



ROUTING STUDY

Lynn Bark Generation Tie-line 138 kV Routing
Study

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1 Introduction

1.1 Project Description

Savion, LLC (Savion) is planning to construct approximately six miles of new 138 kilovolt (kV) transmission line to connect the proposed Lynn Bark Substation within the Lynn Bark Solar Facility to the existing Inez Substation within the Martin Solar Facility (the Project).

The goal of the route selection study was to identify a Preferred Route for the proposed 138 kV transmission line connecting the proposed Lynn Bark Substation to the existing Inez Substation that minimized potential impact to sensitivities, while utilizing existing routing opportunities, and adhering to the routing guidelines and regulatory requirements in Kentucky.

1.2 Existing Environment & Study Area Development

The Project is located between Davelle and Threeforks in Martin County, Kentucky. The largest towns in the area are Inez and Warfield to the north and northeast of the Study Area, respectively. The Big Sandy Regional Airport is located to the southwest of the Study Area. The Study Area is generally rural, with mostly residential and industrial land uses. Rural neighborhood clusters are present along Coldwater Road and South Wolf Creek Road. The landscape is generally mountainous with valleys associated with stream systems and wetlands.

The Routing Team identified a Study Area in which to gather information about the existing environment and to site potential routes that would feasibly meet the routing guidelines for the Project (Appendix A, Figures A-1 and A-2). The Study Area encompassed the Project endpoints (proposed Lynn Bark Substation and existing Inez Substation) and a diverse range of possible corridors that could connect the endpoints.

The Project Study Area is approximately 26 square miles and is generally bounded by the proposed Lynn Bark Solar Facility and the Martin Solar Facility as the western and eastern endpoints, respectively; Coldwater Road to the north; and South Wolf Creek Road to the south.

2 Route Development Process

Savion retained Stantec Consulting Services Inc. (Stantec) to assist in transmission line routing for the proposed Project. Savion and Stantec assembled a Routing Team of diverse subject matter experts to identify and analyze Alternative Routes and select a Preferred Route for the Project for submission to the Electric Generation and Transmission Siting Board of the Kentucky Public Service Commission (PSC).

2.1 Routing Team and Process Overview

The transmission line routing process was iterative, including frequent updates throughout the process based on new information. The routing process began with assembling a multidisciplinary Routing Team. The Routing Team included members experienced in high voltage transmission line routing, project management, environmental and cultural resources, engineering, permitting, and real estate. The Routing

Team then identified routing guidelines and the Study Area. Data were then collected for the Study Area using public data sets. Based on this information, the Routing Team created a Segment Network to connect the Project endpoints, while minimizing impacts on sensitivities and taking advantage of routing opportunities. Field reconnaissance helped to refine the Segment Network. The Segments were then analyzed and compared using a broad array of criteria to eliminate Segments and ultimately identify full-length Alternative Routes. The Alternative Routes were then analyzed and compared by the Routing Team to identify a Preferred Route.

2.2 Routing Guidelines

The Routing Team developed the following guidelines to be applied throughout the routing study.

System Planning Requirements

- Meet the electrical need and requirements in an economic and reliable way.

Engineering Requirements / Planning Considerations

- Greenfield right-of-way (ROW) width of 100-feet.
- Centerline of transmission line must be at least 50 feet from fenced solar arrays.
- Parallel to roadways, maintain a minimum of 30 feet offset from road ROW or edge of pavement/gravel.
- Parallel to existing transmission lines, circuits are required to maintain appropriate fall distance of ideally 190 feet, but a minimum of 50 feet centerline to centerline.
- Span lengths greater than 800 feet are atypical.
 - In steep terrain, ridgetop to ridgetop spans can be up to 1,500 feet.
- Minimize slopes steeper than 20%.
 - Maximum slope tolerance for structure locations is 40%.
- Minimize angle structures and avoid angles higher than 60 degrees to the extent practicable.
- Avoid open water expanses greater than 1,000 feet.
- Avoid structure placement in poor soils (i.e., marshes).
- All structures must be accessible for construction and maintenance vehicles.
- Minimize route length, circuitry, cost, and special design requirements.

Impacts to the Natural Environment and Land Use

Where possible:

- Minimize the removal of or substantial interference with the use of existing residences.
- Minimize the removal of existing barns, garages, commercial buildings, and other nonresidential structures.
- Minimize interference with the use and operation of existing schools, recognized places of worship, cemeteries, and facilities used for cultural, historical, and recreational purposes.
- Maximize distance from residences, schools, cemeteries, historical resources, recreation sites, and other important cultural sites.
- Minimize interference with economic activities, including agricultural and silvicultural activities.
- Minimize the crossing of environmentally and culturally sensitive lands, such as recreation lands, designated battlefields and other designated historic sites, national and state forests and parks, nature preserves, conservation lands and easements, jurisdictional waters and large wetland complexes, critical habitat, and other unique or distinct natural resources.
- Where crossings of environmentally sensitive lands are unavoidable, maximize the use of existing crossings.
- Avoid geologically unstable or highly erosive areas.

- Minimize substantial visual impact on residential areas and public resources.
- Minimize interference with regulated airspace associated with Federal Aviation Administration (FAA) regulated and private airfields and flight paths.
- Avoid interference with existing/future land uses (planned developments/road construction activities).
- Minimize the need for additional easement by crossing Savion, Pocahontas, Lexington Coal Company, and Bel Air Investment Holdings-owned land, to the extent practicable.
- Minimize interference with oil/gas extraction activities.

2.3 Data Collection

Data collection was updated throughout the routing process as new data needs were identified. The Routing Team developed a list of evaluation criteria (Appendix B) based on the routing guidelines which guided data collection throughout the study. A Project geographic information system (GIS) was compiled from publicly available and subscription-based data from federal, state, and local sources. GIS data varies in its accuracy and precision based on the source, the age of the dataset, and the resolution of underlying data development. Results and mapping products provided as part of the routing study should be considered reasonable approximations of the features they represent and not as absolute measures. Aerial imagery was an important source of information as a direct data source, for correcting datasets from other sources, and for indicating new data needs. Some datasets were sourced from interpreting aerial imagery (e.g., residences) and were later verified during visual inspections from public roads. Field reconnaissance was an important step in improving the accuracy and precision of the datasets; however, exhaustive geospatial review of all datasets was not feasible within the scope of the routing study. Additional field inspections, surveys, regulatory consultation, and landowner engagement will occur prior to construction.

3 Alternative Route Identification

3.1 Opportunities and Sensitivities

Throughout the study, the Routing Team identified opportunities and sensitivities for line placement as described below.

3.1.1 OPPORTUNITIES

Routing opportunities include situations where placing the Project adjacent to an existing linear feature may reduce impacts and/or increase the constructability of the Project (e.g., decrease cost, decrease permitting needs, increase public acceptance). Routing opportunities identified within the Study Area included:

- Local highways and roads, and former mining roads
- No-cost easement parcels (parcels owned by Savion, Pocahontas, Lexington Coal Co., or Bel Air Investment Holdings)

Opportunities to site routes along these features were incorporated into the process at multiple stages.

3.1.2 SENSITIVITIES

Routing sensitivities are areas or objects that should be avoided or impacts to minimized to the extent practicable. Large area sensitivities identified within the Study Area included, but were not limited to:

- Environmentally and culturally sensitive lands such as archeological sites.
- Large wetlands, wetland complexes streams, floodplains, and water bodies. These include Wolf Creek, Coldwater Fork, and their associated tributaries throughout the Study Area.
- Both proposed and existing solar array locations.

These sensitivities were identified through GIS data review, local knowledge of the Routing Team, and field reconnaissance. Small area sensitivities, such as the following, were identified throughout the route development process.

- Individual residences, community facilities (e.g., schools, places of worship, etc.), and commercial and industrial buildings.
- Infrastructure such as electric transmission and distribution lines and substations in addition to oil and gas wells and gathering lines.

Additional opportunities and sensitivities identified during field reconnaissance were incorporated into the routing study on a qualitative basis.

3.2 Segment Network Development

After initial desktop data acquisition, the Routing Team developed a Preliminary Segment Network that connected the Project endpoints while minimizing impacts to sensitivities and taking advantage of routing opportunities. Data compilation continued throughout the Segment Network development phase, including field reconnaissance. As local information was gathered, new data needs were identified and changes to the Segments were made accordingly.

Following sensitive receptor digitizing and field reconnaissance (Section 3.3), the Final Segment Network was comprised of 22 Segments that were carried forward for further evaluation (Appendix A, Figure A-3).

3.3 Field Reconnaissance

Field reconnaissance was conducted by the Stantec Routing Team once the Preliminary Segment Network was identified. This windshield survey was conducted from public roads to photograph and note features of interest and to confirm aerial imagery. Field reconnaissance occurred on November 19, 2024. These efforts focused on identifying and confirming sensitivities and opportunities in proximity to the Segment Network. Observations were used to modify or remove Segments as necessary. Key observations resulting from field reconnaissance included additional cemeteries, places of worship, and electric distribution infrastructure. These additional points of interest were primarily located in proximity to existing residential clusters along both Coldwater Road and South Wolf Creek Road.

3.4 Alternative Route Identification

After field reconnaissance was conducted and discussed with the greater Project team, the Final Segment Network was analyzed using the evaluation criteria. This process allowed the Routing Team to compare Segments with each other, combine Segments into longer assemblages, and ultimately eliminate Segments that did not perform as well in the analysis. This analysis was based on a potential centerline and assumed 100-foot greenfield ROW, with a 50-foot offset from centerline from fenced solar arrays, and a 30-foot offset from road ROW. The objective was to reduce the number of Segments such that those remaining were more suitable for routing a new transmission line and could be combined into full length routes. Comparisons became successively more complex and covered longer distances, as strings of Segments with common starting and ending nodes were evaluated.

Over the course of this iterative review process, the Routing Team completed four multi-segment comparisons. Preferred Segments were selected because, for example, they impacted fewer residences, impacted fewer streams and wetlands, and impacted less solar arrays. As a result of this analysis, four Segments (4, 6, 13, 15) were removed from further consideration. The remaining 17 Segments were combined into four full-length Alternative Routes (Routes A – D).

The Alternative Routes were reviewed by the routing team, and minor adjustments were made to their centerlines based on new information and engineering considerations (Appendix A, Figures A-4 through A-7). Route A is the northernmost Alternative Route. Routes B and C share much of the same path in the central portion of the Study Area, with Route B diverging to the north, and then sharing a centerline with Route A. Route D is the southernmost Alternative Route.

4 Alternative Route Evaluation

The four full-length Alternative Routes (Routes A-D) were evaluated using a comparative analysis of the evaluation criteria, quantified with the GIS desktop data as modified by field reconnaissance. The results of the analysis are discussed below, and a table of the full results are provided in Appendix C.

4.1 Environmental

Within the environmental criteria, results for the Alternative Routes were differentiated by impacts to streams and water features, forested land within the proposed ROW, and the number of state and federally listed threatened and endangered species occurrences within 1,000 feet of the centerline (Appendix A, Figure A-4). Route A has no known protected species occurrences within 1,000 feet of the route. Route B has one known federally listed species occurrence within 1,000 feet of the route, Northern Long-eared Bat (*Myotis septentrionalis*), and two state-listed species, Common Raven (*Corvus corax*), and Rafinesque's Big-eared Bat (*Corynorhinus rafinesquii*). Route C has one known state-listed species occurrence within 1,000 feet of the route, Common Raven (*Corvus corax*). Route D has one federally listed species within 1,000 feet of the route, Northern Long-eared Bat (*Myotis septentrionalis*). Route A performed most favorably in this category. While only Alternative Routes B, C, and D have known occurrences of federally and state-listed species within 1,000 feet of centerline, tree clearing is a more accurate estimate of potential impacts to threatened and endangered species within the Study Area. Route A has no known occurrences of federally or state-listed species within 1,000 feet of the route,

crosses the fewest streams and water features and has the least amount of forested land within the ROW. Route D performed least favorably from an environmental perspective, crossing the most streams and waterbodies, and having the most forested land within the proposed ROW.

4.2 Cultural

Within the cultural criteria group, routes were evaluated by proximity to National Register of Historic Places (NRHP) structures or districts, known archaeological sites, cemeteries, and historic trails or battlefields (Appendix A, Figure A-5). While cemeteries and archaeological sites were present within the Study Area, they were not within or adjacent to the Alternative Route rights-of-way. This criteria group was not a differentiating factor among the Alternative Routes.

4.3 Social

Within the social criteria group, routes were differentiated by proximity to residences, the number of parcels crossed, and the number of landowners crossed (Appendix A, Figure A-5). Route D performed most favorably in this category, followed by Route C. Route D has no residential buildings 500 feet of ROW.. Routes A and B are both less favorable from a social perspective. Route A crosses the most unique property owners (8) not owned by Savion or another no-cost easement landowner, followed by Route B (6). Additionally, Routes A and B both have four residential buildings within 250 feet of ROW.

4.4 Land Use

Within the land use criteria group, routes were differentiated by paralleling of local roads, the acreage of additional easement required, and the percentage of the route that crosses no-cost easement properties (Appendix A, Figure A-6). Route D performed most favorably in the land use category. Route D is located entirely on property owned by Savion, Pocahontas, Lexington Coal Co., or Bel Air Investments Holdings, and requires no additional easements. Routes A and B are both less favorable from a land use perspective. Routes A and B both have the lowest percentages of total length within no-cost easement properties, requiring the greatest acreage of additional easements. However, Route A has the highest percentage of total length that parallels existing local roads (including mining roads) (25.3%), which is a large difference from Routes B, C, and D (4.3%, 4.4%, and 3.5% respectively). Paralleling existing roads is an opportunity because it reduces construction costs associated with building new access roads.

4.5 Engineering

Routes were differentiated within the engineering criteria category by shallow bedrock crossings, steep slope crossings (greater than 20% and 40%), span lengths in excess of 1500 feet, number of hard turn angles, and total route length (Appendix A, Figure A-7). All routes have one transmission line crossing and all routes must cross 100-year floodplain associated with Wolf Creek. It is likely that 100-year floodplain can be spanned.

Route A performed most favorably in the engineering criteria category. It is the shortest route (4.95 miles) and crosses less slopes in excess of 20% and 40% than 20% and slopes greater than 40%. Additionally, Route A also has no span lengths in excess of 1,500 feet.

Route D is less favorable from an engineering perspective. It is the longest route (6.52 miles) with a difference of 1.57 miles between it and the shortest route (Route A). Route D also has the longest crossing of slopes greater than 20% and 40%

4.6 Constructability Review and Cost Estimates

Stantec also performed a preliminary constructability review to compare the four Alternative Routes. The preliminary constructability review includes the costs for both the access road and the structural components of the transmission line, with labor hours accounted for. Permits and ROW acquisition costs are not included in these estimates. The structural costs include the estimated installation of electrical utility poles, overhead line conductors, insulators, and related components like exothermic welds, copper grounding wire, and terminal lugs. These costs account for estimated necessary labor, materials, and equipment for both the access road and the transmission line. Adjustments will need to be made during detailed design and construction based on the final design and site conditions. See Table 1 below for the high-level cost estimate for each Alternative Route.

Table 1. Preliminary Constructability Review – Cost Estimates

Criteria	Route A	Route B	Route C	Route D
Structure Cost (Without Foundation) ¹	\$4,587,163	\$3,972,180	\$4,193,557	\$4,795,938
Access Road Cost ²	\$1,132,046	\$2,212,072	\$2,707,645	\$2,101,646
Helicopter Access Cost ³	\$704,000	\$352,000	\$352,000	\$704,000
Total Cost	\$6,423,208	\$6,536,254	\$7,253,203	\$7,601,585

Route D is estimated to have the most expensive structure costs (without foundation), while Route B is estimated to have the least. All Alternative Routes will require helicopter construction access. Routes A and D are estimated to have the highest cost associated with helicopter access, and Routes B and C are estimated to have the least. The access road development estimates cover the estimated construction of gravel fill, erosion control, clearing, excavation, and the installation of chain-link fences, gates, and culverts, along with mobilization and demobilization of equipment and materials like silt fences and geotextile fabric for soil stabilization. Route C is estimated to have the most expensive access road development, while Route A is estimated to have the least. Overall, Route D is estimated to be the most expensive to construct, followed by Route C. Route A is estimated to be the least expensive to construct, followed by Route B.

Permitting was not included in the preliminary constructability review, but every Alternative Route also has permitting implications related to tree clearing and potential impacts to the Northern Long-eared Bat.

¹ Additional review may be required for the design at existing infrastructure crossings.

² Additional permits or land acquisition may be required.

³ Some locations are inaccessible and may require helicopter access.

5 Preferred Route

The Routing Team selected Route A as the Preferred Route. Overall, while Route D presents more opportunity to construct entirely on no-cost easement parcels and would not require additional easements, it is the longest overall route and has the highest construction costs. Route A is more favorable from an environmental and engineering perspective and is the least expensive for construction. Route A has no known federally or state-listed species occurrences within the ROW and crosses the fewest streams and water features. Route A also has least acreage of forested land in the ROW, and has the highest percentage of total length that parallels existing local roads (including mining roads), reducing costs associated with the construction of access roads.

Appendix A – Figures

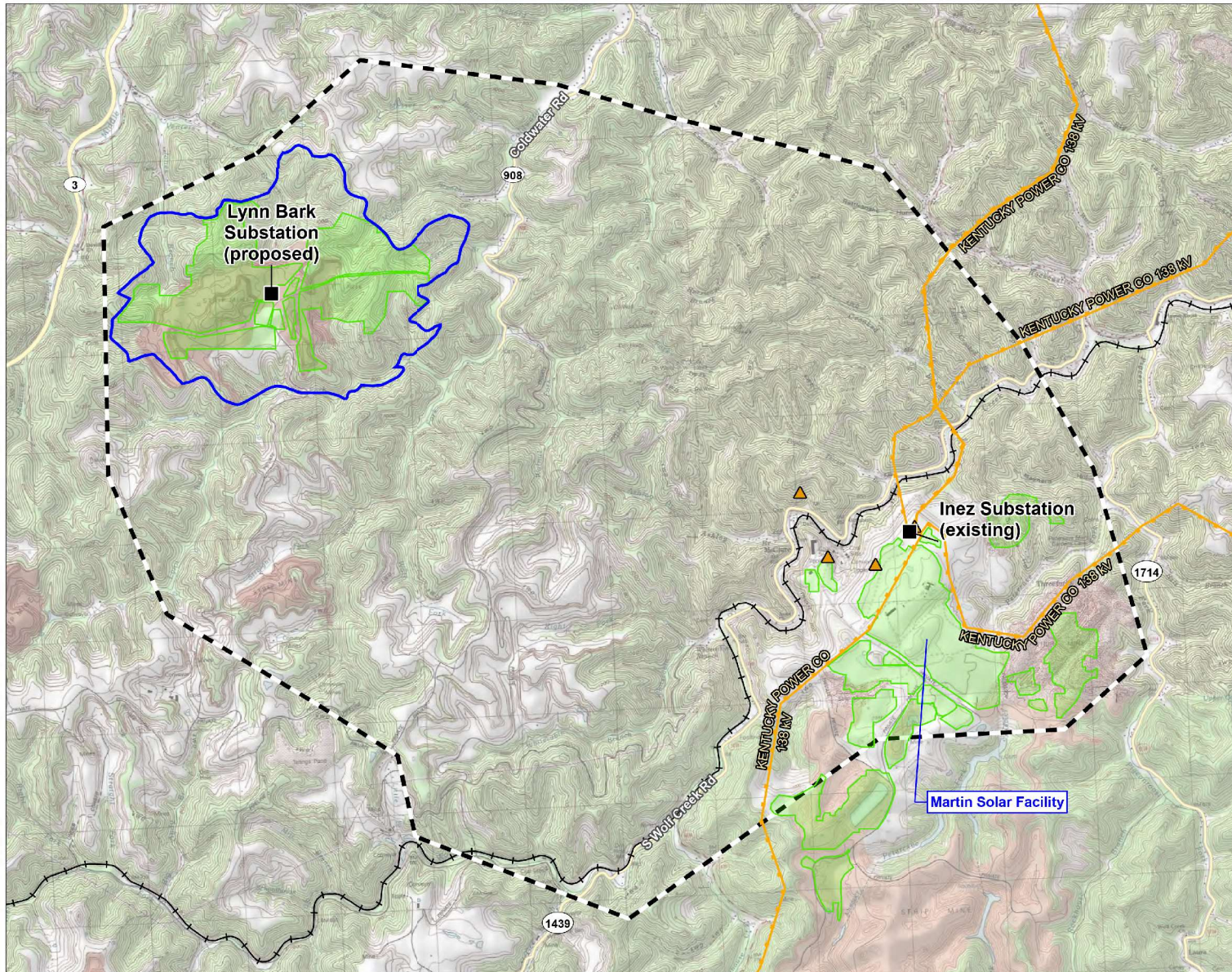


Figure No.

A-1

Title

Study Area and Topography

Client/Project

Savion

Lynn Bark 138 kV Gen-Tie Routing Study

203402782

Project Location
Martin County, KY

Prepared by PM on 2025-02-13
TK by ME on 2025-02-24
IR by KW on 2025-02-24



0 1,750 3,500
Feet
(At original document size of 11x17)
1:42,000

Legend

- Study Area
- Project Endpoint
- Lynn Bark Solar Project Boundary
- Solar Array Fenced Areas
- Existing Substation
- Existing Transmission Line
- Railroad
- State Highway / Other Primary Road
- Local Road



Notes
1. Coordinate System: NAD 1983 StatePlane Kentucky South FIPS 1602 Feet
2. Data Sources: Ameron, Stantec, Esri, USGS, HIFLD, USCB
3. Background: USGS 7.5 Topographic Quadrangles



