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August 11, 2010

TO: DIVISION OF FILINGS

RE: Case No. 2010-00223
Application of Southern Indiana Gas & Electric Co. D/B/A Vectren Energy Delivery of Indiana, Inc. for a Certificate to Construct an Electric Transmission Line From Its A.B. Brown Plant to the Big Rivers Reid EHV Station

Please file in the administrative record of the above referenced case the enclosed copy of the final report of BBC Research & Consulting, "Visual Impact Evaluation of Proposed Vectren Transmission Line," dated August 10, 2010.

Sincerely:

Jeff Derouen
Executive Director

Enclosures

cc. Parties of Record

Report

Visual Impact Evaluation of Proposed Vectren Transmission Line

Completed with assistance from

LLOYD LEVY CONSULTING LLC
SOCIOECONOMIC RESEARCH & ANALYSIS

BBC RESEARCH & CONSULTING

Report

August 10, 2010

Visual Impact Evaluation of Proposed Vectren Transmission Line

Prepared for

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Table of Contents

Visual Impact Evaluation of Proposed Vectren Transmission Line

Background

On July 15, 2010 Vectren Energy Delivery of Indiana (Vectren) filed an application with the Kentucky State Board on Electric Generation and Transmission Siting (Siting Board) to construct a 345 kV transmission line between the A.B. Brown Power Plant near Evansville, Indiana and the Big Rivers Reid EHV Station south of Henderson, Kentucky. While a portion of the proposed transmission line would be constructed in Indiana, completion of the line requires Siting Board approval of approximately 15 miles of the line which would be located in Henderson County and Webster County, Kentucky. The Siting Board retained a consulting team led by BBC Research & Consulting to evaluate the Vectren application.

Statutory requirements. Kentucky Revised Statute 278.714 governs the Commonwealth's review of merchant power line construction applications. KRS 278.714 sets forth a number of requirements regarding the content of an application for construction. Kentucky Public Service Commission (PSC) staff, acting as staff for the Siting Board, reviewed Vectren's application and determined that it was administratively complete.

KRS 278.714 also provides guidance for the Siting Board in making decisions regarding approval of proposed merchant transmission lines. In article 3 of KRS 278.714, the statute includes the following provisions:

- "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."
- "In addition, the board may consider the interstate benefits expected to be achieved by the proposed construction or modification of the electric transmission facilities in the Commonwealth."
- "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."

Vectren's application contains an affidavit from the company's Chief Electrical Engineer that the project will be designed, constructed and maintained in accordance with accepted practices and all applicable legal requirements. The application also documents the benefits of the proposed line, including the declaratory order from the Federal Energy Regulatory Commission noting that the line is a Midwest ISO-approved Baseline Reliability Project that will enhance grid stability, and a statement from the applicant

that the project will reduce congestion in the Southern Indiana/Western Kentucky region and is expected to reduce transaction curtailments.[1]

This report focuses on the potential visual impacts of the proposed transmission line in Kentucky.

Visual impact assessment overview. Various government agencies throughout the country employ visual assessment methodologies based on professionally accepted techniques. These techniques are fundamentally consistent in their approach to evaluating the elements of a project and its compatibility with existing landscapes and other surroundings.

An example of a visual assessment methodology in use by a state power plant siting agency is the methodology employed by the staff of the California Energy Commission.[2] In California siting assessments, the assessment of potential incompatibility between a project and its scenic surroundings focuses on project structures, such as smoke stacks. Typically, the assessment also addresses project lighting and the potential for visible cooling tower plumes.

A standard visual analysis generally proceeds in this sequence:

- Analysis of the project's visual setting;
- Identification of key observation points (KOP);
- Descriptions of visual characteristics of the project; and
- Evaluation of impacts to KOPs.

A KOP is a location where people may periodically or regularly visit, reside or work in the general viewshed vicinity of the project's structures or emissions.

In general practice, visual impact evaluations are conducted within one of three general frameworks, depending upon the relevant jurisdiction and its level of involvement at the project site. These are listed in order of structural formality:

- A formal visual resource or scenery management system, typically in effect only on federal lands, such as the U.S. Forest Service Scenery Management System or the U.S. Bureau of Land Management Visual Resource Management System;
- Locally applicable laws, ordinances, regulations or standards, where imposed by state or local governments; and
- The cultural context, including the influence of previous uses on the landscape and public attitudes toward the compatibility of various types of land use.

Each framework, in its own way, embodies explicit or implicit consideration of some or all of the standard measures of visual impact: viewer exposure and sensitivity; relative project size, quality, visibility, exposure, contrast and dominance; and prevailing environmental characteristics, such as season and light

[1] Vectren application, tab 6, page 2 and tab 1, page 5.

[2] California Energy Commission. Energy Facility Licensing Process: Developers Guide of Practices & Procedures (staff report/draft) [online]. Document P700-00-007. November 2000 (revised December 7, 2000). Retrieved July 9, 2002, from http://www.energy.ca.gov/siting/documents/2000-12-07_700-00-007.PDF.

conditions.[3] Local regulations especially focus on screening of facilities from public view[4] and the effects of glare from outdoor lighting upon adjacent property.[5]

In this instance, the project features under consideration for scenic compatibility include the proposed towers to support the transmission line, the route of the transmission line from the crossing of the Ohio River into Kentucky to the terminus at the Reid EHV Station and the cleared right of way for the transmission line.

Prior transmission line siting reviews by the Siting Board. Subsequent to the implementation of KRS 278.714 in April 2002, the Siting Board has reviewed only one prior application for construction of a merchant transmission line in the Commonwealth. In 2004, the Siting Board reviewed and approved an application by the Cincinnati Gas & Electric Company (CG&E) to construct a 138 kV transmission line to the Silver Grove Substation in Melbourne, Kentucky. The CG&E application included a total of 4.9 miles of transmission line located in Kentucky. Like the proposed Vectren transmission line discussed in this report, the CG&E line also involved an Ohio River crossing. A study on behalf of the Siting Board conducted by MACTEC Engineering and Consulting, Inc. concluded that "No adverse visual impact is anticipated because of the proposed electrical transmission line project."[6]

[3] See California Energy Commission, op cit.; U.S. Forest Service. Landscape Aesthetics: A Handbook for Scenery Management. Agriculture Handbook Number 701. 1995; U.S Bureau of Land Management. Visual Resource Inventory. BLM Handbook H-8410-1; and U.S. Bureau of Land Management. Visual Resource Contrast Rating. BLM Handbook H-8431-1.

[4] Douglas County (Washington) Code, Chapter 18.80 - Conditional Use.

[5] Georgia Department of Community Affairs. Model Code: Alternatives to Conventional Zoning, Performance Standards for Off-Site Impacts [online]. April 2002.

[6] ***Visual Impact Analysis for Proposed Electric Transmission Line***. MACTEC Engineering and Consulting, Inc. November 19, 2004.

Summary of Vectren Application and Route Selection

Vectren's application to the Siting Board included:

- a summary of the application;
- maps of residential neighborhoods, schools and parks within one mile of the proposed facilities;
- a list of affected property owners;
- diagrams of support structures (poles and towers);
- the FERC order regarding the proposed line;
- a discussion of, and materials from, public outreach efforts;
- a route evaluation study conducted by Photo Science;
- aerial photographs of the proposed route; and
- various other materials.

The proposed transmission line would complete the southern portion of the overall Gibson-Brown-Reid 345 kV project, a line that is already partly constructed in Indiana. The overall project includes 70 miles of line, including about 15 miles in Kentucky based on the route Vectren has selected as its preferred option. In general, the route will use steel, H-frame poles to carry the proposed line and will require a 150-foot right of way for the transmission corridor. Vectren's preferred route would cross the Ohio River about 2 miles southwest of the riverfront park in downtown Henderson using approximately 280 to 290-foot tall lattice towers located on both sides of the river and a lattice tower up to 300-feet tall on Henderson Island in the middle of the river.[7] The proposed route would then pass through the Henderson Industrial District and continue southeast for about 1 mile prior to meeting up with the corridor for an existing 161 kV line owned by Henderson Municipal Power and Light (HMPL). The proposed route and right of way abutting the HMPL line would then continue for about 14 miles south-by-southeast to the Reid Substation, passing close to the small community of Robards about two miles from the Substation.

For purposes of this evaluation, the portion of the application of greatest relevance is the route evaluation study, discussed below.

Electric transmission route selection technical report (route evaluation study). Vectren retained Photo Science to conduct an evaluation of potential routes for the proposed transmission line. Photo Science is a national firm specializing in geospatial data and analysis with its headquarters in Lexington, Kentucky.

Photo Science used the Kentucky Siting Model (Siting Model) to evaluate potential routes for the proposed transmission line. The Siting Model is a geospatial optimization process based on prior work developed for the Electric Power Research Institute and Georgia Transmission Corporation. The Siting Model was further customized based on workshops with Kentucky stakeholders in 2006. The Siting Model seeks to minimize the impacts of the proposed transmission route based on a variety of factors, including co-location/engineering factors (existing linear infrastructure and rights of way, slopes and other

[7] Photos of similar H-frame poles and lattice towers for the river crossing are provided later in this report.

considerations); the natural environment (floodplains, wetlands, land cover, habitat and other considerations); and the built environment (proximity to existing buildings, density, proposed new developments, land uses, historic and cultural sites and other factors).[8]

The Photo Science evaluation began by identifying an overall study area of approximately 2,080 square miles for consideration. The evaluation then proceeded in three stages. First, four general corridors were selected based on different weighting of the criteria categories. The "Co-locations/Engineering Environment Alternative" focused on making maximum use of existing right of ways and prioritizing engineering considerations. The "Natural Environment Alternative" focused on minimizing environmental impacts. The "Built Environment Alternative" was based on minimizing impacts to existing and potential new developments. Finally, a combination alternative was based on averages of the three criteria categories.[9]

Once the four corridors had been identified, the evaluation then focused on eight more specific potential routes within the selected corridors. Route D, which would cross the Ohio River almost directly south of the A.B. Brown Power Plant and about 6 miles northwest of downtown Henderson, received the lowest (best) score. Route E which uses the same crossing point but follows a different route west of Henderson received the second best score, while Route C was tied for third among the eight potential routes and received the best score among the options that would cross the Ohio River closer to Henderson using Henderson Island.[10]

In the third, and final, evaluation stage, the Vectren siting team conducted an expert judgment comparison of Routes D and C. Based on consideration of visual issues, community issues, project management, construction and maintenance considerations and special permitting issues, the team selected Route C as Vectren's preferred option. It should be noted, however, that Route C was scored as "high impact" for visual issues primarily because of the proximity of the river crossing to the Henderson waterfront, while Route D was scored as "medium impact" for visual issues.[11]

[8] Vectren application, tab 7, pages 23 and 25.

[9] Vectren application, tab 7, pages 2.

[10] Vectren application, tab 7, pages 105-115.

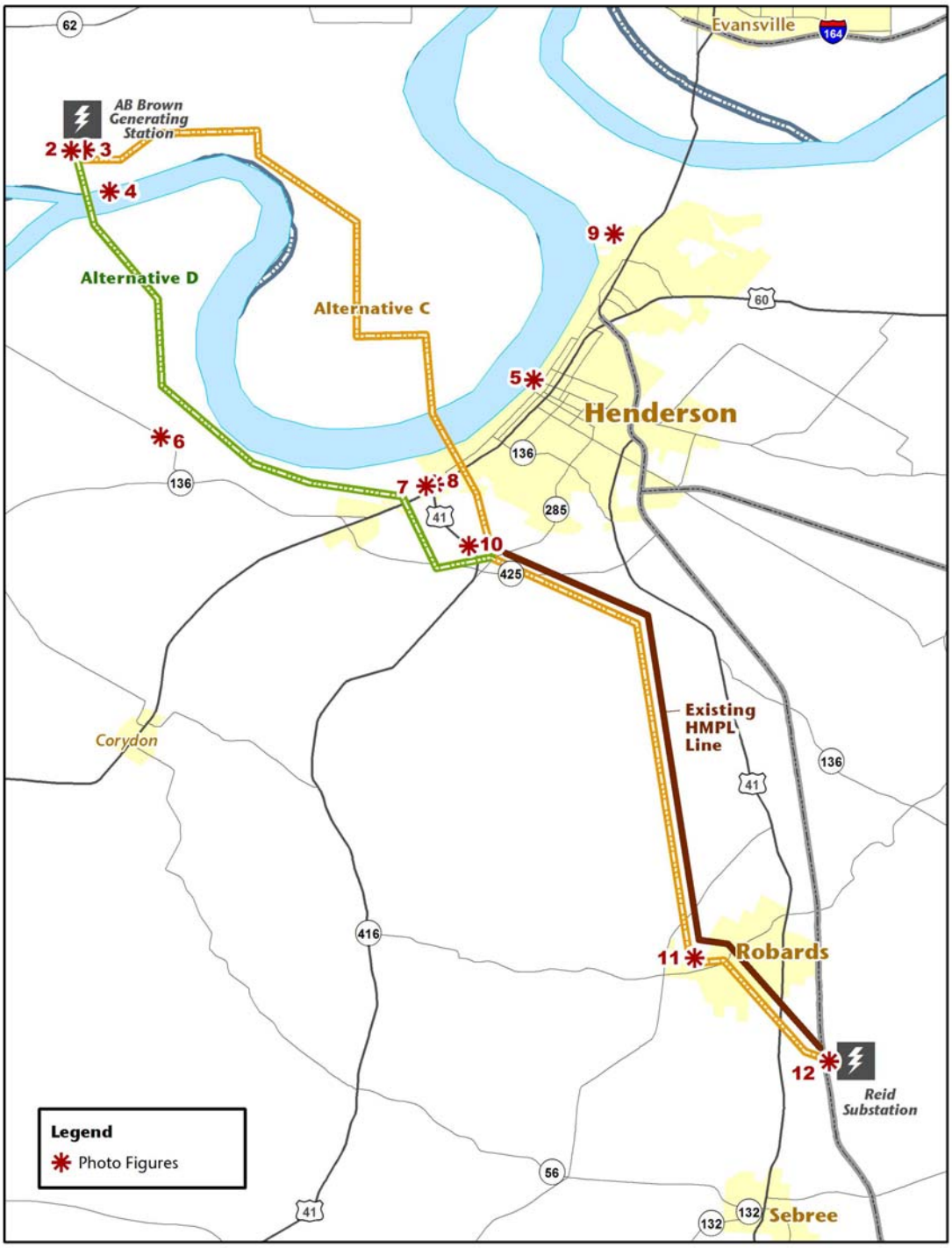
[11] Vectren application, tab 7, page 116.

Site Visit

The study team conducted a site visit on July 28, 2010 as part of this review. After meeting with Vectren officials at the company's headquarters in Evansville, Indiana, the study team, Vectren staff and members of the PSC staff (acting as staff for the Siting Board) toured the proposed alignments for Route C (Vectren's preferred option) and Route D (which scored the best during the second stage of the Photo Science evaluation). The study team also visited the waterfront park in downtown Henderson to evaluate the potential visual impact of the proposed crossing for Route C from that key observation point.

The study team took numerous photographs to assist the Siting Board in its evaluation. Figure 1, on the following page, depicts the alignments for Routes C and D and shows the locations of the photographs included in this report.

Figure 1.
Map of Vectren transmission line Routes C and D and location of photographs



Source: BBC Research & Consulting, 2010.

Photographs from site visit. The study team took numerous photographs during the site visit. The following images provide views from key observation points, as well as images of similar existing transmission towers and lines from the northern portion of the Gibson-Brown-Reid 345 kV project in Indiana, from Vectren's current 138 kV line in southern Indiana and Kentucky, and from the HMPL 161 kV line.

Figure 2. A.B. Brown Power Plant and H-frame poles. This photograph was taken near the beginning of the proposed route at the A.B. Brown Power Plant in Indiana. Towers for the north end of the transmission project (not subject to this study) are shown on the left hand side of this photograph. These H-frame structures, typically 80 to 100-feet tall, are representative of the types of towers proposed for use in Kentucky along most of the proposed transmission line. These towers can be up to 130-feet tall where necessary to cross roads, railroads or other existing rights of way.

Figure 3. Right of way in Indiana. This photograph of the north end of the overall transmission project in Indiana again shows H-frame type towers and the cleared right of way through forested land. Very little of either Route C or Route D in Kentucky crosses forested areas. The predominant land use along the proposed routes in Kentucky is irrigated agricultural land.

Figure 4. Route D crossing of Ohio River from Indiana. This photograph shows the approximate location of the potential Route D crossing of the Ohio River from the Indiana side. This location is approximately 6 miles northwest of Henderson (and out of view from the city).

Figure 5. Route C crossing of Ohio River from Henderson. This photograph provides a view from the key observation point at the Henderson waterfront park of the location of the proposed Route C crossing, about 2 miles away. Henderson Island, where a tower would be placed, is marked with an arrow in this image. The tower on the Indiana side would be located behind the shoreline seen in the middle ground on the right, while the tower on the Kentucky side is also likely obscured by the shoreline (left of this photo).

Figure 6. Wetlands in proximity to Route D northwest of Henderson. This photograph provides a view of the type of wetland terrain that would have to be crossed by Route D northwest of Henderson.

Figure 7. Potential location for Kentucky side tower adjacent to Route C Ohio River crossing. The most prominent visual features of the proposed transmission line are likely to be the 280 to 300-foot tall lattice towers at the river crossing points in Kentucky and Indiana (and on Henderson Island for Route C). This photograph shows the approximate location of the lattice tower on the Kentucky side of the river for proposed Route C as specified in the application (marked with arrow on right side of photo). The river is beyond the trees in the distance.

Figure 8. Alternative location for Kentucky side tower adjacent to Route C Ohio River crossing. This photograph shows an alternative location for the Kentucky side lattice tower to avoid proximity to a historic cemetery and wastewater treatment facilities. Tower location would be near the area where the distribution line shown in this photograph meets the tree line on the left side of the photo (marked with arrow). The river is beyond the trees in the distance. A modern cemetery is located to the left of the scene in this photograph.

Figure 9. Lattice-type towers for existing 138 kV line river crossing. This photograph shows the towers for the existing Vectren 138kV line at the Ohio River crossing east of Henderson. The towers for the proposed 345 kV line would be about 25 percent taller (300-feet versus 235-feet) with a similar paint scheme, as required by FAA regulations. This photo is taken about ½ mile from the nearest tower, considerably closer to the towers than the distance from the Henderson riverfront to the proposed Route C crossing.

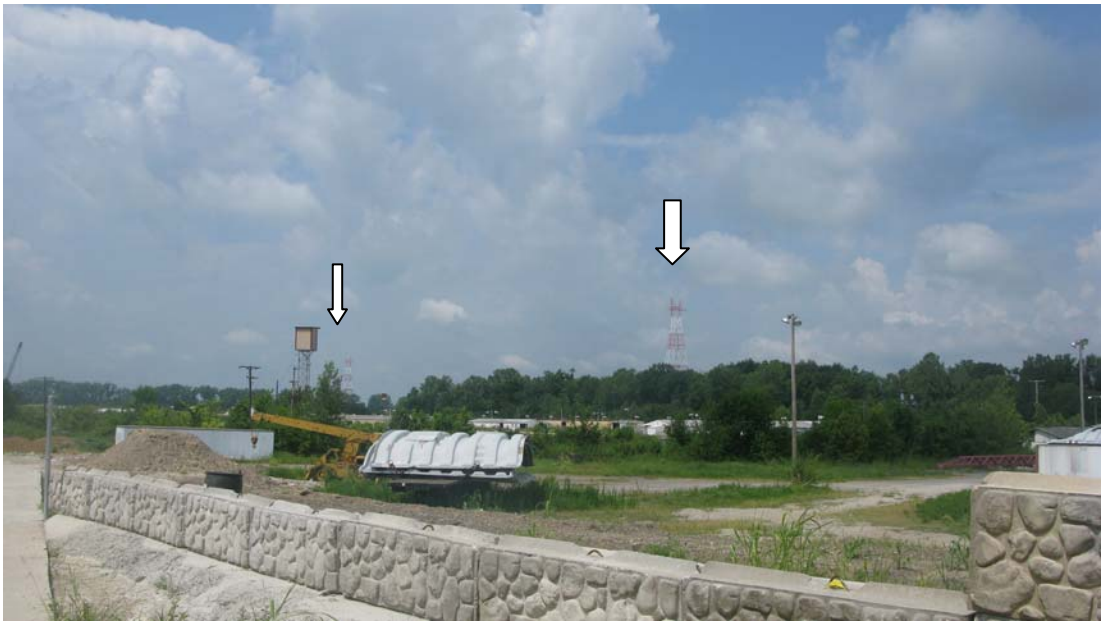


Figure 10. Approximate route junction with existing 161 kV line route. This photograph is taken in the vicinity of the convergence of the proposed line (either Route C or Route D) with the existing HMPL 161 kV right of way about 1 mile southeast of the Henderson Industrial Park and about 14 miles north of the Big Rivers Reid EHV Station.

Figure 11. Proposed routes from community of Robards. This photograph provides a view of the existing HMPL 161 kV line from one of the closest properties in the small community of Robards, south of Henderson. There is a home immediately to the right of where this photo was taken. The 161 kV line (and the proposed right of way for the 345 kV line) crosses the frame from left to right, behind the trees in the foreground. There is a smaller distribution line in the forefront of the picture running towards the viewer.

Figure 12. Route terminus at Big Rivers Reid Substation. This photograph shows the terminus of the proposed route (either route option) at the Substation.

Assessment

The statute governing the Siting Board's review of applications to construct merchant transmission power lines was summarized at the outset of this report. This review focuses primarily on the language in the statute requiring the board to determine whether or not the proposed route of the line will minimize significant adverse impact on the scenic assets of Kentucky and whether or not the transmission line will result in significant degradation of scenic factors.

Evaluation. To assess the visual impact of the two route alternatives, the study team evaluated both of the alternatives (Route C and Route D) in three segments. The first segment consists of the Ohio River crossing for each route. The second segment consists of the portion of each route from the Kentucky side of the river crossing to the point at which the potential routes converge with the corridor for the existing 161 kV HMPL transmission line. The final segment, which is identical for both routes, consists of the most southern portion of the proposed line which would abut the right of way for the existing HMPL line.

The proposed river crossing for Route C would have more visual impact than the alternative river crossing location for Route D. At least a portion of the Route C crossing would be visible from downtown Henderson and the Henderson waterfront park. The Route D crossing would not be seen from Henderson.

The second segment of proposed Route C passes primarily through industrial areas of Henderson, and a short stretch of irrigated agricultural lands, prior to meeting the corridor for the existing HMPL transmission line. In general, the changes to the viewshed from placing a transmission line in this area would be compatible with existing visual characteristics of the area.

The second segment of the Route D alternative is much longer than the second segment of the Route C option preferred by Vectren. However, much of the second segment of Route D would be relatively distant from key observation points (such as roads or extensive development) until the route nears the Henderson City and County Airport. From the vicinity of the airport to the point at which Route D converges with Route C south of the Henderson industrial area, this route would more visible, but would also be generally compatible with the existing visual characteristics of the area.

The final segment for either route option, which includes the majority of the length of either Route C or Route D in Kentucky, would parallel and abut the existing HMPL line. Most of this portion of the route passes through sparsely populated agricultural areas, with the exception of the portion of the route proximate to the small community of Robards. The visual impact of this segment of the route would be minimal, given the existing HMPL line and right of way already present and adjacent to the proposed 345 kV route.

Some of the proposed engineering aspects for the transmission line would tend to mitigate visual impacts. Vectren intends to use specially treated steel for the H-frame poles that would support the proposed transmission line along most of its route. This material quickly weathers to a dull, reddish-brown color that approximates natural, woody materials (as seen in Figures 2 and 3 earlier in this report). The lattice towers for the river crossing, however, would have to be painted in a red and white color scheme to meet Federal Aviation Administration safety requirements. The relatively flat paint, however, will limit sun

reflection from the crossing towers (see Figure 9 for an example of this paint scheme on an existing tower).

Summary conclusions. Based upon the study team's review of the application submitted by Vectren and the subsequent site visit, the study team does not believe that the visual impact from Vectren's preferred option (Route C) will be particularly significant. The combination of the distance to the crossing from the Henderson waterfront (approximately 2 miles), the dense vegetation along the shorelines and on Henderson Island, and the meandering geography of the shoreline all serve to reduce the likely visual effect from the crossing. It appears likely that the towers near the Kentucky and Indiana shorelines may not be visible from downtown Henderson, though the tower on Henderson Island likely would be visible. The Henderson waterfront view is presently dominated by, and will continue to be dominated by, the historic railroad bridge that crosses the river into Indiana. The existing Vectren 138 kV transmission line crossing located at a comparable distance to the proposed crossing (in the opposite direction) is a barely noticeable visual feature from the waterfront and downtown Henderson, though its towers are not as tall as the proposed towers for the 345 kV line (235-feet versus up to 300-feet).

As noted in the siting study performed for Vectren by Photo Science, Route D – which would cross the Ohio River about 6 miles from Henderson and out of site from the City's waterfront – would likely have less visual impact than the Route C option preferred by the applicant.[12] However, the study team finds Route C to be a reasonable route for the proposed transmission line that will not result in significant degradation of scenic factors in Kentucky.

[12] Vectren application, tab 7, page 116.