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June 17, 2015

PARTIES OF RECORD

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

Enclosed for filing is the Visual Impact Evaluation of Big Rivers Electric Corporation's Application for a Certificate of Public Convenience and Necessity to Construct two 161 KV Transmission Lines in Hancock County, Kentucky, authored by Qk4, Inc.

Sincerely,

A handwritten signature in blue ink, appearing to read "Jeff Derouen".

Jeff Derouen
Executive Director

QN/ph

Attachments

**Visual Impact Evaluation of
Big Rivers Electric Corporation's
Application for a Certificate of Public
Convenience and Necessity to Construct
Two 161 kV Transmission Lines in
Hancock County, Kentucky**

Case No. 2015-00051

Prepared for:
Kentucky Public Service Commission

Prepared by:
Qk4, Inc

June 9, 2015

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VISUAL IMPACT EVALUATION OF BIG RIVERS' PROPOSED ALERIS TRANSMISSION SERVICE PLAN

1.0 BACKGROUND

On April 7, 2015, Big Rivers Electric Corporation (Big Rivers) filed with the Public Service Commission of Kentucky (Commission) an application seeking a “certificate of public convenience and necessity” (Application) to construct two 161 kilovolt (kV) transmission lines near Lewisport in Hancock County, Kentucky. The purpose of the proposed transmission lines is to serve a proposed expansion of a Kenergy industrial customer, Aleris Rolled Products, Inc. (Aleris) aluminum mill. The route for the proposed lines begins at the existing Big Rivers Coleman Extra High Voltage (EHV) Substation located 1.5 miles east of the Aleris aluminum mill. From this substation, the lines will extend west approximately 2.0 miles to two substations at the Aleris aluminum mill. Big Rivers is requesting approval to construct these two transmission lines based upon its demonstrated need¹. The proposed transmission lines will be located entirely within Hancock County, Kentucky².

In addition to the information provided in this report, Big River will supply an affidavit from the company's Chief Electrical Engineer that the project will be designed, constructed, and maintained in accordance with accepted engineering practices and all applicable legal requirements³.

1.1 Statutory Requirements

Due to the length and voltage of these transmission lines, Kentucky Revised Statute (KRS) 278.020 required a certificate of public convenience and necessity for the construction. The authority of the Commission to grant the certificate is found in KRS 278.020; 807 KAR 5:120 Section 2(1)(a); 807 KAR 5:001 Section 14(1).

KRS 278.714 sets forth a number of requirements regarding the content of an application for construction. Commission staff reviewed Big River's Application and, in a letter of April 16, 2015, stated that it...*meets the minimum filing requirements and has been accepted for filing.*” KRS 278.714(3) provides guidance for the Commission in making decisions regarding approval of transmission lines:

Action to grant the certificate shall be based on the board's determination that the proposed route of the line will minimize significant adverse impact on the scenic assets of Kentucky and that the applicant will construct and maintain the line according to all applicable legal requirements....If the board determines that locating the transmission line will result in significant degradation of scenic factors or if the board determines that the construction and maintenance of the line will be in violation of applicable legal requirements, the board may deny the application or condition the application's approval upon relocation of the route of the line, or changes in design or configuration of the line. [Emphasis added]

1.2 Focused Review

The Commission retained the consulting services of Qk4, Inc., to provide a “focused” review of the Application (references to which include Exhibits). This report encompasses but is not limited to the following tasks:

¹ 807 KAR 5:120 Section 2; 807 KAR 5:001 Section 15(2)(c).

² 807 KAR 5:120 Section 2(2).

³ KRS 278.714(2)(d).

- Review the Application relative to KRS 278.714(2)(b) – (d), a section of which is quoted above.
- Review the anticipated scenic impacts of the proposed facility to determine if the applicant’s selection of the proposed route is optimal. The review should include, but not be limited to:
 - The scenic nature of the surrounding area and the proposed siting of the facility structures and other landscape intrusions.
 - The use of existing rights-of-way.
 - The use of existing transmission line routes.
 - The consideration and viability of alternative routes.
 - The impact on scenic assets, i.e., surrounding residential areas, schools, and public and private parks within one (1) mile of the proposed facilities.
- Review and evaluate any mitigation efforts proposed by the applicant to lessen the impact of any significant scenic degradation that may occur as a result of constructing the proposed line.
- Prepare a written evaluation that describes the scenic area surrounding the proposed facility, the magnitude of the scenic impact and any recommendations for additional measures to mitigate scenic impacts.

1.3 Visual Impact Assessment Overview

Visual impact analyses are fundamentally consistent in their approach to evaluating the elements of a project and its compatibility with existing landscapes and other surroundings. Typically, an assessment focuses on project structures to determine whether there is potential incompatibility between a project and its scenic surroundings. In the case of this project, the features under consideration for scenic compatibility are the proposed towers to support the transmission lines; the route of the lines; and the rights-of-way.

Visual character of the study area. The Ohio River is approximately 1.3 miles north and west of the Aleris aluminum mill. The study area features that are within a one-mile radius of the project present a visual character that is typical for this rural county—i.e., flat to rolling terrain encompassing primarily forested areas and land in agricultural (row crops) use. Other features of the study area include state roads KY 1957 (Lee Henderson Road) and KY 1605 (Adair Road); several local roads; Hancock County Airport—Ron Lewis Field, northwest of the aluminum mill; two Big Rivers’ transmission lines; the Seaboard System Railroad track running west-to-east across the study area immediately south of the mill; a soccer field west of the mill; three family cemeteries—Henderson, Greathouse, and Thrashers; and rural residential dwellings and farm structures on large parcels throughout the area. In addition to large areas of forest, natural features include Thrashers Creek and unnamed tributaries, a 6-acre lake northeast of the aluminum mill, and small farm ponds and wetlands. (See Figure 1.)

Transmission line requirements. As described in the Application, each proposed transmission line will require 100 feet of right-of-way width. The right-of-way will be cleared of trees to achieve National Electric Safety Code electrical clearances. The lines will be constructed using single steel poles for tangent structures, two-pole steel for angle structures, and three-pole steel for large angled dead-end structures. Exhibit D in the *Technical Report* provides sketches of these proposed structures. Access to the right-of-way for construction will “maximize the use of existing roads in the project area, and off-road movement of vehicles will be restricted to the proposed right-of-way to the extent practicable.” (Application, p. 4.)

The transmission line that will tie into the proposed substation on the north side of the Aleris mill will be approximately 0.2 mile from the airport. The Federal Aviation Administration (FAA) and the Kentucky Airport Zoning Commission have approved Big Rivers' Application, and copies of their approval letters are provided in Exhibit E of the *Technical Report*. As noted in the Application: "No other franchises or permits from any other public authority are required for the proposed construction."

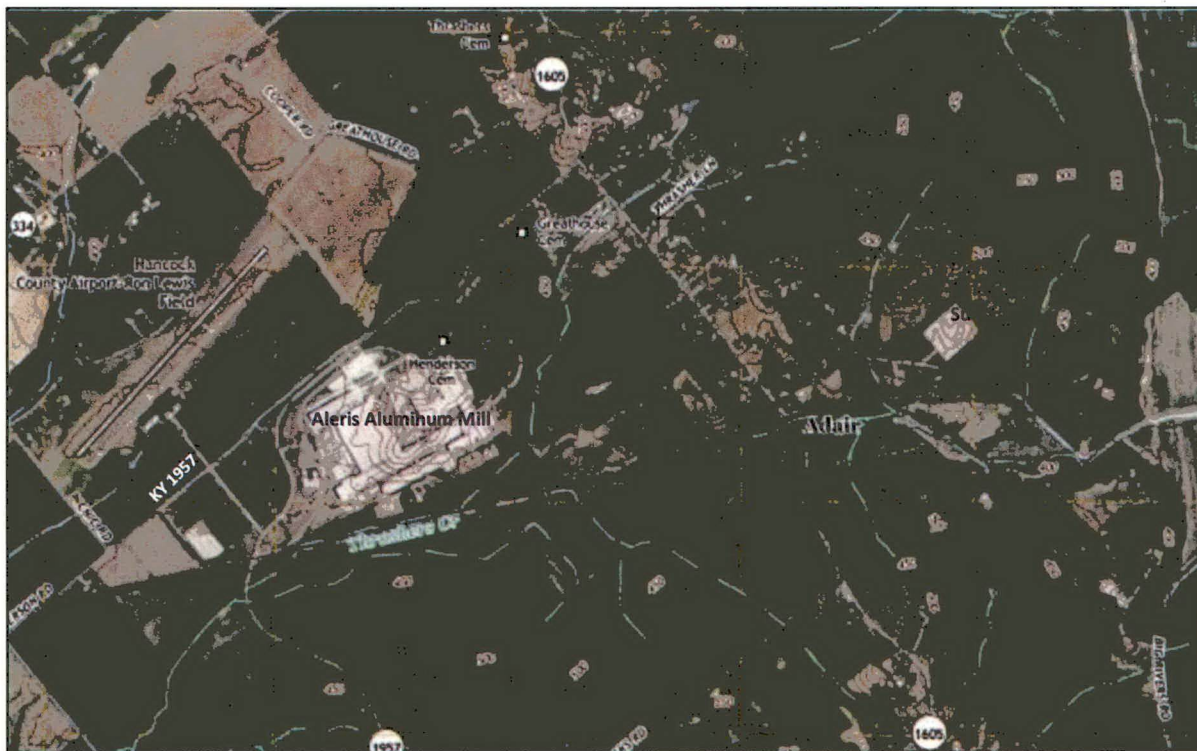


Figure 1. Aerial view of features in the study area.

2.0 SUMMARY OF BIG RIVERS APPLICATION AND ROUTE SELECTION

Big Rivers' Application included the preparation of several studies to analyze service plans for the extension of Big Rivers' existing service to Aleris aluminum mill. Following a management review of the completed studies, a service plan was identified that includes construction of a 1.7-mile-long 161 kV circuit to serve the 28 MW existing load, and a 2.0-mile-long 161 kV circuit to provide service to the planned 33 MW load expansion at the Aleris mill. Both of the circuits are proposed to begin at the Coleman EHV Substation, share right-of-way for approximately 4,000 feet, then separate and terminate at substations north and south of the aluminum mill. (See Figure 3.) The Application for the certificate of public convenience and necessity included the following studies, referred to as "Exhibits" therein:

- ◆ • Exhibit A — *Big Rivers Electric Corporation Cross-Reference Table for Compliance with Regulatory Requirements, Case No. 2015-00051*: Lists applicable regulations, summarizes the requirements of each, and identifies the locations in the Application where the requirement is satisfied.
- Exhibit B — *Aleris Transmission Service Plan* (Big Rivers, February 2015): Describes the completed studies of the proposed service plan and alternatives considered, and includes as Appendix A the evaluation criteria applied during the completion of the studies and analyses.
- Exhibit C — *Electric Transmission Line Route Selection Technical Report, Lines 3-K & 3-L 161 kV Transmission Lines Connecting the Coleman EHV Substation Site and Aleris Aluminum Mill* (Quantum Spatial, for Big Rivers, March 3, 2015): Identifies and summarizes the evaluation of the five alternative routes for the construction of the proposed transmission lines; and discusses and supports the route selection.
- Exhibit D — Sketches of proposed typical transmission line structures; e.g., single steel poles for tangent structures, two-pole steel for angle structures, and three-pole steel for large angled dead-end structures.
- Exhibit E — Federal Aviation Administration and the Kentucky Airport Zoning Commission Application approvals, required because the proposed transmission line that ties into the northernmost substation at Aleris is just over 0.2 mile from Hancock County Airport.
- Exhibits F and G — Sample of notification letters sent by Big River to potentially affected property owners, and a list of the notice’s recipients, respectively.
- Exhibit H — Notice of intent to construct the project, published in the *Owensboro Messenger-Inquirer* and *Hancock County Clarion*.

As noted in the Application (p. 3):

The proposed transmission lines are required to support the voltage in the Hancock County area under certain contingencies. More specifically, the lines are a necessary part of several projects that together will enable Big Rivers to serve the expansion of Aleris’ aluminum mill. The mill expansion will provide employment opportunities for residents of Hancock County and surrounding counties. (807 KAR L001 Section 15(2)(a); 807 KAR 5:120 Section 2(1)(b))

Note that one of the “several projects” referred to above is the construction of a new transmission substation on the north side of the Aleris mill, while another of the projects will modify an existing substation on the south side of the mill. A third proposed project is the construction of line terminals at the Coleman EHV Substation. While the transmission lines that are the subject of Big Rivers’ Application are dependent upon the implementation of the substation projects, those three projects are not included in the Application (or in this report) because they do not require a certificate of public convenience and necessity.

For purposes of this visual assessment, the elements of the Application that are of greatest relevance are Exhibit B and Exhibit C, discussed below.

Aleris Transmission Service Plan (Service Plan). Big Rivers conducted a study to determine the most cost-effective and reliable transmission service option to the Aleris mill. Two alternative service plans were evaluated:

- Alternative A — Construct a new-terrain 1.7-mile-long transmission line from Coleman EHV to an existing substation on the south side of the mill and a new-terrain 2.0-mile-long transmission line from Coleman to a proposed substation on the north side.

- Alternative B — Leave the topology unchanged and provide service to the entire Aleris “load” by expanding the existing substation.

Alternative A was selected as the “more robust and flexible service plan while also providing back-up service options” in the event of outages.

Electric Transmission Line Route Selection Technical Report (Technical Report). Big Rivers retained Quantum Spatial to conduct a study to determine the preferred routes of the two 161 kV transmission lines proposed in the *Service Plan’s* Alternative A. In the *Technical Report*, the line that would terminate at the existing substation is referred to as “Lewisport Aluminum Mill” (LAM 1), and the line that would terminate at the proposed substation is called LAM 2. The study was commissioned to consider:

...many diverse factors, including existing land uses, habitats, special land use classifications (e.g., National or State Parks, Military Reservations, floodplains, and wetlands), previously-confirmed cultural resources and threatened or endangered species. (p.1)

Site Selection Step 1

The first step in the route selection process was the development of “Macro Corridors, which defined an area for more detailed study.” The corridors were developed using a land cover dataset based on 30 meter LandSat imagery (2014). The Macro Corridors were used to identify a 2.28-square-mile study area centered on the area between the Coleman EHV Substation, LAM 1, and LAM 2. (See Figure 2.)

Alternate Corridors were identified within this study area using the EPRI-GTC Overhead Electric Transmission Line Siting Methodology—Build, Natural, Engineering Considerations, and Simple Average. These corridors were selected based on different weighting of these criteria categories to identify the most suitable route for a transmission line in the study area. The corridors are defined in the report (p.2) as follows:

- Build — *Seeks to minimize impacts to human development and historical/cultural resources.*
- Natural — *Emphasizes protection of natural resources and avoiding impacts to natural plant communities and animal species.*
- Engineering — *Seeks to maximize infrastructure co-location opportunities and avoid areas in which it would be difficult to construct a new transmission line.*

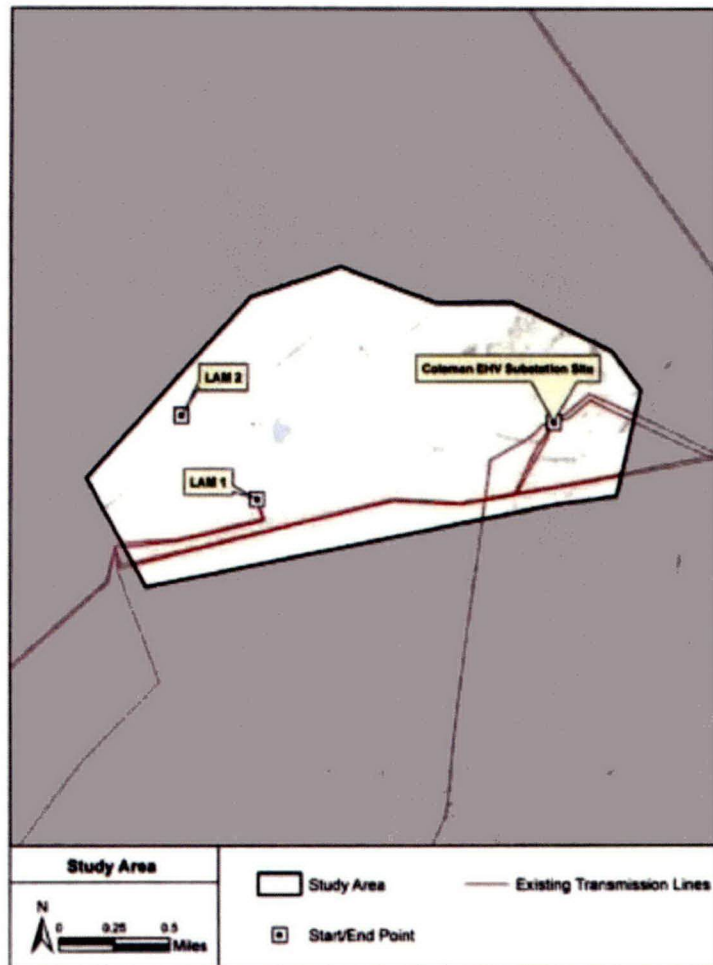


Figure 2. Existing transmission lines, and existing and proposed substation sites. (Source: *Technical Study*, Figure 7)

- Simple Average — *Weighs all three perspectives equally, with no emphasis on any one group of criteria.*

Site Selection Step 2

Once the corridor locations were developed, the evaluation focused on five Alternate Routes (“potential centerline paths of a transmission line”). The alternatives, labeled A through E, were evaluated using more site specific data and weighting of criteria to assess and compare their suitability (high, medium, and low) for the construction of the proposed transmission lines. Alternate Routes C, D, and E would connect the Coleman EHV Substation site with LAM 1 transmission line south of the Aleris mill, and Alternate Routes A and B would connect the EHV Substation site with LAM 2 on the north side of the mill. The alternates were evaluated with respect to the Built Environment, Engineering Environment, and Natural Environment perspectives.

- Alternates C, D, and E, serving LAM 1 — All alternates scored the same from the Built Environment Perspective since there are no Built features in the area of these three alternates. Alternate E scored the best according to the Engineering and the Natural Environment perspectives.
- Alternates A and B, serving LAM 2 — Alternate A have the better score in the Natural Perspective, which Alternate B scored best according to the Built and Engineering Environment perspectives and had the best overall score.

Site Selection Step 3

The final stage of the route evaluation was the Expert Judgment phase of the siting process. Because only three routes were evaluated for LAM 1 and two for LAM 2, all five alternates were carried over, with their scores, into the this final phase. All of the alternates were given a score ranging from 1 (highest) to 3 (lowest) based on their suitability in the following eight categories—visual, community, project management, special permit, accessibility, reliability, maintenance cost, and capability to be circuited with another transmission line and thereby reduce right-of-way requirements.

Site Selection Results—Routes B and D

Alternates B and D were the best scoring routes upon completion of the site selection process, i.e., they had lower overall impact than Routes A, C, and E.

Route B is the preferred route for constructing a transmission line to serve LAM 2 and Route D is the preferred routed to serve LAM 1. Regarding Route B, it should be noted that the Expert Judgment value of “1” was given for visual concerns because, unlike Route A, it would not affect an occupied house and two structures that are potentially eligible for listing on the National Register of Historic Places (NRHP). Route D also received an Expert Judgment value of “1” for visual concerns (as did Routes C and E).

3.0 STUDY TEAM SITE VISIT

The study team conducted a site visit on May 16, 2015, as part of this review. The study team observed the study area to evaluate the potential visual impact of the selected routes for construction of the transmissions lines.

The team took numerous photographs to assist the Commission in its evaluation. Figure 3-a, on the following page, depicts the alignments for Routes B and D and shows the locations of the photographs that follow (Figures 3-b through 3-p).

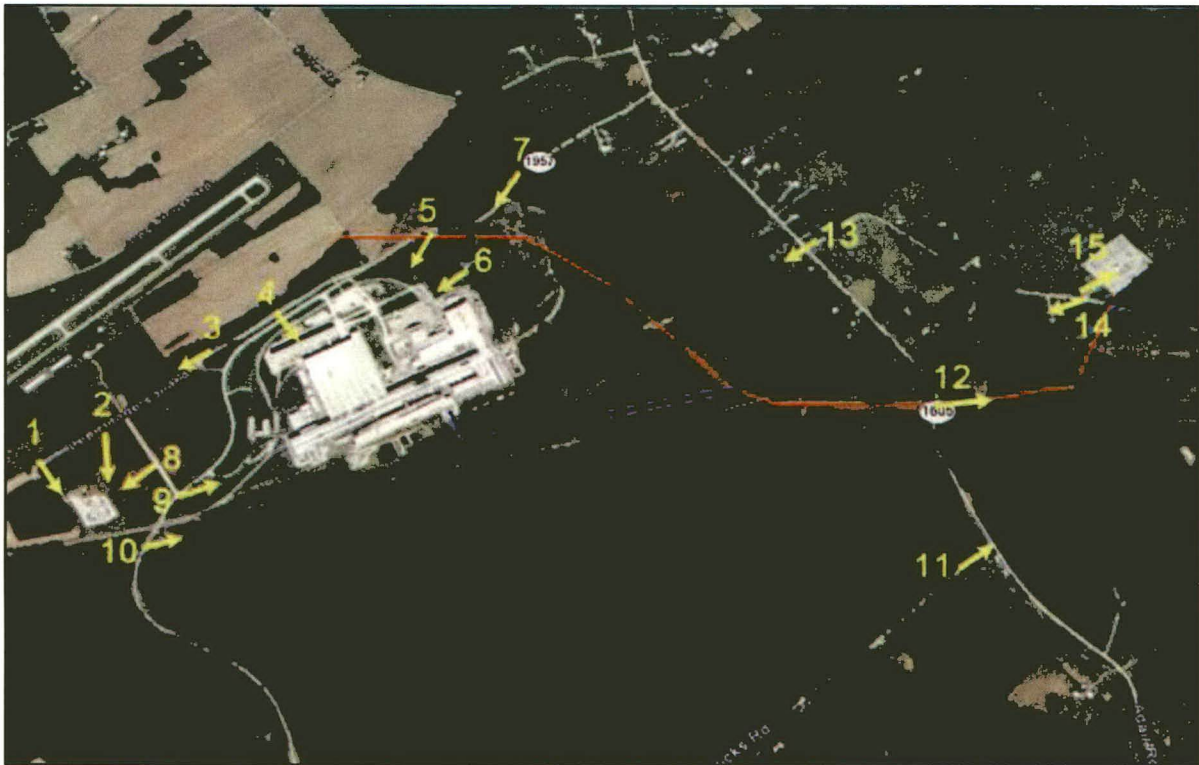


FIGURE 3-a. Aerial view of Big Rivers' proposed transmission line Routes B (Blue) and D (Orange). Numbers represent the locations of photos 1–15 that are provided as Figures 3-b through 3-p on the following pages.



Figure 3-b. Location #1—View toward Big Rivers’ substation. Looking south from Lee Henderson Road (KY 1957) across the soccer field (to the left of the gravel drive) toward a Big Rivers substation. The soccer field is located adjacent to a substation. The addition of transmission lines will not affect the character of the recreational area.



Figure 3-c. Location #2—View across open area toward substation. Looking south from Lee Henderson Road across an undeveloped area toward substation. The addition of transmission lines will not affect the existing character of the area.



Figure 3-d. Location #3—View west down Lee Henderson Road. Overhead transmission lines are common in this area.



Figure 3-e. Location #4—Aleris Rolled Products, Inc. (Aleris). View of the aluminum mill from Lee Henderson Road north of the mill.



Figure 3-f. Location #5—View of vegetation screening Aleris aluminum mill. Seen from Lee Henderson Road looking toward the mill, existing vegetation screens the mill from adjacent land and right-of-way. Because the proposed project should minimally impact vegetation, a screen would still be provided.



Figure 3-g. Location #6—Aleris aluminum mill viewed from Henderson Cemetery. The addition of transmission lines, which will be east of the cemetery and partially shielded from view by a stand of trees, will not alter the existing character of this area.



Figure 3-h. Location #7—Transmission lines viewed looking west down Lee Henderson Road. Transmission lines are typical features throughout the project area. Existing vegetation and topography screen the Aleris aluminum mill. The addition of transmission lines should only minimally impact existing vegetation and should not alter the overall character of vicinity.



Figure 3-i. Location #8—View of substation across an agricultural field. Farm fields together with transmission lines are common features in this area's landscape.



Figure 3-j. Location #9—View eastward toward the Aleris aluminum mill and transmission lines.



Figure 3-k. Location #10—View of Big Rivers' transmission lines south of the Seaboard Railroad track. Looking east along the utility right-of-way, the tree line (to the right) is the northern edge of a large, contiguous forest block that extends eastward toward Adair Road.



Figure 3-l. Location #11—View from Hendricks Road toward Adair Road, south of the railroad track. Existing vegetation and topography will screen views of new overhead transmission lines from nearby residences; therefore, the character of the area will remain unaltered by the proposed project.



Figure 3-m. Location #12—View from Adair Road eastward along the Big Rivers utility right-of-way. The proposed transmission line will parallel existing overhead lines. The use of a portion of the existing utility corridor will minimize the visual effect of the new lines.



Figure 3-n. Location #13—View from Adair Road (KY 1605) toward the proposed transmission line corridor. Vegetation and topography will screen the existing rural residential area from the new lines.



Figure 3-o. Location #14—View eastward from entrance of Coleman Extra High Voltage (EHV) Substation. Existing transmission lines are entering the substation near a rural residential area. The addition of transmission lines will minimally affect the visual character of the area.



Figure 3-p. Location #15—Big Rivers Coleman Extra High Voltage (EHV) Substation.

4.0 ASSESSMENT

The statute governing the Commission's review of applications for a certificate of public convenience and necessity is identified at the beginning of this report. This review focuses primarily on the language in KRS 278.714(3) requiring the Commission to determine whether the proposed transmission line routes "will minimize significant adverse impact on the scenic assets of Kentucky," and whether they "will result in significant degradation of scenic factors...."

Qk4 is charged with a review of the anticipated scenic impacts of the proposed transmission lines to determine if the applicant's selection of the proposed routes is optimal. The review includes consideration of the data presented in the Application and attendant documents as well as the site review conducted for purposes of the evaluation of potential visual impacts resulting from the project. The features under consideration for scenic compatibility are the proposed towers to support the transmission lines; the route of the lines; and the rights-of-way.

4.1 Finding

The project area presents a visual character that is typical for this rural county. As can be seen in Figures 4-a through 4-p, the area features primarily flat to rolling land primarily in agricultural use to the north of the Aleris aluminum mill and the proposed transmission lines, and a mix of agricultural fields and forest to the east and south.

The proposed transmission lines have been sited within a study area that, although surrounded by a pastoral viewshed, contains within a one-mile radius of the proposed routes numerous towers carrying transmission lines, the aluminum mill, the airport, the railroad, state and local roads, residences, and farm buildings.

The site selection process was first evaluated four general corridors, and then five Alternate Routes within the corridor shown by the analysis to be the most suitable, and finally in an Expert Judgment phase, which included "factors that do not readily lend themselves to quantification but which are nevertheless important in the selection of a preferred route." (*Technical Report*, p. 111.) This process was thorough in its consideration of a full range of potential routes and the impacts that could result from each of the Alternate Routes. As noted in the *Technical Report* (p. 119):

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

It is apparent from the site selection process described in the Application's *Technical Report* that careful consideration was given to the location of the lines so that they will:

- Where practicable, construct the transmission lines across open/agricultural land and existing transmission line right-of-way to avoid/minimize impacts to the built and natural environments, including residences, forested areas and hydrological resources. While the preferred Routes B and D would impact approximately 1.0 acre, each, of forested land—more than all but Alternate Route C (also 1.0 acre); neither would have stream crossing or wetland impacts, unlike Route C (1.0 acre of wetland), and Routes A and E (1 stream crossing each). Note that the forested areas serve as natural visual buffers that, in concert with the rolling terrain, shield residences from nearby developed areas—the most notable of which is the aluminum plant and associated facilities.

- Require no residential relocations or impacts to local cemeteries.
- Have no impact to the soccer field located southwest the Aleris mill property and adjacent to a Big Rivers' substation.
- Have no adverse visual effects to NRHP-eligible resources, all but one of which are more than 1,200 feet from the proposed project routes. Most of the resources are north and east of the project, and separated from it by the airport runway and structures. The single exception is a site south of the railroad. The site is within approximately 600 feet of Alternate Routes in a section of the new transmission line that will follow the existing transmission line right-of-way. While the new line may be in view of the potentially NRHP-eligible site, it is likely the density of the trees in this forested area would provide a buffer. If the new line would be visible from the site despite the trees, it would be within the same viewshed as the existing lines and present an additional visual impact.

4.2 Conclusion

The preferred Routes B and D have been situated in such a way as to have minimal impact to the natural and built environment. Existing overhead transmission towers and lines are prevalent throughout the study area, and the addition of the proposed new lines would not substantially alter the viewshed. Due to judicious placement of the transmission towers/lines primarily in open/agricultural fields or paralleling existing transmission lines, forested areas that currently help to buffer most residential properties from view of the aluminum mill and Big Rivers' facilities will be minimally affected by construction of the transmission lines.

Therefore, because no scenic degradation is anticipated to result from constructing the proposed lines, no mitigation measures are recommended.

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