Appendix 3 GTC Methodology

The industry has developed computer-based models (e.g., using GIS) that systematically identify transmission routes that have the least impact on surrounding landscapes and result in more logical and defensible decisions. The method developed by EPRI-GTC is the best known of these systems.

The GTC methodology begins by identifying a large area of landscape containing corridors or land parcels that are most suitable based on set criteria for the construction of a proposed transmission line. Increasingly detailed information is added about each corridor as the method moves through successive phases and as more refined routes are identified. The process ends with the identification of specific routes. EPRI published the methodology in February 2006 as a national model for siting transmission lines. In May 2006, the methodology earned GTC the National Rural Electric Cooperative Association's 2006 Cooperative Innovators Award. It has been real-world tested on more than 200 miles of transmission line projects.

Benefits of the model include its ability to produce siting decisions that are consistent, objective and defensible, backed by a consistent rationale; to improve productivity and analytical capabilities; and to lower data acquisition costs. Other advantages that set it apart from other GIS-based routing processes are that it uses a collaborative process for the utility team and external stakeholders to assess and rank criteria for siting. Also unique to the EPRI-GTC approach is its use of algorithms to create alternative corridors on suitability maps for manmade, environmental and engineering features; a fourth corridor is made from a composite average of the other three.

The documented methodology (***EPRI GTC Overhead Electric Transmission Line Siting Methodology*,** February 2006**)** describes a standardized process utilities could use to improve the way transmission line routes are evaluated and selected; it discusses right-of-way environmental issues in siting development and management. The process incorporates GIS technology, statistical evaluation methods, and stakeholder collaboration to produce a new siting methodology. The project team performed landscape analysis at different scales, from large regional areas called macro-corridors, to alternative corridors, to constructible alternative routes, to a preferred route. Analysis was performed at each phase, using off-the-shelf geographical databases and other datasets. A new GIS siting model was developed and used to manage data, produce macro and alternative corridors, generate statistics on alternative routes, and create graphic depictions. It also claims to lower data acquisition costs.

The methodology uses GIS software called Corridor Analyst©. This software maps all geographic features, assigns numerical suitability values to features, assigns engineering constraints, generates corridor alternatives, automatically generates alternative corridor reports and creates reports of criteria used and values assigned.

GIS software views each data set as a separate map, or data layer. There is a map showing the beginning and ending locations of the proposed transmission line, a map detailing land use based on satellite imagery, a digital elevation map, a road map, a map showing existing transmission lines, and a map displaying all avoidance areas. These data layers can be thought of as a series of maps stacked one on top of the other, but because each is geographically referenced to a real place on to a real place on the earth's surface, GIS software can analyze spatial relationships between them. For example, the software has the ability to determine that the end point of the proposed transmission line is located in an agricultural field (land-use data layer) that has a 5 percent slope (Digital Elevation Model data layer), and that while there are no existing transmission lines in the vicinity, there is a secondary road nearby and that an archaeological site eligible for the National Register for Historic Places is located less than 60 meters away.

The EPRI-GTC method is a well-defined four step process that includes:

- Macro-Corridor generation, based on locations of suitability or opportunity areas;
- Alternative Corridor generation, based on collection of more detailed data;
- Development of suitability maps that avoid built, environmental, and engineering constraints
- Alternative route generation, based on collection of more detailed data, route analysis and evaluation
- Selection of preferred route, based on consideration of additional metrics including cost, assigning weights to special concerns using expert judgment, and ranking of alternatives.

Other entities are starting to adopt the EPRI-GTC standardized methodology, including the state of Kentucky, although with some modification to reflect state siting and permitting requirements. For example, it has been applied to projects in Kentucky by East Kentucky Power Cooperative. A key benefit of this methodology is the ability to quantitatively consider stakeholder input in the route selection process. Several companies sponsored a project to calibrate the siting methodology to local Kentucky concerns. This involved assembling a group of Kentucky stakeholders representing a wide range of interests at a February 2006 workshop held in Lexington, Kentucky. Stakeholders provided input to the relative suitability and importance of the criteria used to develop alternative corridors for new transmission lines.

Kentucky Transmission Line Siting Methodology. (EPRI, December 2007) describes the workshop results and subsequent (successful) testing of the methodology; the report was prepared by Photo Science, Inc. (Lexington, KY).

Finally, a transmission siting methodology developed for Tribal Planners was also reviewed and summarized (*Energy Transport Corridor Siting for Tribal Planners, Guidance Manual*, January 2010). The objective of the manual is to provide tribes with the guidance and information needed for siting energy transport facilities on tribal lands. The process recommended is applicable for siting energy corridors as well as for the approval of individual rights-of-way. The manual was developed by Argonne National Laboratory on behalf of the US Department of Interior's Office of Indian Energy and Economic Development (IEED) and Bureau of Indian Affairs (BIA) to provide assistance to tribes in energy system transmission planning. In addition to outlining a siting methodology, it also contains useful information relating to technological applications that facilitate and enhance the siting process (e.g., GIS); general impacts from siting transmission lines and pipelines (and mitigation), and available resources relevant to siting transmission corridors and rights-of-way. Much of the resource information provided in Attachment 1 to this exhibit was pulled from Appendix B of the Tribal manual. Note that the manual does not require that a specific GIS model be used in transmission siting. However, it does provide examples using ESRI's Arc/Info 9.3.1 with the Spatial Analyst Extension (ESRI 2009).

The tribal guidance also includes four steps that are mostly consistent with the EPRI-GTC model, although there are some variations in terminology and what activities are conducted at the various phases. The steps include: (1) locate unrestricted energy transport corridor (with no consideration to any issues or constraints; (2) revise location of corridor to avoid constraints (opportunities are also considered at this phase); (3) refine the preliminary corridor using location specific input and results of any environmental impact analysis; and (4) finalize the corridor (outside agencies and other external stakeholders are invited to review the results at this time and the location may be further refined in response to comments).