdis-archive.missouri.edu/archive/Missouri_Elevation_Data/10mDEM/

Facility Registry System. U.S. Environmental Protection Agency. U.S. EPA regulated sites. 2019. Available online at: http://www.epa.gov/enviro/geo_data.html.

Floodplains. United States Federal Emergency Management Agency (FEMA). 1986. Digital Flood Insurance Rate Maps and FEMA National Flood Hazard (NFHL) Viewer. Missouri. Available online at: https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html?id=8b0adb51996444d4879338b5529aa9cd&extent=-92.34400821289033,38.51043074195508,-92.01167178710955,38.64462954251206

Geological Bedrock Map of the Cape Girardeau-McClure 7.5' Quadrangles by Ira R. Satterfield, OFM-82-73-GI. Available at: https://dnr.mo.gov/geology/docs/CapeGirardeau82-0073-gi-B.pdf

Geologic Survey. Missouri Geological Survey GeoStrat. Accessed at: https://modnr.maps.arcgis.com/apps/webappviewer/index.html?id=3ac3a61da4af4834811503a24a3cb935

Hazardous Materials. Missouri DNR ESTART (hazardous materials). Accessed at: https://apps5.mo.gov/ESTARTMAP/map/init_map.action Accessed on 7/16/20

Homes, Buildings, and Structures. HDR field work, aerial photography review, and public comments. 2020 - 2021.

Hospitals. ESRI Map data Cultural Landmark, ESRI US GNIS Daycares, and Homeland Infrastructure Foundation-Level Data available at: https://hifld-geoplatform.opendata.arcgis.com/ 2020.

Karst Topography. MoDNR Geological Survey. https://dnr.mo.gov/geology/geosrv/envgeo/sinkholes.htm Available online at: msdis-archive.missouri.edu - /archive/Missouri_Vector_Data/Geological_Geophysical/ 2018

Land Cover. Natural Resources Conservation Service (NRCS) / ESRI 2016. Available online at: https://www.mrlc.gov/national-land-cover-database-nlcd-2016

Land Cover Tree Canopy. Natural Resources Conservation Service (NRCS) / ESRI 2016 Available online at: https://www.mrlc.gov/national-land-cover-database-nlcd-2016

Impaired Waters. U.S. Environmental Protection Agency, Office of Water. 2013. Available online at: http://www.epa.gov/waters/data/downloads.html and https://modnr.maps.arcgis.com/apps/webappviewer/index.html?id=a2f7af2562a94cb2a73d12647c3aa484

Levees. U.S. Army Corps of Engineers, St. Louis District.

Military Installations. *S*urface Deployment and Distribution Command Transportation Engineering Agency. Published by Bureau of Transportation Statistics. Available online at: http://www.bts.gov/publications/national_transportation_atlas_database/2011/.

Mines and Quarries. Missouri Department of Natural Resources. Available online at: msdis-archive.missouri.edu/archive/Missouri_Vector_Data/Geological_Geophysical/, https://data-msdis.opendata.arcgis.com/, HDR field work, public comment and Homeland Infrastructure Foundation-Level Data available at: https://hifld-geoplatform.opendata.arcgis.com/ 2020 – 2021.

Missouri Department of Conservation. Apple Creek Conservation Area Management Plan.

Missouri Department of Conservation. Eagle Nest Locations. https://nature.mdc.mo.gov/sites/default/files/downloads/baldeaglemo2012.pdf

Missouri Department of Conservation Heritage Data Request Information, email from Jennifer Campbell. July 2020.

Missouri Conservation Heritage Foundation and Stream Trust Fund. https://mochf.org/project/apple-creek-conservation-area-outdoor-education-facility/

Missouri Department of Conservation Managed Public Waters 2019. Available at http://http://msdis-archive.missouri.edu - /archive/Missouri_Vector_Data/Inland_Water_Resources/

Missouri Department of Conservation. Missouri Forest Action Plan. https://mdc.mo.gov/sites/default/files/downloads/MoFRAS.pdf

Missouri Department of Conservation. State Wildlife Action Plan. https://mdc.mo.gov/sites/default/files/downloads/SWAP.pdf

Missouri Department of Conservation. Tower Rock Natural Area Management Plan.

Missouri State Parks. Land and Water Conservation Fund Projects by County. https://mostateparks.com/page/61224/land-and-water-conservation-fund-projects-county

Municipalities. 2010. US Census Bureau. Available online at: http://www.census.gov/cgi-bin/geo/shapefiles2010/main.

National Conservation Easements Database. Conservation Biology Institute, Defenders of Wildlife, Ducks Unlimited, NatureServe, and The Trust for Public Land. 2019. Available online at: http://www.conservationeasement.us/projects

National Register of Historic Places (NHRP). National Park Service. 2013. Available online at: http://www.cr.nps.gov/nr/research/data_downloads.htm and Missouri Department of Natural Resources National Register (NR) districts available online at: http://msdis-archive.missouri.edu/archive/Missouri_Vector_Data/Administrative_Political_Boundaries/ 2017

National Wetlands Inventory. United States Fish and Wildlife Service. 2019. Available online at: http://www.fws.gov/wetlands/Data/Data-Download.html and https://www.fws.gov/wetlands/data/mapper.html

Parcel Boundaries and Landowner Information. Perry, Cape Girardeau counties, Missouri. 2019 - 2020

Pipelines. National Pipeline Mapping System 2020 – 2021 Available at https://www.npms.phmsa.dot.gov/ HDR field work, and aerial photography review. 2020

Public Land Survey System. Illinois State Geological Survey. 2003. Available online at: http://crystal.isgs.uiuc.edu/nsdihome/webdocs/st-basem.html.

Oil and Gas Wells. Illinois State Geological Survey. Available online at: https://data-msdis.opendata.arcgis.com/

Railroads. Federal Railroad Administration. 2019. Available online at: http://www.bts.gov/publications/national_transportation_atlas_database/2019/.

Religious Facilities. ESRI US GNIS Cemetery, Cape Girardeau Parcel, Perry County Parcel, HDR field work, and public comment. 2010, 2020.

Roads. ESRI Mapdata Streets. 2010.

Roads. Missouri Department of Transportation. 2019 - 2020. Available online at: https://msdis-archive.missouri.edu - /archive/Missouri_Vector_Data/Transportation_Networks/

Schools. Missouri Department of Information 2020. Available online at: https://msdis-archive.missouri.edu - /archive/Missouri_Vector_Data/Facilities_Structures/, Homeland Infrastructure Foundation-Level Data available at: HIFLD Open Data (arcgis.com) 2020, and ESRI map data Schools 2010

Sensitive Crops. Driftwatch. 2020. Available online at: https://il.driftwatch.org/map.

SSURGO. United States Department of Agriculture, Natural Resources Conservation Service. Soil Survey Geographic (SSURGO) database. Available at: http://SoilDataMart.nrcs.usda.gov/ and ESRI SSURGO downloader https://esri.maps.arcgis.com/apps/View/index.html?appid=cdc49bd63ea54dd2977f3f2853e07fff#!

Streams and Waterbodies. United States Geological Survey. National Hydrography Dataset. 2019. Available online at: ftp://nhdftp.usgs.gov/DataSets/Staged/States/ and https://www.epa.gov/waterdata/get-nhdplus-national-hydrography-dataset-plus-data

Streams. MoDNR. Gaining and Losing Streams. https://dnr.mo.gov/education/documents/losing-streams.pdf and MO DNR.. Available online at: msdis-archive.missouri.edu - /archive/Missouri_Vector_Data/Inland_Water_Resources/, 2018.

USDA Classified Farmland. Derived from Soil Survey Geographic (SSURGO) database. Available at: http://SoilDataMart.nrcs.usda.gov/.

Topographic Maps. U.S. Geological Survey Digital Raster Graphic. Available online at: http://earthexplorer.usgs.gov/.

Water and Related Wells. Missouri State Geological Survey and Missouri Department of Natural Resources. 2020 Available online at: https://data-msdis.opendata.arcgis.com/

Water Quality. Missouri DNR ArcGIS Water Quality Standards Map Viewer.. https://modnr.maps.arcgis.com/apps/webappviewer/index.html?id=1d81212e0854478ca0dae87c33c8c5ce. Accessed on 7/16/2020

USFWS Lands and Easements. U.S. Fish and Wildlife Service. 2019. Available online at: http://www.fws.gov/GIS/data/CadastralDB/index.htm.

USFWS Information for Planning and Consultation (IPaC). County Endangered Species List for Perry and Cape Girardeau Counties.

Appendix B

Permit Matrix

Regulatory Authority	Statute	Permit/ Approval	Description	Trigger	Fee	Application Timeline	Website
Federal Approvals							
USACE – St. Louis District	Clean Water Act	Section 404 Permit	Required for the discharge of dredged or fill material into waters of U.S. Minimal levels of file may be covered under existing General Permits/Letters of Permission	Presence of waters of the U.S. that will be impacted by project	No fee.	Depends on level of fill and type of permit required (individual vs. nationwide)	http://www.usace.army.mil/
US Fish and Wildlife – Missouri Field Office	Section 7/9 /10 of Endangered Species Act (ESA)	Consultation pursuant to Section 7 or 10 of the Endangered Species Act - USFWS and project proponent (or federal agency) to coordinate on how to implement proposed project while avoiding impacts to federally-listed endangered species to the greatest extent feasible.	Determination that "take" is likely to occur during a proposed non-Federal activity and a decision by the landowner or project proponent to apply for an incidental take permit. Federal activities and non-Federal activities that receive Federal funding or require a Federal permit (other than a section 10 permit) typically obtain incidental take authority through the consultation process under section 7 of the ESA. Thus, the Habitat Conservation Plan (HCP) process is designed to address non-Federal land or water use or development activities that do not involve a Federal action that is subject to section 7 consultation.	Presence of endangered species near the study area and project potentially impacting the endangered species. If a federal permit or approval is required, Section 7 Consultation will be necessary.	No Fee	Prior to ground disturbing activities. Depending on project size and potential impacts to listed species – 6 to 9 months.	http://www.fws.gov/endangered/hcp/hcpbook.htm

Regulatory Authority	Statute	Permit/ Approval	Description	Trigger	Fee	Application Timeline	Website
State Approvals							
Missouri Public Service Commission	Pursuant to Missouri Revised Statute Title XXV, Chapter 393.170.1 and Missouri Code of State Regulations 4 CSR 240-2.060 and 4 CSR 240-3.105	Certificate Convenience and Necessity	For development of new transmission facilities for which	Generation of power described in previous column.		180 days prior to construction (minimum).	
Missouri Department of Conservation		Easement	Crossing Apple Creek Conservation Area	Location of transmission line in lands owned and managed by MDC.		6 – 12 months prior to construction. Application needs to provided access information, amount of proposed clearing and construction timing in into addition easement location.	
	Missouri Code of State Regulations 3 CSR 10-4.111	State Endangered Species consultation	Consultation completed as part of CCN and land crossing of Apple Creek Conservation Area		No Fee		
Missouri Department of Natural Resources	Clean Water Act, Missouri Clean Water Law and Missouri Code of State Regulations 10 CSR 20-6.060	Section 401 Certification	Verify that project construction would comply with state water quality standards.	A 401 Water Quality Certification required if a Section 404 permit is required and not covered under pre-certification	No fee.	Same as a Section 404 Permit.	https://dnr.mo.gov/env/wp/401/index.html
	National Pollutant Discharge Elimination System Act and Missouri Code of State Regulations 10 CSR 20-6.200	Land Disturbance Permit	For stormwater discharges from construction activities. Should be filed electronically using ePermitting.	Grading of more than 1 acre.	Dependent on the size of disturbance	Permit to be filed prior to construction with a Stormwater Pollution Prevention Plan (SWPPP).	https://dnr.mo.gov/env/wp/stormwater/sw-land-disturb-permits.htm

Regulatory Authority	Statute	Permit/ Approval	Description	Trigger	Fee	Application Timeline	Website
Missouri Department of Natural Resources State Historic Preservation Office (SHPO)	Section 106 of the National Historic Preservation Act	Review and Coordination	Section 106 Compliance is required if there is a federal permit or approval	Federal permit/approval	No Fee	Prior to construction	
Missouri Department of Transportation		Road Approach/ Access Permit	Required to provide driveway access to state owned right of way.	Project requires change in access to or from state right of way or change in use of property.	$100	Prior to construction	https://www.modot.org/permits
		Permit to Perform Work on MHTC Right of Way	Required to install utilities within state owned right-of-way	Project requires a utility line crossing of DOT right-of-way		Prior to construction	https://www.modot.org/permits
Missouri Motor Carrier		Oversize/ Overweight Permit	Required to transport loads that exceed Missouri's legal weight and size requirements. Specific routes and special requirements may be applicable.	Project construction requires oversize/ overweight truck loads.	Annual Blanket Permit up to $500	Prior to construction	https://www.modot.org/OSOW
Local Regulations							
Perry County	Missouri Revised Statutes Title XIV Section 229.100	County Assent	Required for installation electrical infrastructure over or under public county roads or highway and for using county roads during construction.	Working in or utility crossing of county road right-of-way	Contact County	Prior to construction across county roads	
	42 U.S. Code Chapter 50 and County Regulations	Floodplain Development Permit	Required for transmission infrastructure installation or grading in Federal Emergency Management Agency (FEMA) regulated floodplains	Encroachment or work in regulated 100-year floodplain	Contact County	Prior to construction	https://sema.dps.mo.gov/county/
Cape Girardeau County	Missouri Revised Statutes Title XIV Section 229.100	County Assent	Required for installation electrical infrastructure over or under public county roads or highway and for using county roads during construction.	Working in or utility crossing of county road right-of-way	Contact County	Prior to construction across county roads	

Regulatory Authority	Statute	Permit/ Approval	Description	Trigger	Fee	Application Timeline	Website
	42 U.S. Code Chapter 50 and County Regulations	Floodplain Development Permit	Required for transmission infrastructure installation or grading in Federal Emergency Management Agency (FEMA) regulated floodplains	Encroachment or work in regulated 100-year floodplain	Contact County	Prior to construction	https://sema.dps.mo.gov/county/

Appendix C

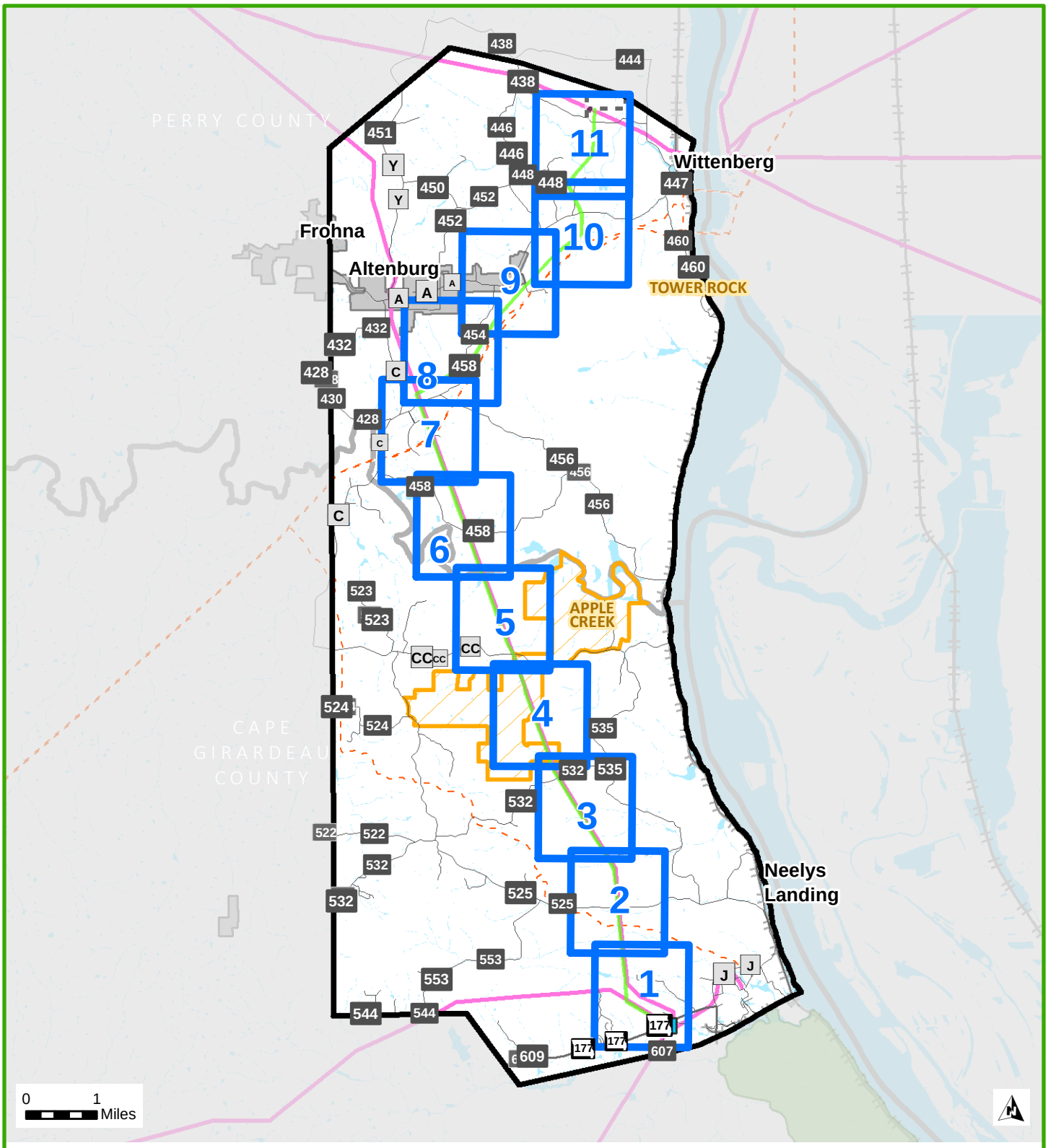
State and Federally Listed Species

Species Scientific Name	Status	Suitable Habitat/Designated Critical Habitat Description	Recorded Occurrence in the Study Area	Recorded with half mile of the route
Bald Eagle *Haliaeetus leucocephalus*	Protected under Bald and Golden Eagle Act	Migrate along the Mississippi River and nest near steams or water bodies.	Yes	No
Indiana Bat *Myotis sodalis*	Federal Endangered	During winter months hibernate in caves and mines. During the summer months, they roost and raise young under the bark of trees in riparian forests and upland forests near perennial streams. Designated Critical habitat is located west of Perry County.	Yes	No
Northern Long-eared Bat *Myotis septentrionalis*	Federal Threatened	During winter months hibernate in caves and mines. During the summer months, they roost and raise young under the bark of trees in riparian forests and upland forests near perennial streams.	No	No
Gray Bat *Myotis grisescens*	Federal Endangered	Gray bats live in caves year-round. During winter, gray bats hibernate in deep, vertical caves. In summer, they roost and form maternity colonies in caves which are scattered along streams, rivers and reservoirs.	No	No
Pallid Sturgeon *Scaphirhynchus albus*	Federal / State Endangered	Mississippi River and confluence streams	Yes	No
Grotto Sculpin Cottus specus	Federal Endangered	Cave streams, springs, and surface streams. It is restricted to five cave systems and two surface streams in Perry County, Missouri.	No	No
Curtis' pearlymussel *Epioblasma florentina curtisi*	Federal Endangered	Transitional zones of clean streams and rivers, between the swift-flowing headwaters and more leisurely, meandering currents farther downstream.	No	No
Lake Sturgeon *Acipenser fulvescens*	State Endangered	Mississippi River and large tributaries	Yes	No
Crystal Darter *Crystallaria asprella*	State Endangered	Open channels of large, clear streams with low to moderate gradients and long stretches of silt-free sand and small gravel substrate.	Yes	No

Species Scientific Name	Status	Suitable Habitat/Designated Critical Habitat Description	Recorded Occurrence in the Study Area	Recorded with half mile of the route
Virginia pennywort *Obolaria virginica*	S2 (voluntary stewardship recommended by MDC)	Nutrient rich eastern forests, often under dense leaf litter	Yes	No
Once a route is approved and survey permission obtained from landowners, ATXI will perform any necessary field surveys. ATXI will continue to coordinate with United State Fish and Wildlife Service and the Missouri Department of Conservation and will obtain any approvals and implement appropriate mitigation measures.				

Appendix D

Detailed Proposed Route Maps



Ameren

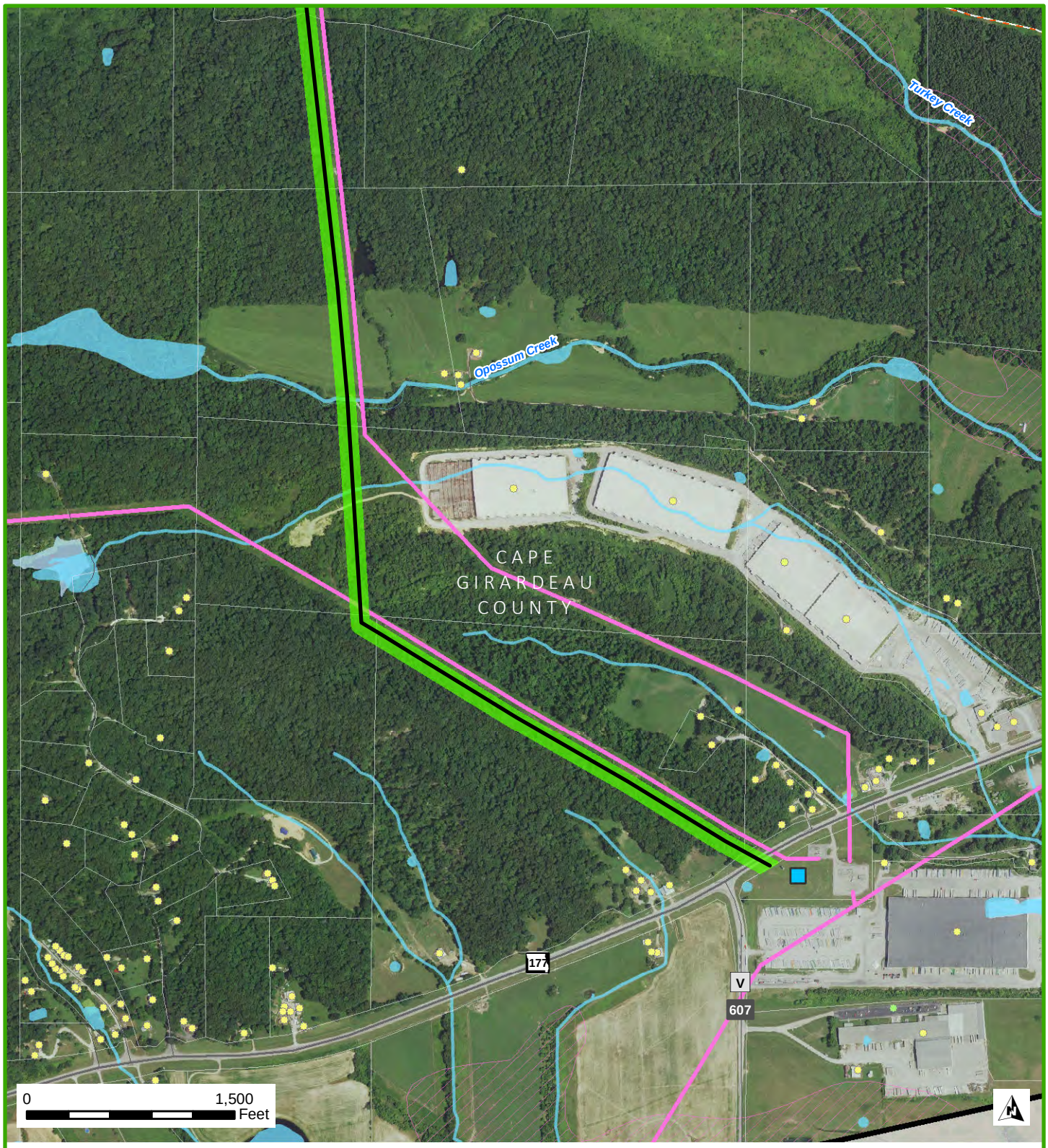
The route depicted on this map is the route ATXI is proposing to utilize for purposes of the project. All landowners in the study area are advised to stay engaged as the project progresses through siting and regulatory approvals.

- Proposed Route
- Map Page
- Study Area
- Substation Area
- Project Substation
- Existing Transmission Lines
- Pipeline
- Railroad
- MO Conservation Land
- MO DNR Land
- Wetlands and Water
- County
- City

LIMESTONE RIDGE PROJECT

PROPOSED ROUTE INDEX

Schedule DS-01



Ameren

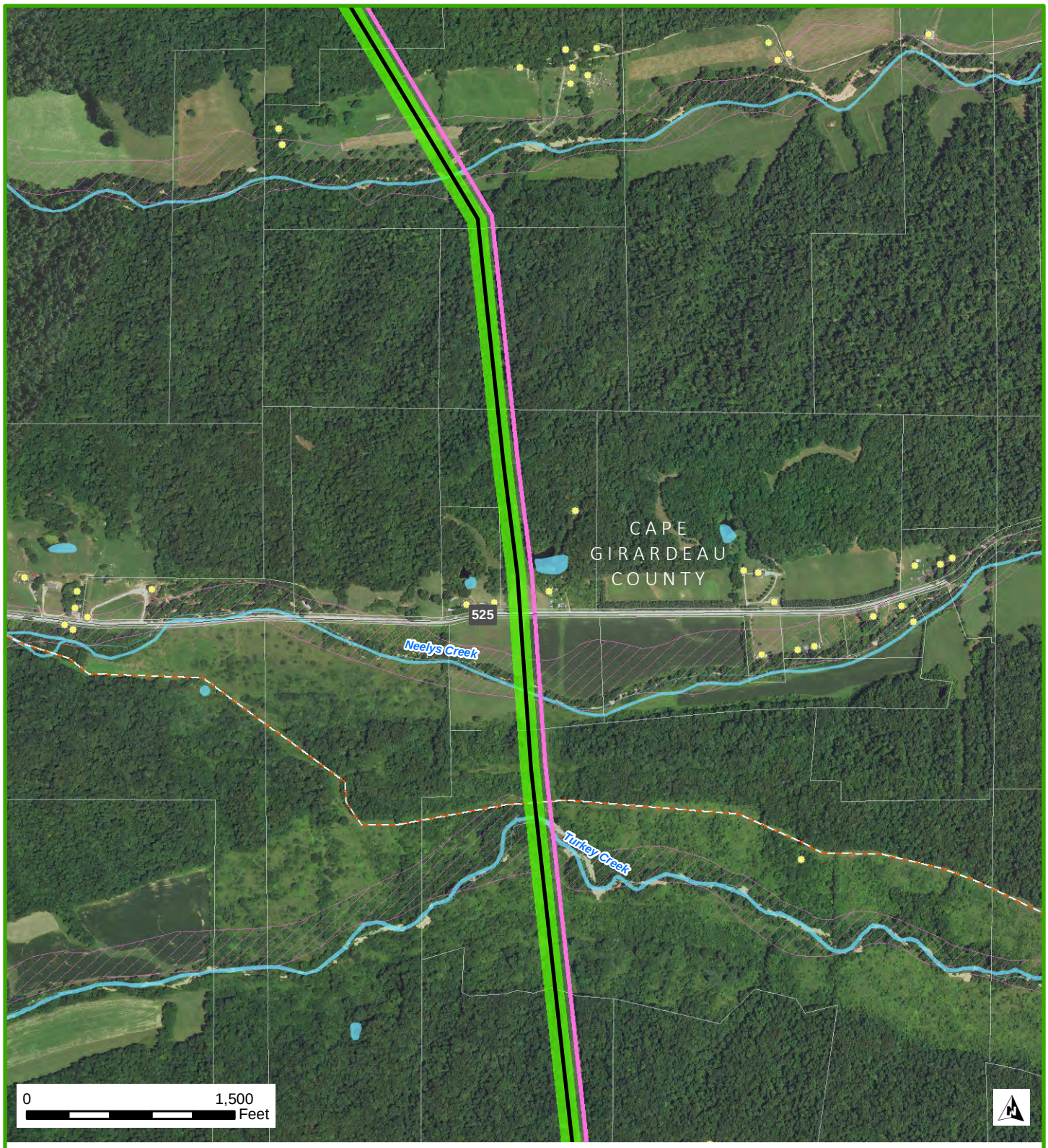
The route depicted on this map is the route ATXI is proposing to utilize for purposes of the project. All landowners in the study area are advised to stay engaged as the project progresses through siting and regulatory approvals.

- Proposed Route Ceterline
- Proposed Route ROW
- Study Area
- Substation Area
- Project Substation
- Existing Transmission Lines
- Pipeline
- MO Conservation Land
- MO DNR Land
- Wetlands and Water
- Flood Zone
- Sink Holes Area
- Home and Outbuildings
- Communication Tower
- Church or Cemetery
- Mine Occurances
- County
- City
- Parcels

LIMESTONE RIDGE PROJECT

PROPOSED ROUTE

Schedule DS-01



Ameren

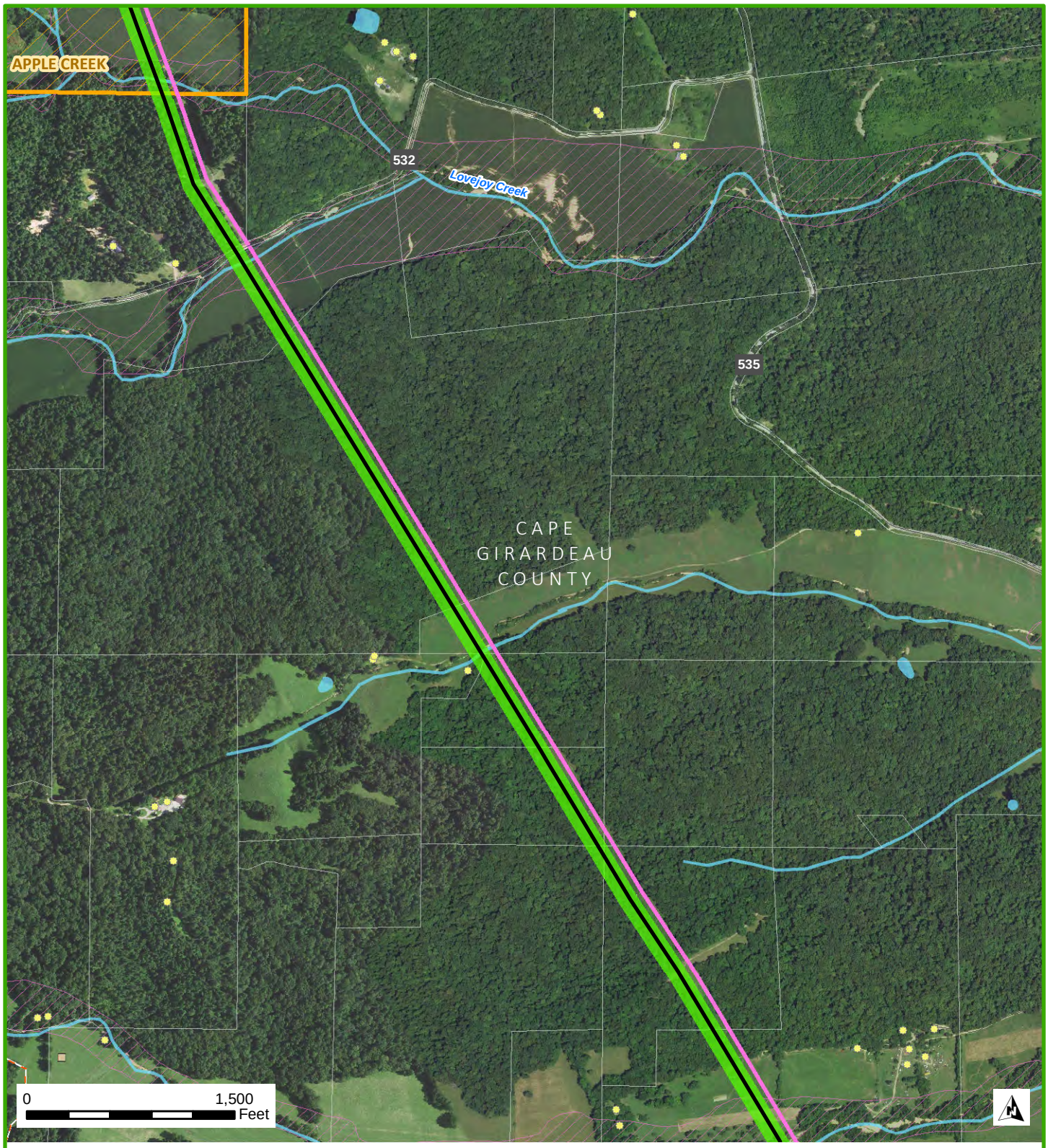
The route depicted on this map is the route ATXI is proposing to utilize for purposes of the project. All landowners in the study area are advised to stay engaged as the project progresses through siting and regulatory approvals.

- Proposed Route Ceterline
- Proposed Route ROW
- Study Area
- Substation Area
- Existing Transmission Lines
- Pipeline
- MO Conservation Land
- MO DNR Land
- Wetlands and Water
- Flood Zone
- Sink Holes Area
- Home and Outbuildings
- Communication Tower
- Church or Cemetery
- Mine Occurances
- County
- City
- Parcels

LIMESTONE RIDGE PROJECT

PROPOSED ROUTE

Schedule DS-01



Ameren

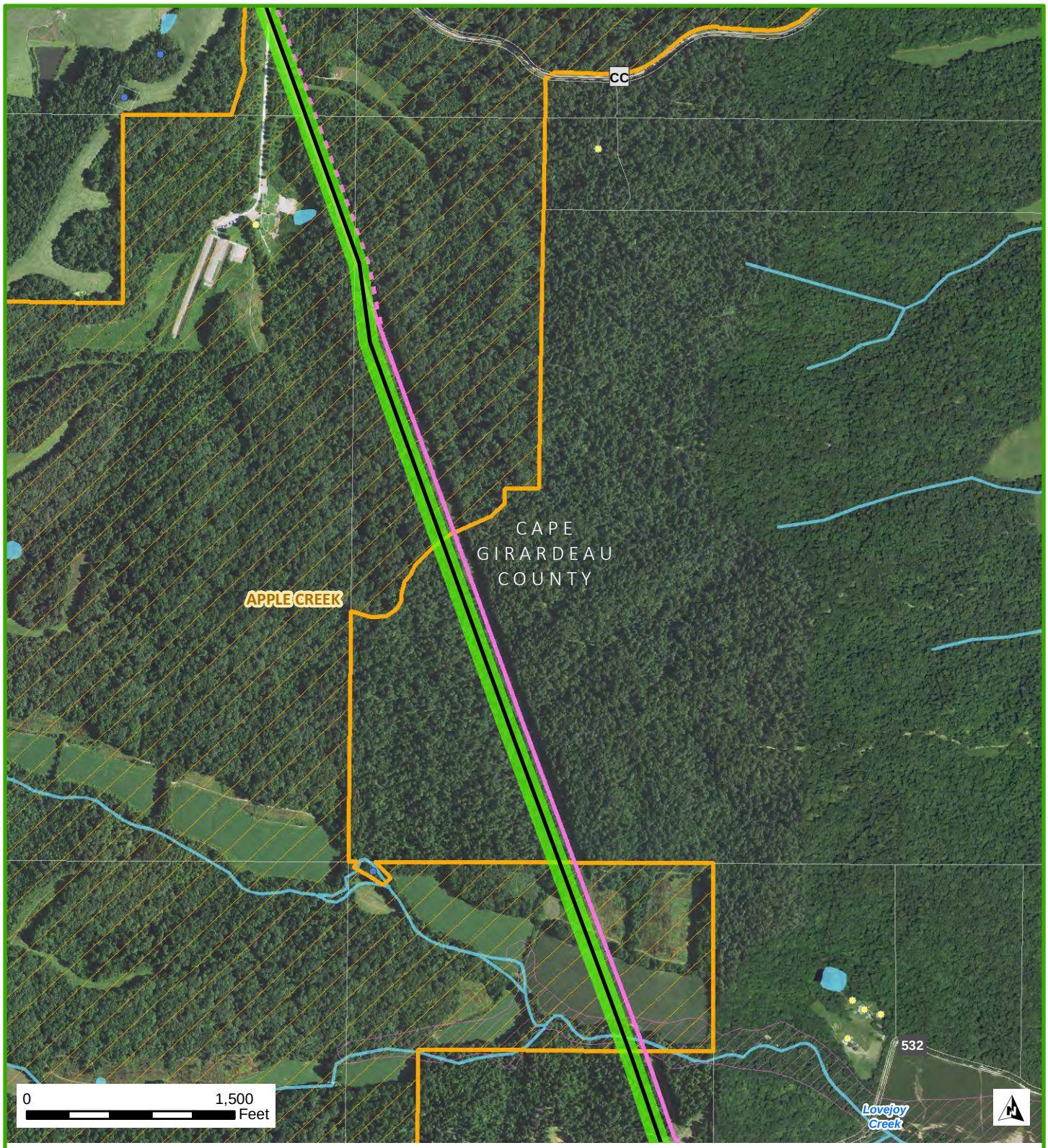
The route depicted on this map is the route ATXI is proposing to utilize for purposes of the project. All landowners in the study area are advised to stay engaged as the project progresses through siting and regulatory approvals.

- Proposed Route Ceterline
- Proposed Route ROW
- Study Area
- Substation Area
- Existing Transmission Lines
- Pipeline
- MO Conservation Land
- MO DNR Land
- Wetlands and Water
- Flood Zone
- Sink Holes Area
- Home and Outbuildings
- Communication Tower
- Church or Cemetery
- Mine Occurances
- County
- City
- Parcels

LIMESTONE RIDGE PROJECT

PROPOSED ROUTE

Schedule DS-01



Ameren

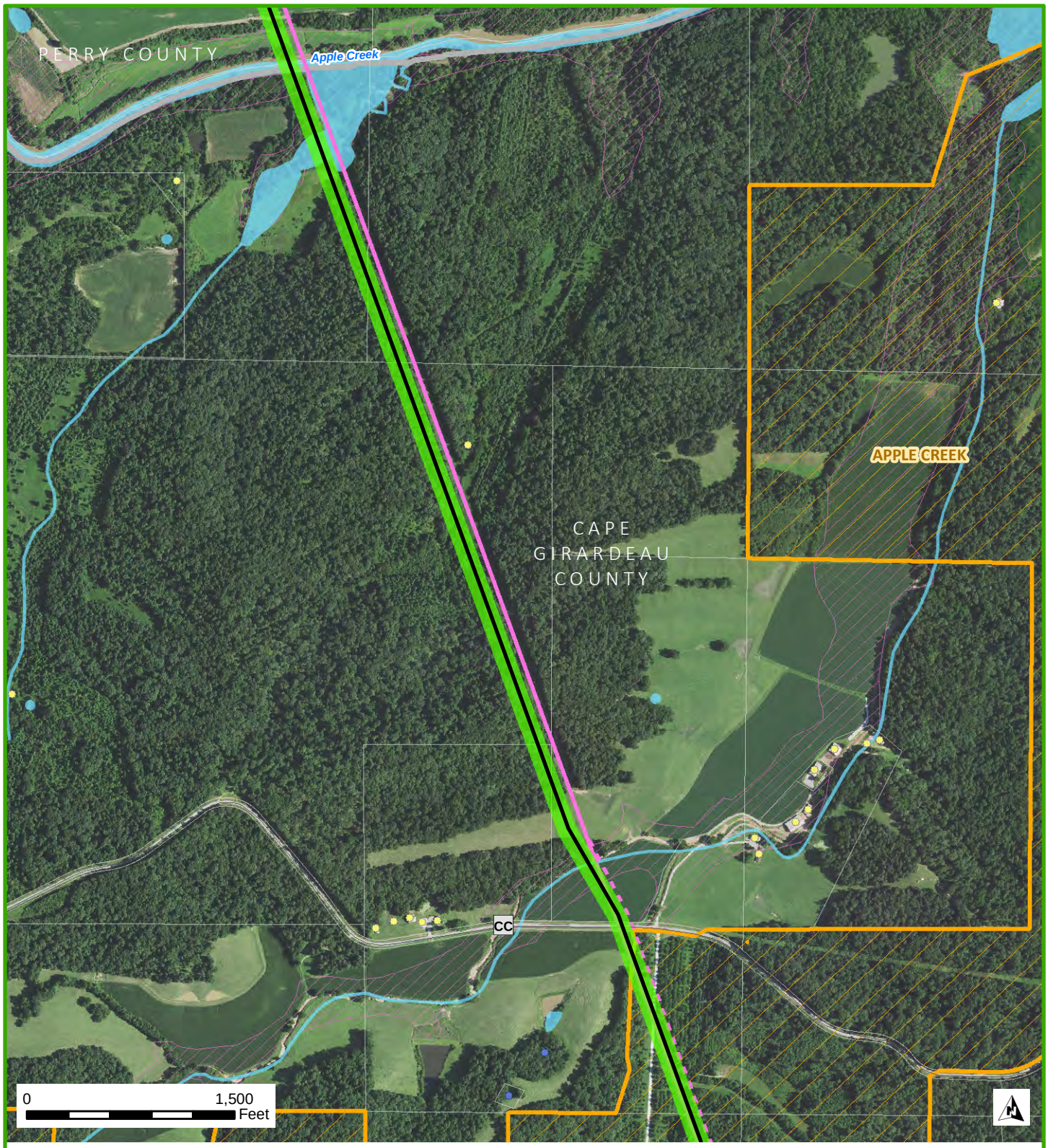
The route depicted on this map is the route ATXI is proposing to utilize for purposes of the project. All landowners in the study area are advised to stay engaged as the project progresses through siting and regulatory approvals.

- Proposed Route Ceterline
- Proposed Route ROW
- Study Area
- Substation Area
- Existing Transmission Lines
- Modified 69kV Centerline
- Pipeline
- MO Conservation Land
- MO DNR Land
- Wetlands and Water
- Flood Zone
- Sink Holes Area
- Home and Outbuildings
- Communication Tower
- Church or Cemetery
- Mine Occurances
- County
- City
- Parcels

LIMESTONE RIDGE PROJECT

PROPOSED ROUTE

Schedule DS-01



Ameren

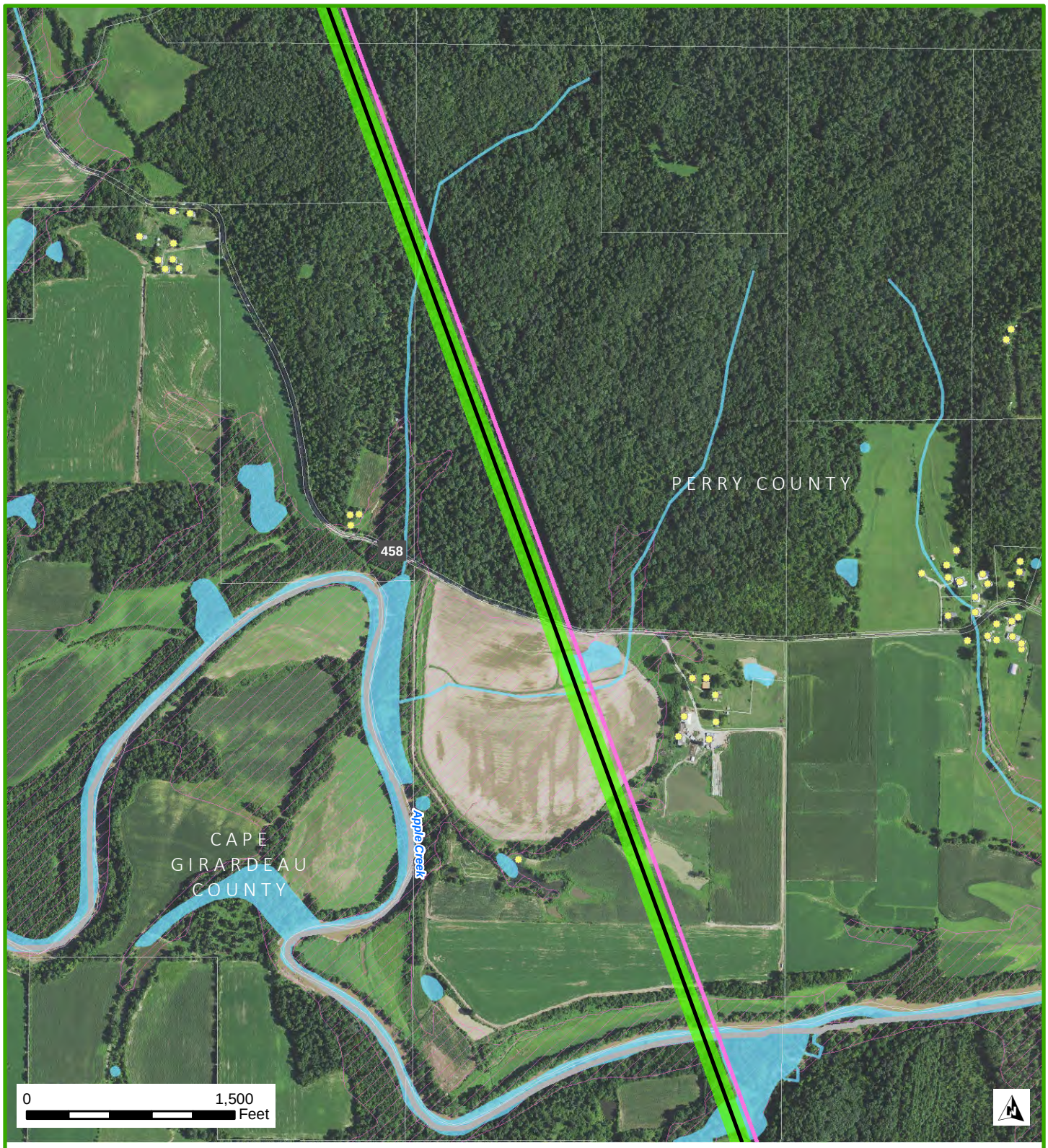
The route depicted on this map is the route ATXI is proposing to utilize for purposes of the project. All landowners in the study area are advised to stay engaged as the project progresses through siting and regulatory approvals.

- Proposed Route Ceterline
- Proposed Route ROW
- Study Area
- Substation Area
- Existing Transmission Lines
- Modified 69kV Centerline
- Pipeline
- MO Conservation Land
- MO DNR Land
- Wetlands and Water
- Flood Zone
- Sink Holes Area
- Home and Outbuildings
- Communication Tower
- Church or Cemetery
- Mine Occurances
- County
- City
- Parcels

LIMESTONE RIDGE PROJECT

PROPOSED ROUTE

Schedule DS-01



Ameren

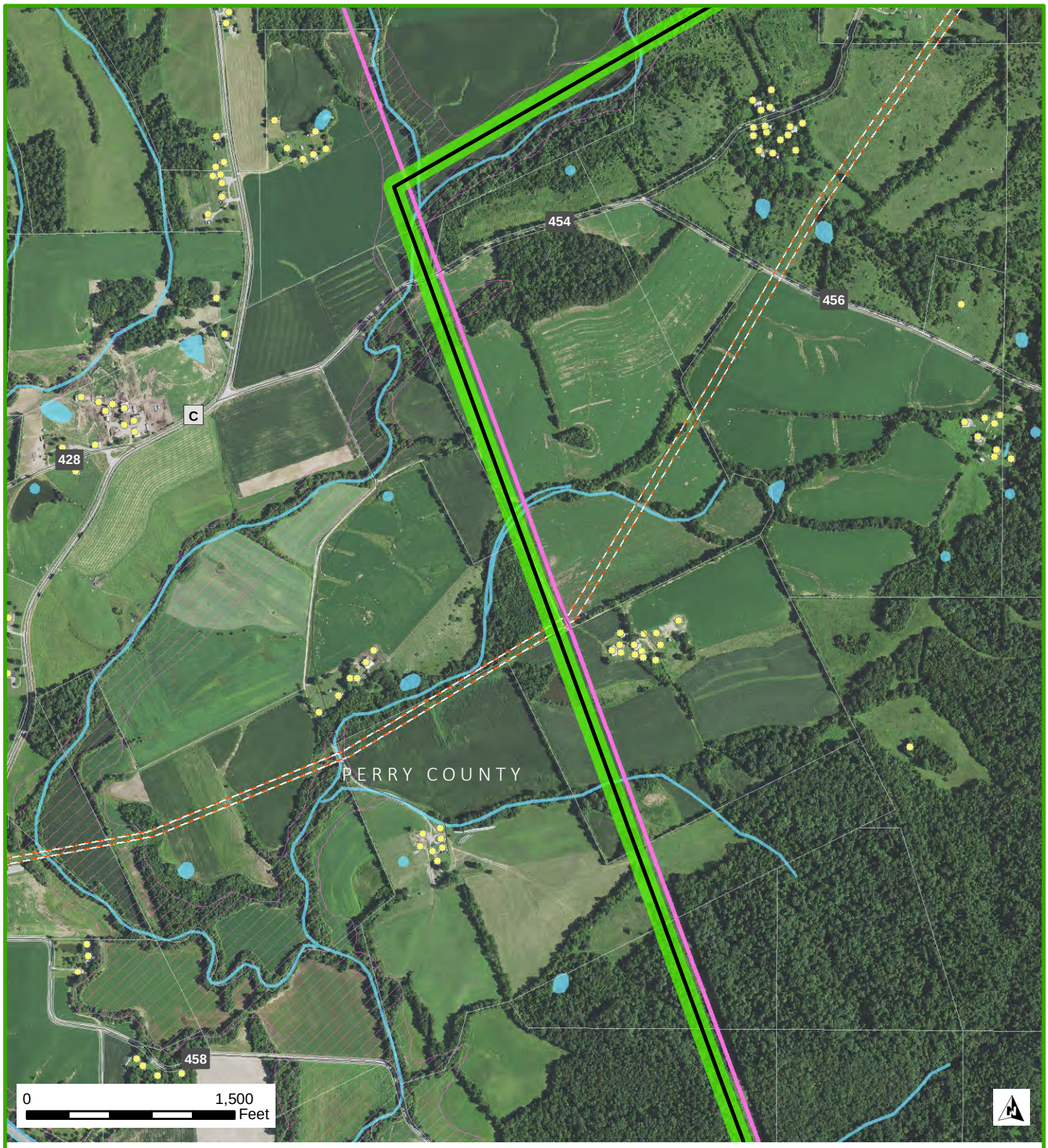
The route depicted on this map is the route ATXI is proposing to utilize for purposes of the project. All landowners in the study area are advised to stay engaged as the project progresses through siting and regulatory approvals.

- Proposed Route Ceterline
- Proposed Route ROW
- Study Area
- Substation Area
- Existing Transmission Lines
- Pipeline
- MO Conservation Land
- MO DNR Land
- Wetlands and Water
- Flood Zone
- Sink Holes Area
- Home and Outbuildings
- Communication Tower
- Church or Cemetery
- Mine Occurances
- County
- City
- Parcels

LIMESTONE RIDGE PROJECT

PROPOSED ROUTE

Schedule DS-01



Ameren

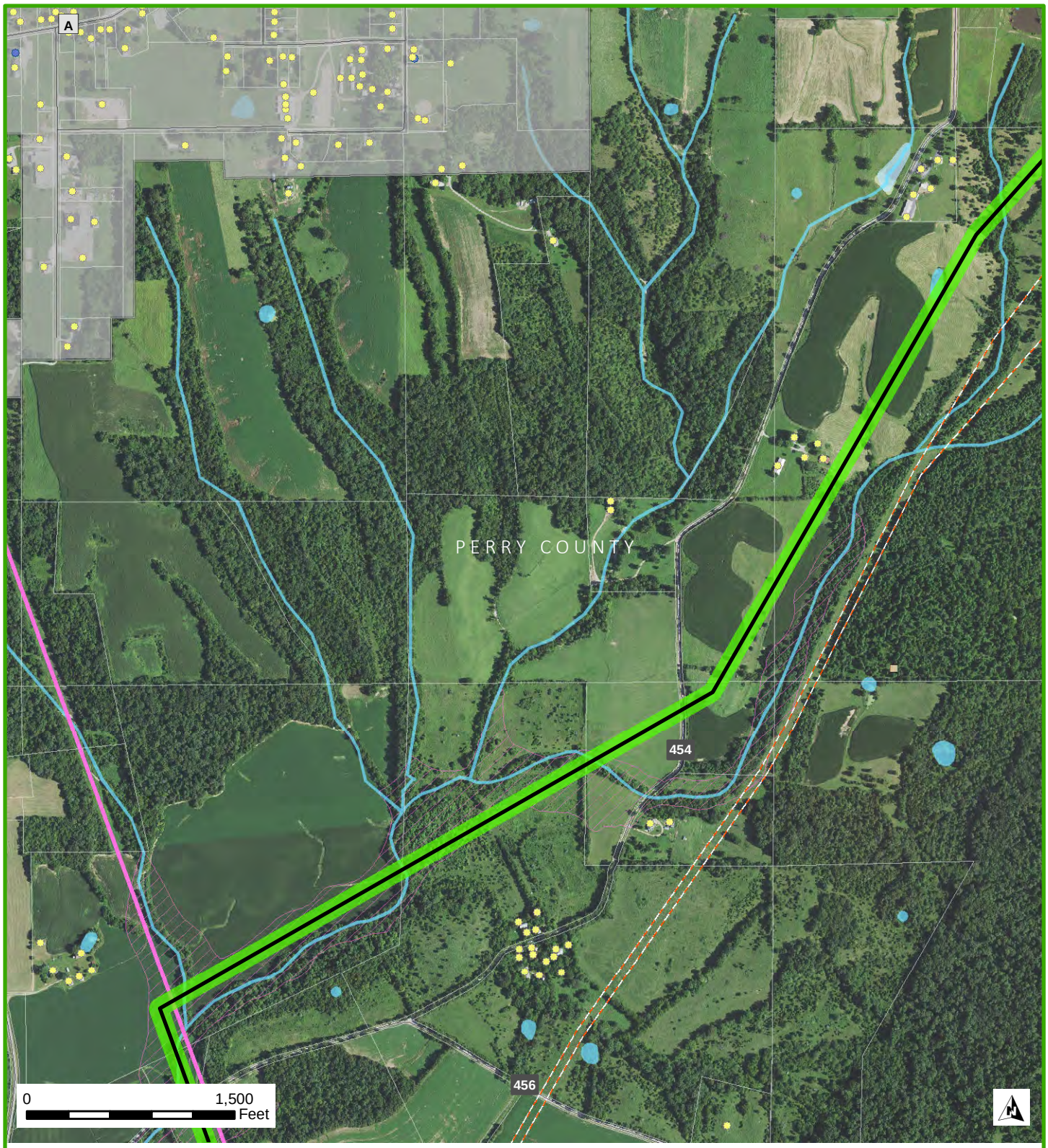
The route depicted on this map is the route ATXI is proposing to utilize for purposes of the project. All landowners in the study area are advised to stay engaged as the project progresses through siting and regulatory approvals.

- Proposed Route Ceterline
- Proposed Route ROW
- Study Area
- Substation Area
- Existing Transmission Lines
- Pipeline
- MO Conservation Land
- MO DNR Land
- Wetlands and Water
- Flood Zone
- Sink Holes Area
- Home and Outbuildings
- Communication Tower
- Church or Cemetery
- Mine Occurances
- County
- City
- Parcels

LIMESTONE RIDGE PROJECT

PROPOSED ROUTE

Schedule DS-01



Ameren

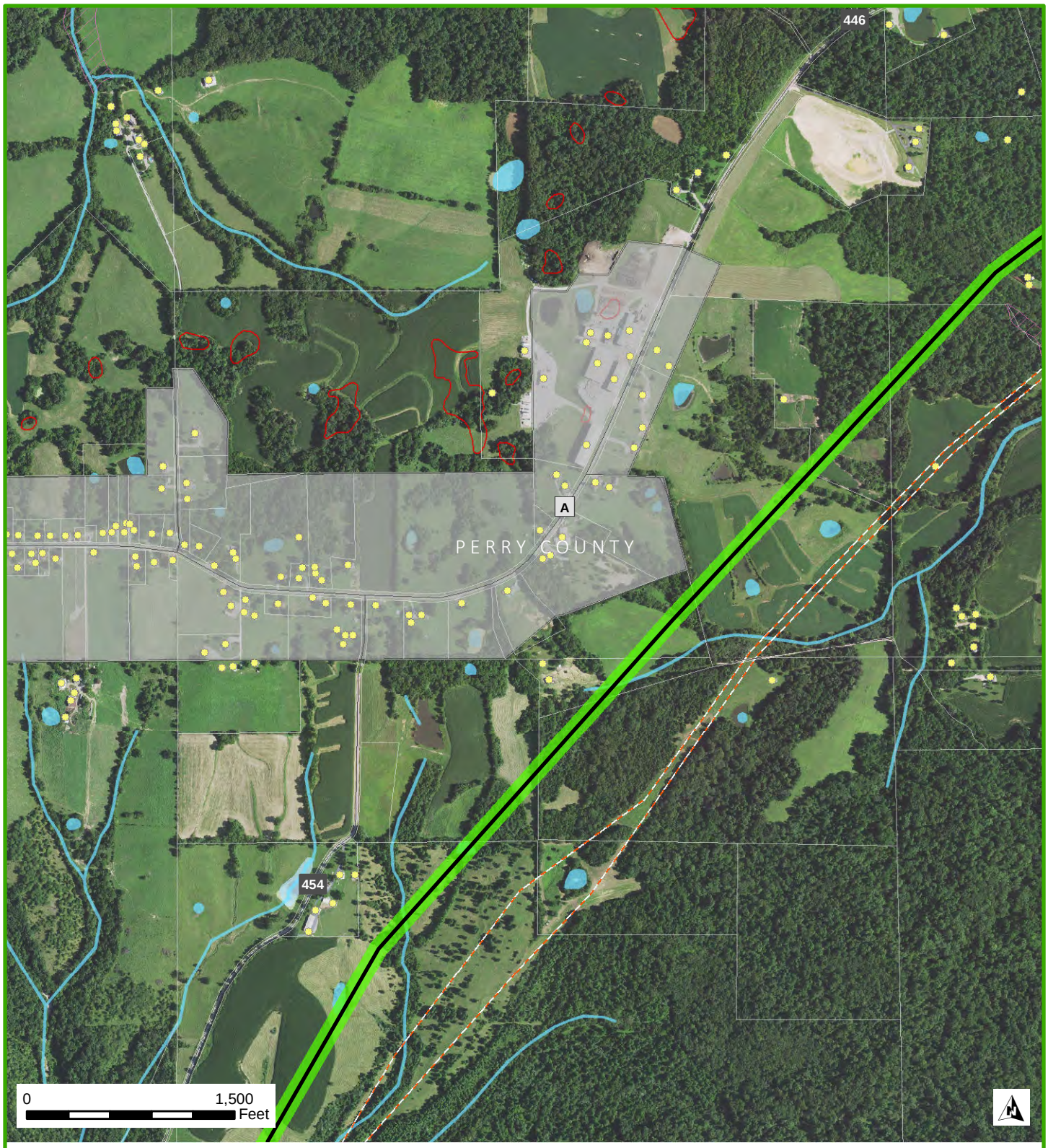
The route depicted on this map is the route ATXI is proposing to utilize for purposes of the project. All landowners in the study area are advised to stay engaged as the project progresses through siting and regulatory approvals.

- Proposed Route Ceterline
- Proposed Route ROW
- Study Area
- Substation Area
- Existing Transmission Lines
- Pipeline
- MO Conservation Land
- MO DNR Land
- Wetlands and Water
- Flood Zone
- Sink Holes Area
- Home and Outbuildings
- Communication Tower
- Church or Cemetery
- Mine Occurances
- County
- City
- Parcels

LIMESTONE RIDGE PROJECT

PROPOSED ROUTE

Schedule DS-01



Ameren

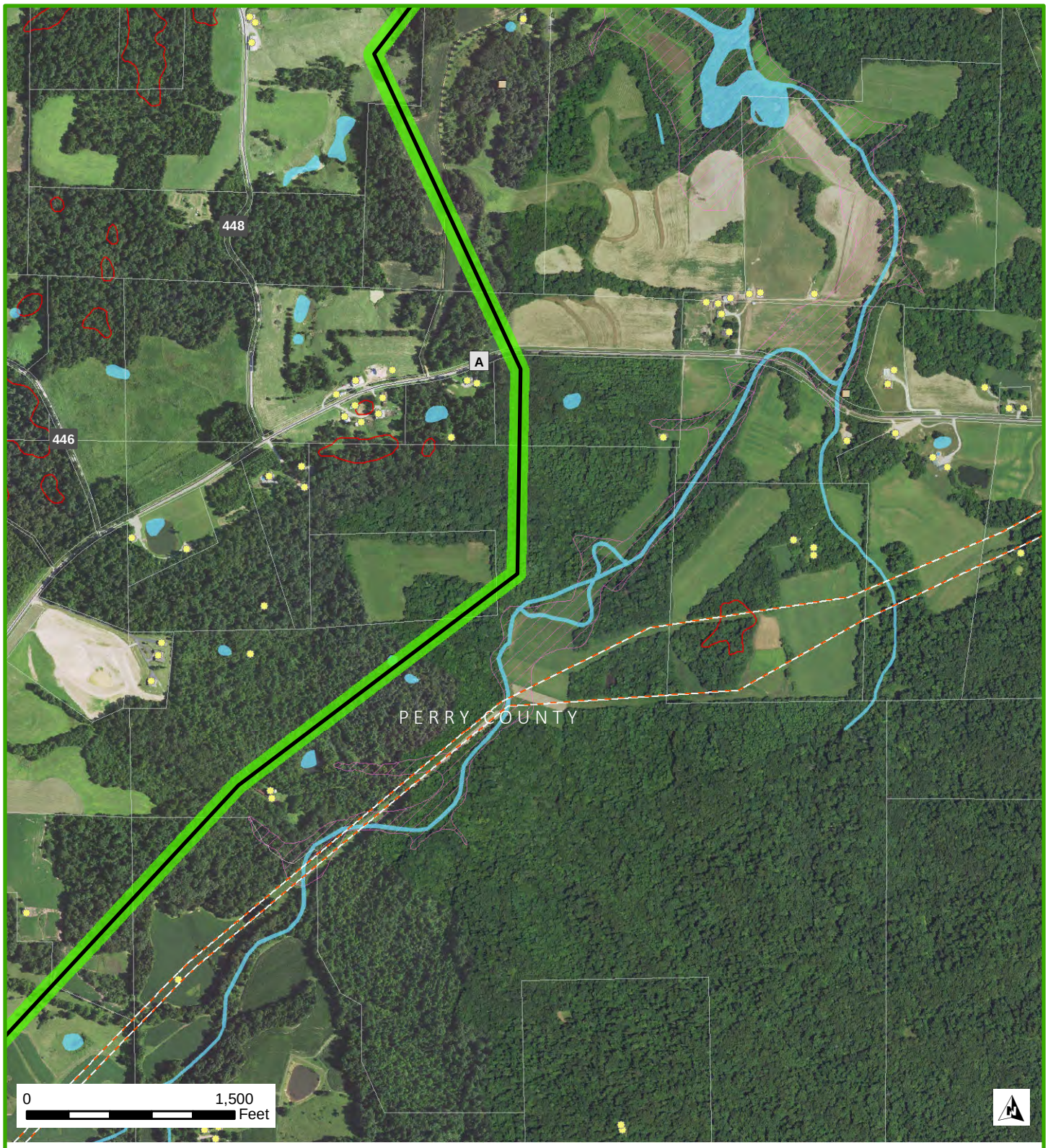
The route depicted on this map is the route ATXI is proposing to utilize for purposes of the project. All landowners in the study area are advised to stay engaged as the project progresses through siting and regulatory approvals.

- Proposed Route Ceterline
- Proposed Route ROW
- Study Area
- Substation Area
- Existing Transmission Lines
- Pipeline
- MO Conservation Land
- MO DNR Land
- Wetlands and Water
- Flood Zone
- Sink Holes Area
- Home and Outbuildings
- Communication Tower
- Church or Cemetery
- Mine Occurances
- County
- City
- Parcels

LIMESTONE RIDGE PROJECT

PROPOSED ROUTE

Schedule DS-01



Ameren

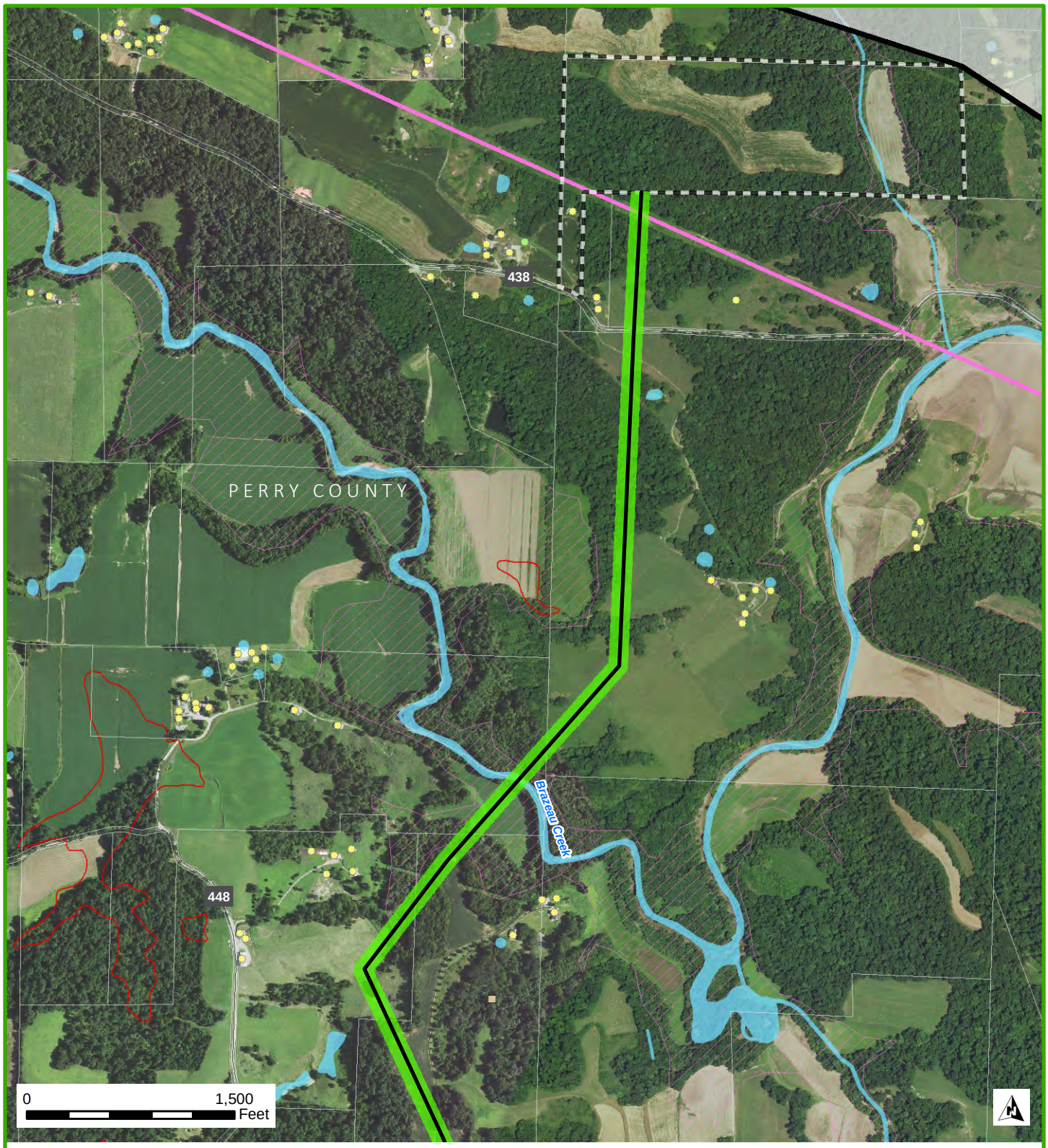
The route depicted on this map is the route ATXI is proposing to utilize for purposes of the project. All landowners in the study area are advised to stay engaged as the project progresses through siting and regulatory approvals.

- Proposed Route Ceterline
- Proposed Route ROW
- Study Area
- Substation Area
- Existing Transmission Lines
- Pipeline
- MO Conservation Land
- MO DNR Land
- Wetlands and Water
- Flood Zone
- Sink Holes Area
- Home and Outbuildings
- Communication Tower
- Church or Cemetery
- Mine Occurances
- County
- City
- Parcels

LIMESTONE RIDGE PROJECT

PROPOSED ROUTE

Schedule DS-01



Ameren

The route depicted on this map is the route ATXI is proposing to utilize for purposes of the project. All landowners in the study area are advised to stay engaged as the project progresses through siting and regulatory approvals.

- Proposed Route Ceterline
- Proposed Route ROW
- Study Area
- Substation Area
- Existing Transmission Lines
- Pipeline
- MO Conservation Land
- MO DNR Land
- Wetlands and Water
- Flood Zone
- Sink Holes Area
- Home and Outbuildings
- Communication Tower
- Church or Cemetery
- Mine Occurances
- County
- City
- Parcels

LIMESTONE RIDGE PROJECT

PROPOSED ROUTE

Schedule DS-01