



GHANA/NARUC PARTNERSHIP

17 DECEMBER 2008

ACCRA, GHANA

KLAUS LAMBECK
OHIO POWER SITING BOARD





Ohio Power Siting Board

Mission Statement

To support sound energy policies that provide for the installation of energy capacity and transmission infrastructure for the benefit of the Ohio citizens, promoting the state's economic interests, and promoting the environment and land use.



Member Agencies

- Public Utilities Commission of Ohio - Chairman
- Ohio Environmental Protection Agency
- Ohio Department of Development
- Ohio Department of Health
- Ohio Department of Agriculture
- Ohio Department of Natural Resources
- Public Member
- Four Legislative Members
 - 2 from Ohio House of Representatives
 - 2 from the Ohio Senate



Board Jurisdiction

Major Utility Facility

- A generating plant of 50 megawatts or more;
- An electric transmission line of 125 kilovolts or more; or
- A gas or natural gas transmission line capable of transporting gas at more than 125 pounds per square inch of pressure

And,

- Any wind farm of 5 megawatts or more;



Process

- Pre-Application meetings and conferences
- Pre-Application Public Informational meetings
- Application submitted
- Completeness Review
- Letter of Completeness
- Proof of Service



Process (cont.)

- Board Entry establishing Filing Date & Hearing schedule
- Public Notice published by Applicant
- Staff Report
- Public Hearing
- Adjudicatory Hearing
- Board Decision
- Appeal Process



The Board's Decision

- The need for the facility;
- The probable environmental impact of the proposed facility;
- Whether the facility represents the minimum adverse environmental impact considering the technology that is available and the nature and economics of the various alternatives;



The Board's Decision (cont.)

- That the facility is consistent with regional plans for expansion of the electric power grid of the electric systems serving Ohio and interconnected systems, and that the facility will serve the interests of electric system economy and reliability;
- The facility will comply with all air and water pollution control and solid waste disposal laws and regulations;



The Board's Decision (cont.)

- The facility will serve the public interest, convenience and necessity;
- The facility's impact on agricultural lands; and
- The facility incorporates maximum feasible water conservation practices.



Resource Planning



Reliability

- **Adequacy**

The ability of an electric system to supply the aggregate electrical demand and energy requirements of the customers at all times.

- **Security**

The ability of the electric system to withstand sudden disturbances such as electric disruptions or unanticipated loss of system elements



Generation Adequacy

- Sufficiency of generation supply to meet expected demand

Sufficient megawatt generating capacity shall be installed to ensure that the probability of occurrence of load exceeding the available generating capacity shall not be greater, on the average, than one day in ten years. Factors to be considered in the calculation are the characteristics of the loads, the probability of error in load forecast, the scheduled maintenance requirements for generating units, the forced outage rates of generating units, limited energy capacity, the effects of connections to other pools, and network transfer capabilities within the systems.



EVOLUTION OF PLANNING

- Traditional
- Integrated Resource Planning
- Least Cost Planning
- Integrated Value Based Planning under a Competitive Environment
- Integrated Resource Planning



Integrated Resource Planning

- **Evaluate**

- Annual load shape
- Cost Effectiveness
- Program Performance
- Plant Performance
- Financial Performance

- **Analyze Options**

- Supply-Side Generation Resources
- Transmission Requirements
- Demand Side Management

- **Minimize Revenue Requirements**



- Demand Side Management

Longer term energy conservation measures that help to

- Defer capacity additions
- Save energy
- Avoid power purchases to meet load
- Reduce emissions

- Demand Response

Shorter term actions, generally voluntary curtailments, in response to spot prices

- Defer capacity additions
- Avoid power purchases
- Reduce market price volatility



- Link to the Planning Process
 - DSM programs are one of the major components to the development of Integrated Resource Plans (IRP)
 - Load Forecast
 - Generation Option
 - Demand Side Management Options
 - Iterative cost-effective analysis relative to generation options
- In a deregulated market, the key measure of cost-effectiveness is projected market prices which are calculated based upon
 - Options
 - LMPs / Published Prices



- Barriers include:
 - Higher incremental costs
 - Lack of consumer education
 - Lack of contractor / trade ally training
 - Lack of supply at time of replacement
 - Fear of change
 - Societal costs not reflected
- Utility is uniquely situated to offer energy efficiency
 - Still retains customer relationships
 - Vendor / Supplier relationships
 - Primary information source for energy questions



Concepts and Methods

- Public Policy
- Non-Utility Generation
- Assessing Investment Options
- Competitive Organization
- Reducing Uncertainty
- Understanding Customer Value
- Product Differentiation
- Rates and Prices



Resource Adequacy Requirement

- Forward-looking requirement development
- Regional basis to encourage long-term contracts for supply and reflect markets
- Preserve strong state role in determining planning horizon, supply and demand options and siting requirements, as well as cost recovery where appropriate.



BUILD vs. BUY

- Unique needs
- “Tailor-made” without contractual “lock-in”
- Utilization of existing resources
- New technologies
- Lifecycle costs
- Speed to market
- Resource Utilization



Why Competitive Solicitations???

- Central role in getting the best possible deal for customers
- At a country or regional level, it provides a modern prudence review standard
- At federal level, it meets needed requirements to prevent affiliate abuse



Legal, Negotiating, and Regulatory Issues

Bidding Design Issues

- Portfolio diversity
- Long-term supply
- Resource adequacy

Regulatory Issues

- Taxes
- Siting
- Cost recovery

Contract Design Issues

- Fuel volatility
- Performance issues
- Replacement power
- Liquidated damages for non-performance
- Reliability



**“All regulation is
incentive regulation”**



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“The Puritan hated bear-baiting, not because it gave pain to the bear, but because it gave pleasure to the spectators.” - *Thomas Babington Macaulay, History of England*

“I’m not a vegetarian because I love animals; I’m a vegetarian because I hate plants.” - *A. Whitney Brown*

“Today I will drink until I see double, not because I am addicted to alcohol, but because I want to recycle two bottles.” - *B. Lagowski and R. Mumma, Daily Negations*



Socioeconomic and Environmental Considerations

“To support sound energy policies that provide for the installation of energy capacity and transmission infrastructure for the ***benefit of the Ohio citizens, promoting the state’s economic interests, and promoting the environment and land use.***”



Socioeconomic and Environmental Considerations

Economic growth is directly related to energy growth

Balancing of interests is successfully achieved through active participation of the member agencies that comprise the Board



Socioeconomic and Environmental Considerations

- According to OPSB regulations, applicants must provide certain baseline information concerning environmental and social issues, followed by a description of steps taken to minimize adverse effects.
- Recognizing that some impacts are unavoidable, the applicant must then describe efforts to mitigate the potential impacts to the extent feasible.



Socioeconomic and Environmental Considerations





Principal Environmental and Socioeconomic Considerations

A general socioeconomic survey of the study area:

- a field survey
- preparation of a land use map
- determination of current population
- estimates and projections for the area
- an assessment of project compatibility with local and regional development plans.



Project summary and facility overview

The summary and overview shall include the following:

- A statement explaining the general purpose of the facility
- A description of the proposed facility
- A description of the site or route selection process, including descriptions of the major alternatives considered
- A discussion of the principal environmental and socioeconomic considerations of the preferred and alternate routes or sites
- An explanation of the project schedule (a bar chart is acceptable)



Detailed description of the proposed facility, including alternatives

Generation

Type, number of units, and estimated net demonstrated capability, heat rate, annual capacity factor and hours of annual generation

Land area requirement

Fuel quantity and quality (i.e., ash, sulfur, and British thermal unit value)

A list of types of pollutant emissions

Water requirements, source of water, treatment, quantity of any discharge and names of receiving streams

Description of the major equipment.

Any need for new transmission line(s) associated with the proposed facility.



Detailed description of the proposed facility, including alternatives

Transmission

Statement of purpose

Projections of system conditions or local requirements regarding need

Relevant load flow studies and contingency analyses

Power flow (electric) or relevant base case system data (gas) and models

How the project fits with recent long-term gas or electric forecast reports and regional plans for expansion

Impact of electric power system economy and reliability and on interconnected utility systems

All options considered that could eliminate the need to construct.



Detailed Facility Project Schedule

- Acquisition of land and land rights
- Preparation of the application
- Submittal of the application for certificate
- Issuance of the certificate
- Preparation of the final design
- Construction of the facility
- Placement of the facility in service
- Impact of critical delays



Site and Route Alternatives Analyses Site Selection Study

- The applicant *shall* conduct a site selection study
- The study *shall* be designed to evaluate all practicable sites for the proposed facility area



Site Selection Study Requirements (cont.)

- A comprehensive list and description of all **qualitative and quantitative siting criteria**, factors, or constraints utilized by the applicant, including any evaluation criteria or weighting values assigned to each
 - Initial screening attributes / constraints used to draw potential route segments on a map
 - Existing road & utility corridors
 - Avoidance of residential areas & sensitive land uses
 - Follow parcel lines / edge of property boundary



Suitability Analysis

- Evaluate study area before drawing routes
- Identify potential corridors using a systematic approach



Environmental Impacts Pipeline Installation





Transmission Equipment (Electric)

Data for electric power transmission lines:

- Design voltage
- Tower designs, pole structures, conductor size, insulator arrangement
- Base and foundation design
- Cable type and size, where underground
- Other major equipment or special structures



Transmission Equipment (Electric)

A description for electric power transmission substations that includes a single-line diagram with a description of the proposed major equipment, such as:

- Breakers
- Switchgear
- Bus arrangement and structures
- Transformers
- Control buildings
- Other major equipment



Transmission Equipment (Gas)

The following data for gas transmission lines:

- Maximum allowable operating pressure
- Pipe material
- Pipe dimensions and specifications
- Other major equipment

A description of gas transmission facilities such as:

- Control buildings
- Heaters, odorizers, and above-ground facilities
- Any other major equipment



Social & Ecological Data (Generation)

Health and safety

- Demographic - existing and ten-year projected population estimates for communities within five miles of the proposed site
- Atmospheric emissions - the probable impact to the population

Water

- Estimate the impact to public and private water supplies
- Construction and operation of the proposed facility
- Pollution control equipment failures





Socioeconomic & Land-use Impact Analysis (Cont.)

Proposed substation or compressor station locations. General land use within the area, including, but not limited to:

- (a) Residential use
- (b) Commercial use
- (c) Industrial use
- (d) Cultural use
- (e) Agricultural use
- (f) Recreational use
- (g) Institutional use



Ecological Impact (Generation)

Site information

Construction

- Estimate the impact of construction on the undeveloped areas
- Estimate the impact of construction on the major species
- Describe the mitigation procedures to be utilized to minimize both the short-term and long-term impacts due to construction

Operation

- Estimate the impact of operation on the undeveloped areas
- Estimate the impact of operation on the major species listed



Land uses - Generation

- A map indicating general land uses within a five-mile radius of the site, including such uses as residential and urban, manufacturing and commercial, mining, transport, utilities, water and wetlands, forest and woodland, pasture and cropland
- Estimate the impact of the proposed facility on these land uses within a one-mile radius
- Identify structures that will be removed or relocated
- Describe adopted plans for future use of the site and surrounding lands for anything other than the proposed facility
- Describe the applicant's plans for concurrent or secondary uses of the site



Health and Safety Information

- A description of how the facility will be **constructed, operated, and maintained** to comply with the any applicable state and federal statutes and regulations
- For electric power transmission facilities, the applicant shall discuss the production of electric and magnetic fields during operation of the preferred and alternate site/route and for each configuration
- For electric power transmission facilities, an estimate of the level of radio and television interference from operation of the proposed facility, identify the most severely impacted areas and discuss methods of mitigation



Cultural Resources

Potential and identified recreational areas

Districts, sites, buildings, structures, and objects which are “historical”



Environmental Impacts Assess Wetland Quality and Potential Impacts





Ecological Impact Analysis

Location of proposed transmission line alignments, proposed generating station and proposed substation or compressor station locations relative to all areas currently not developed for agricultural, residential, commercial, industrial, institutional, or cultural purposes including:

- Streams and drainage channels
- Lakes, ponds, and reservoirs
- Marshes, swamps, and other wetlands
- Woody and herbaceous vegetation land
- Locations of threatened or endangered species
- Soil associations in the corridor



Ecological Impact Analysis

A description of each stream or body of water (including floodplain) that is present and may be affected, including but not limited to the following:

- Construction: estimate the probable impact of the construction of the proposed facility on streams and bodies of water, including impacts from route clearing
- Operation and maintenance: estimate the probable impact of the operation and maintenance of the proposed facility after construction on streams and bodies of water, including the permanent impacts from route clearing
- Mitigation procedures: describe the mitigation procedures to be used during construction and the operation and maintenance of the facility to minimize the impact on streams and bodies of water



Environmental Impacts Identify Stream Quality



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Identify Stream Quality

A description of each wetland that is present

Construction: estimate the probable impact of the construction of the facility on wetlands and wildlife habitat

Operation and maintenance: estimate the probable impact of the operation and maintenance after construction on wetlands and wildlife habitat. Include the permanent impacts from route clearing and any impact to natural nesting areas

Mitigation procedures: describe the mitigation procedures to be used during construction and during the operation and maintenance of the proposed facility to minimize the impact on wetlands and wildlife habitat



Identify Vegetation

A description of the naturally occurring vegetation that is present and may be affected. Describe the probable impact to the environment from the clearing and disposal of this vegetation:

- Construction: estimate the probable impact of the construction of the facility on the vegetation. Include the impacts from route clearing, types of vegetation waste generated, and method of disposal or dispersal
- Operation and maintenance: estimate the probable impact of the operation and maintenance of the facility after construction on species described above. Include the permanent impact from route clearing and impacts to natural nesting areas.
- Mitigation procedures: describe the mitigation procedures to be used during construction and operation and maintenance of the facility to minimize the impact on species described above.



Identify Threatened and Endangered Species

A description of each major species of commercial or recreational value and species designated as endangered or threatened





Identify Threatened and Endangered Species



- Construction: estimate the probable impact of the construction of the facility on commercial, recreational, threatened, or endangered species, including impacts from route clearing and any impact to natural nesting areas
- Operation and maintenance: estimate the probable impact of the operation and maintenance of the facility after construction on species described above, including the permanent impact from route clearing and any impact to natural nesting areas
- Mitigation procedures: describe the mitigation procedures to be used during construction and during the operation and maintenance of the facility to minimize the impact on species described above



Identify Soils & Topography

Description of the areas with slopes and/or highly erodible soils

- Construction: measures taken to avoid or minimize erosion and sedimentation during the site clearing, access road construction, facility construction process, and other temporary grading. If a storm water pollution prevention plan is required, include the schedule for the preparation of this plan



Identify Soils & Topography

- Operation and maintenance: describe and estimate the probable impact of the operation and maintenance of the proposed facility after construction on the environment, including permanent impacts from sites where grading has taken place
- Mitigation procedures: describe the mitigation procedures to be used during construction and during operation and maintenance of the proposed facility to minimize the impact on the environment due to erosion from storm water run-off



Environmental Data (Generation)

Air

Preconstruction

- Available information concerning the ambient air quality of the proposed site
- Describe air pollution control equipment for the proposed facility Describe applicable federal or other laws or standards (i.e., Ohio new source performance standards, applicable air quality limitations, applicable national ambient air quality standards) and how those are met
- A list of all required permits to install and operate air pollution sources
- The location and elevation (ground and sea level) of any air monitoring stations
- The location of major present and anticipated air pollution point sources



Environmental data - generation

Air

Construction: Describe plans to control emissions during the site clearing and construction phase

Operation: Describe ambient air quality monitoring plans for the following, if applicable:

- Sulfur oxides
- Nitric oxides
- Volatile organic compounds
- Particulates
- Carbon monoxide
- Other pollutants

Estimated concentrations of principle air pollutants



Environmental Data (Generation)

Water

Preconstruction

- List of permits required to install and operate water pollution control equipment and treatment processes
- Map showing location and sampling depths of all water monitoring and gauging stations used in collecting preconstruction survey data



Environmental Data (Generation)

Water

Construction

- Map indicating the location of the water monitoring and gauging stations to be utilized
- Estimate the quality and quantity of aquatic discharges from the site clearing and construction operations, including runoff and siltation from dredging, filling, and construction of shoreside facilities
- Plans to mitigate the effects in accordance with current regulations
- Any changes in flow patterns and erosion due to site clearing and grading operations.



Environmental Data (Generation)

Water

Operation

- Map indicating the location of the water quality monitoring and gauging stations
- Describe the water pollution control equipment and treatment processes
- Schedule for receipt of the required permits
- Describe how the facility incorporates maximum feasible water conservation practices considering available technology and the nature and economics of the various alternatives



Environmental Data (Generation)

Water

Operation

A flow diagram or description for water and water-borne wastes through the proposed facility, showing the following potential sources of pollution, including:

- Sewage
- Blow-down
- Chemical and additive processing
- Waste water processing
- Run-off and leachates from fuels and solid wastes
- Oil/water separators
- Run-off from soil and other surfaces



Environmental Data (Generation)

Solid waste

Preconstruction

- Describe the nature and amount of debris and solid waste on the site
- Describe any plans to deal with such wastes

Construction

- Estimate the nature and amounts of debris and other solid waste generated
- Describe the proposed method of storage and disposal of these wastes

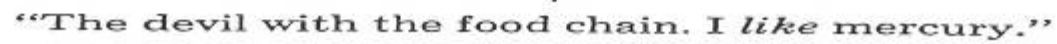


Environmental Data (Generation)

Operation

- Estimate the amount, nature, and composition of solid wastes generated during the operation of the proposed facility
- Describe proposed methods for storage, treatment, transport, and disposal of these wastes
- Licenses and permits.

The applicant shall describe its plans and activities leading toward acquisition of waste generation, storage, treatment, transportation and/or disposal permits.



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Social Impacts to Agriculture





Agricultural Impacts

Identify on a map of all agricultural land and provide

- An evaluation of the impact of the construction, operation, and maintenance of the proposed facility on the following agricultural practices within the proposed facility site boundaries:
- Field operations (i.e., plowing, planting, cultivating, spraying, harvesting, etc.)
- Irrigation
- Field drainage systems
- A description of any mitigation procedures to be utilized by the applicant during construction, operation, and maintenance to reduce impacts to the agricultural land



An Example



Project Summary and Facility Overview

138 kV overhead electric transmission line between CG&E's existing Eastwood

Substation and the proposed Hillcrest Substation, (the subject of PUCO Case No. 05-360- EL-BSB). The proposed project will provide needed electric transmission and distribution support to the eastern limits of the CG&E service area. This project is within Mount Orab, and Sterling and Green Townships in Brown County, and Williamsburg Township in Clermont County. CG&E will construct, maintain, operate, and own the proposed transmission line.



General Purpose of the Facility

The purpose of the proposed facility (and the associated substation) is to relieve the jointly-owned and Dayton Power and Light Company-operated 345/138 kV transformer bank (TB) 7 at the Stuart Generating Station (which feeds the 138kV circuit to Brown Substation and onto Eastwood Substation) and to support the Stuart-Foster 138 kV corridor. In addition, Hillcrest Substation will provide increased distribution reliability and a source of distribution capacity for load growth throughout the extended project vicinity



Summary Description of Proposed Facility

The Hillcrest-Eastwood 138 kV electric transmission line is approximately 9.3 miles in length along the Preferred Route and 8.7 miles in length along the Alternate Route. This Application is part of a combined transmission line and substation project. The proposed transmission line will originate at the existing CG&E Eastwood Substation and end at the proposed Hillcrest Substation (PUCO case no. 05-360-EL-BSB). The Hillcrest Substation will tap the existing Stuart-Foster 345 kV transmission line; as a consequence the selection of a suitable site for the Hillcrest Substation near to the Stuart-Foster 345 kV transmission line was a precursor to transmission line route selection as it defined the eastern termination point for the project



Land Use Impacts

Land use in the immediate area of both the Preferred and Alternate Routes is predominantly residential and agricultural with some commercial, institutional, and recreational uses. No sensitive land uses were identified along the Preferred or Alternate Routes. Based on a review of available land use plans and contacts with local agencies, the project appears to be **consistent and compatible with local and regional development** projects. Existing land use is not expected to be significantly altered by the project as proposed. **Access will be predominantly within and adjacent to existing road and railway ROW.** Temporary access routes will be required along portions of the right-of-way to install and maintain the proposed electric transmission line.



Economic Impacts:

Regional development within Brown and Clermont County is not expected to be directly impacted as a result of this project. However, the project will have an **indirect positive impact for Brown and Clermont Counties through the increased reliability and availability of electricity** throughout the region. In addition, CG&E will pay **property taxes** on utility facilities in each jurisdiction crossed by the completed transmission line.



Ecological Impacts

An ecological study of the Preferred and Alternate Routes was performed. The study included analysis of published literature and maps and a field survey to assess the presence of plant and animal species, wetlands, and streams located along the project route.



Ecological Impacts (con't.)

No exceptional quality streams or wetland areas were identified during the ecological field surveys. Construction impacts to streams and wetlands along the Preferred Route and Alternate Route are expected to be minimal, as the **transmission line will span these sensitive areas.** **Structures and temporary access routes will be installed outside of wetlands and riparian areas.** Furthermore the **utilization of non-mechanized land clearing techniques** to clear wetlands crossed by the ROW, will minimize impacts in these areas.



Ecological Impacts (con't.)

No Federal or State species of concern were identified during the field surveys. **Potential Indiana bat roosting habitat** was observed in select wooded areas along the Preferred and Alternate Routes. CG&E will conduct all **tree cutting outside of the April 15 to September 15 roosting window** of the Indiana bat or will conduct bat surveys if cutting is necessary within this time window to avoid any possible impacts to this species.



Visual Impact Minimization

The ability to minimize the visual impacts of the Hillcrest-Eastwood transmission line is constrained by engineering requirements, project area topography, existing land use, and the project length. CG&E has limited the potential aesthetic impacts of the transmission line to the extent possible through the route selection process and by **taking advantage of overbuild opportunities**. Where possible for both the Preferred and Alternate routes, the transmission line is proposed to be **located adjacent to an existing transportation corridor and in existing distribution ROW** so that it will somewhat “blend in” with the conditions that currently exist along the proposed routes. Visual impacts cannot be limited further because of the very flat nature of the area and the wide-open views due to extensive agricultural land use.



Estimate of Radio and Television Interference

No radio or television interference should result from the operation of the proposed transmission line along either the Preferred or Alternate Routes. During the operation of the transmission line, gas type discharges (corona) would result in both radio frequency interference (RFI) and television interference (TVI). However, large corona levels are 14945561 06-25 Hillcrest-Eastwood Transmission CG&E Line Project June 2005 typically not encountered at 138 kV, so these types of interference do not generally occur, and should therefore not occur with the operation of the transmission line at 138 kV.



Estimate of Radio and Television Interference (con't.)

The radio frequency noise level of the line during heavy rain is greater than the fair weather noise level. However, the quality of radio reception under typical heavy rain is affected more by atmospheric conditions than by operation of transmission lines. Gas-type (corona) discharges can also produce RFI and TVI. These are localized effects (from ball and socket hardware in insulators, hardware to hardware, line to hardware, etc.) primarily from defective hardware and may be easily and quickly detected. Once detected, the hardware may either be repaired or replaced, thus eliminating the interference source. CG&E has a past record of quickly responding and correcting any such problems reported to it.



Route Selection Process

- A route selection study was conducted to identify and evaluate potential routes for the project. Preferred and Alternate Routes were selected based upon the results of this study
- Seventy-five potential routes were identified, scored, and ranked prior to the selection of a Preferred and an Alternate Route. The objective of the study was to minimize the overall impacts to ecological and land use features, while taking into consideration engineering and construction needs. The Route Selection Study identified Preferred and Alternate Routes that are predominantly located along existing utility corridors, roadways, or railways.



This reflects a **desire to minimize land use change, avoid splitting properties, and to make best use of existing corridors with respect to vegetation, land use, and wetlands.**

Importantly, overhead transmission requires periodic maintenance and emergency repair, particularly in adverse weather conditions. As the role of electricity is an essential quality of life service, the minimization of electric outage through timely repair (e.g., during severe winter conditions) is essential. For this reason there is a strong preference for electric transmission to be **located adjacent to accessible rights-of-way**, the ideal being adjacent to an existing road.



Route Selection Process

- The ideal substation site is one that provides **adequate land area** for construction, equipment layout, operation, and maintenance of the facility and opportunity for an **economically and technically feasible tie-in** with the existing electric transmission and distribution systems, while **limiting effects on sensitive land uses, cultural features, and ecological characteristics**.



Route Selection Process

- The **rural nature** of Brown County provides **numerous areas of cleared and relatively flat, agricultural land**, not designated agricultural district lands, which are suitable for substation development. Construction site **grading, erosion, and sedimentation issues are minimized** on relatively flat parcels of land, and limiting **woodlot clearing minimizes** potential ecological impacts.
- Due to the **need for adequate construction and maintenance access** to the new substation, the site selection process also focused on **locations near roads**. Substation sites near to existing roads have the advantage of being readily accessible to distribution circuits that typically run adjacent to roadways.



Route Selection Process

- The selection of a suitable site for the Hillcrest Substation near to the CCD Stuart-Foster 345 kV transmission line drives the siting process at the eastern project transmission line runs generally southeast to northwest and comes within 1.5 miles east of the City of Mount Orab. Locations in the immediate vicinity of Mount Orab were not considered viable due to **difficulties in routing a new transmission line through dense residential areas**. Potential locations to the north of State Route 32 (SR 32), near the intersection of Hillcrest Road and Greenbush East Road, were given priority as this area is **generally less developed** than areas to the south and is located midway between the existing Foster Substation to the northwest and Stuart Generating Station to the southeast.



Route Selection Process

- A new substation in this area would also **minimize the length required for the new Hillcrest-Eastwood 138 kV transmission line** due to the general southeast to northwest trend of the Stuart-Foster line and increase opportunities for future **distribution support and growth**. In addition, substation sites **adjacent to existing transmission line** are considered ideal as they **minimize the aesthetic impacts** of additional transmission lines to and from a more distant substation location.



Environmental Attributes

The following attributes were considered as environmental constraints in the siting process:

- Woodlots
- Mapped National Wetland Inventory (NWI) wetlands
- Perennial or intermittent surface drainage crossings
- Recorded endangered and threatened species locations
- Established nature preserves, refuges, wildlife management areas, etc.



Land-use Attributes

The use attributes were considered in the siting process:

- Sensitive land uses (e.g., recreational areas, airstrips, and communication facilities)
- Institutional land uses (e.g., churches, schools, and hospitals)
- Housing, including residential subdivisions and trailer parks
- Property ownership, tax parcels, and boundaries
- Route crossing or adjacent to the planned Foreign Trade Zone (FTZ) Industrial Park (Figure 2)



Cultural Attributes

The following attributes were considered as cultural constraints in the siting process.

- Mapped archaeological sites
- Sites listed on the National Register of Historic Places (NRHP)
- Known cemeteries

Engineering Attributes

The following attributes were engineering considerations in the siting process.

Road and rail crossings

Percentage of route adjacent to or within existing transmission or transportation right-of-way



Identification of Potential Corridors

After the constraint data was collected and plotted on the base map, the base map was reviewed to identify potential corridors for the electric transmission line. The primary focus was to identify potential corridors that avoided, to the extent possible, constraints described by the OPSB regulations or to minimize impact where they could not be avoided. In addition, potential corridors that connected the end points in the most direct manner possible would minimize the length of the corridor and thereby reduce overall impacts and construction costs.



Identification of Potential Corridors

Preferred locations for the routing of the transmission line included the following:

- Routes along or adjacent to existing utility or transportation easements
- Routes that avoid residences and associated aesthetic effects to the extent possible
- Routes with minimal impact on woodland and wetland areas



Route Scoring & Route Scoring Rationale

The transmission line route selection process involves balancing the many conflicting constraints identified in the study area. One way to compare the alternatives is to develop a ranking system based on attributes that are linked to the objectives of the route selection. This approach is a multi-objective decision analysis and has been used in other decisions involving energy facilities. The objective of this selection study is to identify a Preferred and Alternate Route for the electric transmission line that minimizes the overall effects on environmental, land use and cultural resources while still providing a technically and economically feasible route. Nineteen quantifiable attributes relating to these objectives were developed. Each attribute for every lettered segment was scored as described in the following sections. After the attribute table was completed, the objectives of the route selection study were revisited and the routes that most closely matched the objectives were selected as the Preferred and Alternate Routes.



Route Scoring & Route Scoring Rationale

Numerical scoring of the routes was conducted according to the following steps:

- ***i) Step 1 Assembly of "Raw" Segment Data***
- ***ii) Step 2 Adjustment of Data for Segment Length***
- ***iii) Step 3 Grouping of Data to Assign Scores***
- ***iv) Step 4 Scoring Constraints***
- ***v) Step 5 Totaling Segments to Find Route Scores***



Route Scoring & Route Scoring Rationale

- i) Step 1 Assembly of "Raw" Segment Data:** For the purposes of scoring, viable route candidates were subdivided into segments, which were identified by lettered nodes. These nodes were located at the intersections of two or more potential segments. Residences and sensitive land uses were identified and scored within several distances from the segment centerline (generally 100, 500, and/or 1,000 feet). It should be noted that features scored within 100 feet were also scored within the 500 and 1,000-foot categories, thereby giving closer features a slightly higher weight compared to more distant features.



Route Scoring & Route Scoring Rationale

ii) Step 2 Adjustment of Data for Segment Length: Data were standardized to remove segment length as a factor in the scoring process. Without this adjustment, routes made up of many segments but of equal total route length would be scored more severely than the routes with fewer segments. However, total route length is an important factor and is considered qualitatively in the final selection of Preferred and Alternate Routes. Data pertaining to linear feet of constraint crossed by the centerline of a segment and the number of occurrences of attributes within specified distances of the route were gathered. Raw data was normalized for segment length based on calculating the segment length and scoring attributes on a per mile basis.



Route Scoring & Route Scoring Rationale

iii) Step 3 Grouping of Data to Assign Scores: In order to assign a score to the standardized data, the data had to be grouped into discrete ranges. There are numerous methods of deciding where these group thresholds will fall. Some are more arbitrary than others. Examples of group threshold determinations include: equal number in each group and equal breaks in the data distribution. However, a significant effort was made in this study to eliminate subjectivity in the scoring process. One way to achieve this is to take the data for each attribute (e.g., percent of route length occupied by woodland) for every segment, and calculate the standard deviation. Multiples of the standard deviation were then used as the data group breaks. Using the standard deviation, the scores developed are proportional between attributes. Ecological scores, for example, will not have a higher proportion of 10s than 5s. It is the range of data for each attribute that determines the grouping divisions, not an arbitrary outside reference. This allows comparison between segments, and ultimately between routes, for different attributes, which is the overriding purpose of a route selection study.



Route Scoring & Route Scoring Rationale

iv) Step 4 Scoring Constraints: Scores, instead of raw data, were used to allow all attributes to receive equal consideration in the route selection process. The number of available scores can be as many or as few as desired; however, simplicity usually achieves satisfactory results. In this study the raw data were normalized for length and then assigned a score of 0, 1, 5, or 10 depending on the magnitude of the attribute. Attributes with a lower score are more desirable. The standard deviation of the normalized segment data was calculated and used to group the data for scoring. One standard deviation from the mean received a score of 1, two standard deviations received a score of 5, more than two standard deviations received a score of 10. If there were no occurrences of the attribute, a score of 0 was assigned.



Route Scoring & Route Scoring Rationale

v) *Step 5 Totaling Segments to Find Route Score:* Once each segment has been scored, routes comprising multiple segments are averaged to come up with a total route score. Care was taken in the scoring process to ensure no attributes or group of attributes received greater emphasis than any other. Therefore, no attribute group weighting was conducted. Seventy-three possible combinations of segments were analyzed and are shown in Table 3. Constraint classes, individual attributes, and data sources are discussed in detail in the following section.



Chart 1

Constraint	Score	Rationale
Percent woodland crossed by centerline	0 1 5 10	-No woodlands crossed by centerline -Less than 16.4% of centerline crossing woodlands -16.4 to 24.6% of centerline crossing woodlands -More than 24.6% of centerline crossing woodlands
Percent wetland crossed by centerline	0 1 5 10	-No wetlands crossed by centerline -Less than 2.8% of centerline crossing wetlands -2.8 to 4.2% of centerline crossing wetlands -More than 4.2% of centerline crossing wetlands
Stream crossings	0 1 5 10	-No streams in ROW corridor -Less than 2.4 streams crossed -2.4 to 3.6 streams crossed -More than 3.6 streams crossed
Recorded protected species within corridor	0 10	-None within ROW corridor -One or more within 1,000 feet



Chart 2

Constraint	Score	Rationale
Residences within 100 feet of the centerline	0	-No residences within 100 ft
	1	-Less than 4.8 residences/mile within 100 ft
	5	-4.8 to 7.2 residences/mile within 100 ft
	10	-More than 7.2 residences/mile within 100 ft
Residences within 500 feet of the centerline	0	-No residences within 500 ft
	1	-Less than 26.6 residences/mile within 500 ft
	5	-26.6 to 39.9 residences/mile within 500 ft
	10	-More than 39.9 residences/mile within 500 ft
Residences within 1,000 feet of the centerline	0	-No residences within 1,000 ft
	1	-Less than 60.8 residences/mile within 1,000 ft
	5	-60.8 to 91.2 residences/mile within 1,000 ft
	10	-More than 91.2 residences/mile within 1,000 ft
Properties crossed per mile by centerline	0	-No properties crossed
	1	-Less than 6 properties crossed
	5	-6 to 9 properties crossed
	10	-More than 9 properties crossed
Institutional uses within 100 feet (e.g., schools, hospitals, churches, correctional facilities)	0	-No institutional land uses within 100 ft
	10	-One or more institutional land uses within 100 ft



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Chart 2 (Cont.)

Constraint	Score	Rationale
Sensitive land uses within 100 ft (e.g., parks, preserves)	0 1 5 10	-No sensitive land uses within 100 feet -Less than 2 sensitive land/mile uses within 100 ft -2 to 3 sensitive land uses/mile within 100 ft -More than 3 sensitive land uses/mile within 100 ft
Sensitive land uses within 500 ft (e.g., parks, preserves)	0 1 5 10	-No sensitive land uses within 500 ft -Less than 2 sensitive land/mile uses within 500 feet -2 to 3 sensitive land uses/mile within 500 feet -More than 3 sensitive land uses/mile within 500 feet
Sensitive land uses within 1,000 ft (e.g., parks, preserves)	0 1 5 10	-No sensitive land uses within 1,000 ft -Less than 2 sensitive land/mile uses within 1,000 feet -2 to 3 sensitive land uses/mile within 1,000 feet -More than 3 sensitive land uses/mile within 1,000 feet
Route crosses or adjacent to Foreign Trade Zone (FTZ)	0 10	-Crosses or adjacent to Foreign Trade Zone (FTZ) -Not adjacent to or crossing Foreign Trade Zone (FTZ)



Vistas

Views of the Transmission Line:

Public views along the candidate routes from residences and other potentially sensitive vantage points will be altered. In areas where overbuild of existing distribution lines are planned, aesthetic modifications will include an increase in pole height of approximately 4 feet and additional 138 kV conductors and static wire. Figure 06-4 is an example what this will likely look like from SR 32 looking north on Brooks-Malott Road. Along Hageman's Crossing Road CG&E is planning to relocate distribution circuits, cable lines, and phone lines, that are now on the west side, to the east side of the road and combine these with an overbuild of the 138 kV transmission line. Figure 06-5 shows how this arrangement will appear from a view north along Hageman's Crossing Road.



Structures

Structure Design Features: Transmission line structures, conductors, associated hardware, and guy and anchor arrangements are primarily dictated by engineering requirements. The conductor arrangements and structure designs proposed for the project are shown in Appendix 04-1. For this project overbuild of existing distribution lines was preferred from construction access, ROW acquisition, and aesthetic impact standpoints.



CONSTRUCTION OVERSIGHT





OPSB

- Final Plans and drawings
- Insist on a Preconstruction meeting
- Get to know the players/contractors
- Make periodic field visits (announced or unannounced)
- State and Federal Inspectors responsible
- If condition violations observed, we do have violation schedules



Look for all this In the field....

- Hierarchy
(subcontractors,
contractors,
project/property owners)
superintendent
- Routing alignment
- Parameters/extent of
work at site





Look for all this In the field.



- Staking/Flagging (wetlands, trees, work limits/ buffers)
- Traffic controls in place
- Segregation of agricultural soils



Look for all this In the field....

- Off site damage (streets, adjacent property)
- Tree clearing



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Look for all this In the field....

- Noise
- Schedule
- Post construction
- Restoration (lawns, banks, agricultural lands land





Look for all this In the field....

- Environmental protection/mitigation (silt fencing, straw bales, emissions)
- Specific conditions of approval (boring vs. trenching, clearing). Project specific
- Frac-outs





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Violations of Conditions

In determining the amount of any forfeiture, the:

- The gravity of the violation
- The person's history of prior violations;
- The person's good faith efforts to comply and undertake corrective action
- The person's ability to pay the forfeiture
- The cost of the project
- The effect of the forfeiture on the person's ability to continue as an applicant
- Such other matters as justice requires



Stakeholder and Public Input



Public Participation

- Formal
 - Intervention by Public Officials
 - Township Trustees, County Commissioners, City Officials, etc.
 - Notice Required
 - Intervention by persons impacted
 - Request for intervention
 - Counsel required



Public Participation

- Informal
 - Written submissions to the Board
 - Toll-free Phone Inquiries
 - Sworn Testimony at Public Hearing





Process

- Pre-Application meetings and conferences
- **Pre-Application Public Informational meetings**
- Application submitted
- Completeness Review
- Letter of Completeness
- Proof of Service
- Board Entry establishing Filing Date & Hearing schedule
- **Public Notice published by Applicant**
- Staff Report
- **Public Hearing**
- Adjudicatory Hearing
- Board Decision
- Appeal Process



- Filings of notices with local officials
- Filings of applications at local libraries
- Written notice to directly impacted landowners of upcoming meetings/hearing



OPSB Requirements...

Provide the following public interaction information for each of the site/route alternatives:

- A list of counties, townships, villages, and cities within one thousand feet on each side of the centerline or facility perimeter
- A list of the public officials contacted regarding the application, their office addresses, and office telephone numbers
- Description of the program or company/public interaction planned for the siting, construction, and operation of the proposed facility.
- Description of any insurance or other corporate program for providing liability compensation for damages to the public resulting from construction or operation of the proposed facility
- Description of how the facility will serve the public interest, convenience, and necessity
- Estimate of the increase in tax revenues as a result of facility placement
- Description of the impact of the facility on regional development, referring adopted regional development plans.



Back to an example...



Public Involvement & Participation

Applicant's public information program for this project included:

- written correspondence with local officials
- written correspondence with residents
- meetings with local officials
- meetings with local residents
- information posters and brochures
- newspaper notices
- a public information open house



The Poster

Included:

- a map showing the proposed route alternatives
- information on the location and time of the open house

Placed:

- in five commercial businesses local to the project area
- major grocery store
- service stations
- local market convenient stores





The Information Brochure

Provided:

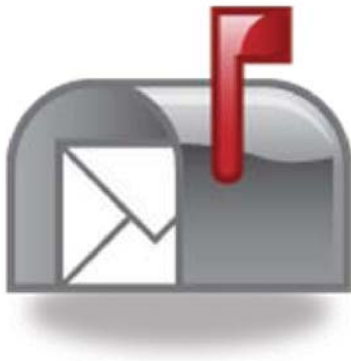
- a summary of routing and siting
- purpose and need
- schedule
- construction sequence
- power line safety
- easement acquisition
- property restoration.



Applicant also....



Mailed letters to nearby property owners notifying them of recently acquired property locations that would be used to build the project.





Importance of.....

Up-front homework

It's all about....

- Public Relations
- Public Relations
- Public Relations



Positive proof of global warming.



**18th
Century**

1900

1950

1970

1980

1990

2006



“ When I heated my home with oil, I used an average of eight hundred gallons a year. I have found that I can keep comfortably warm for an entire winter with slightly over half that quantity of beer.”

-Dave Barry





“Difficulties mastered are opportunities won.”

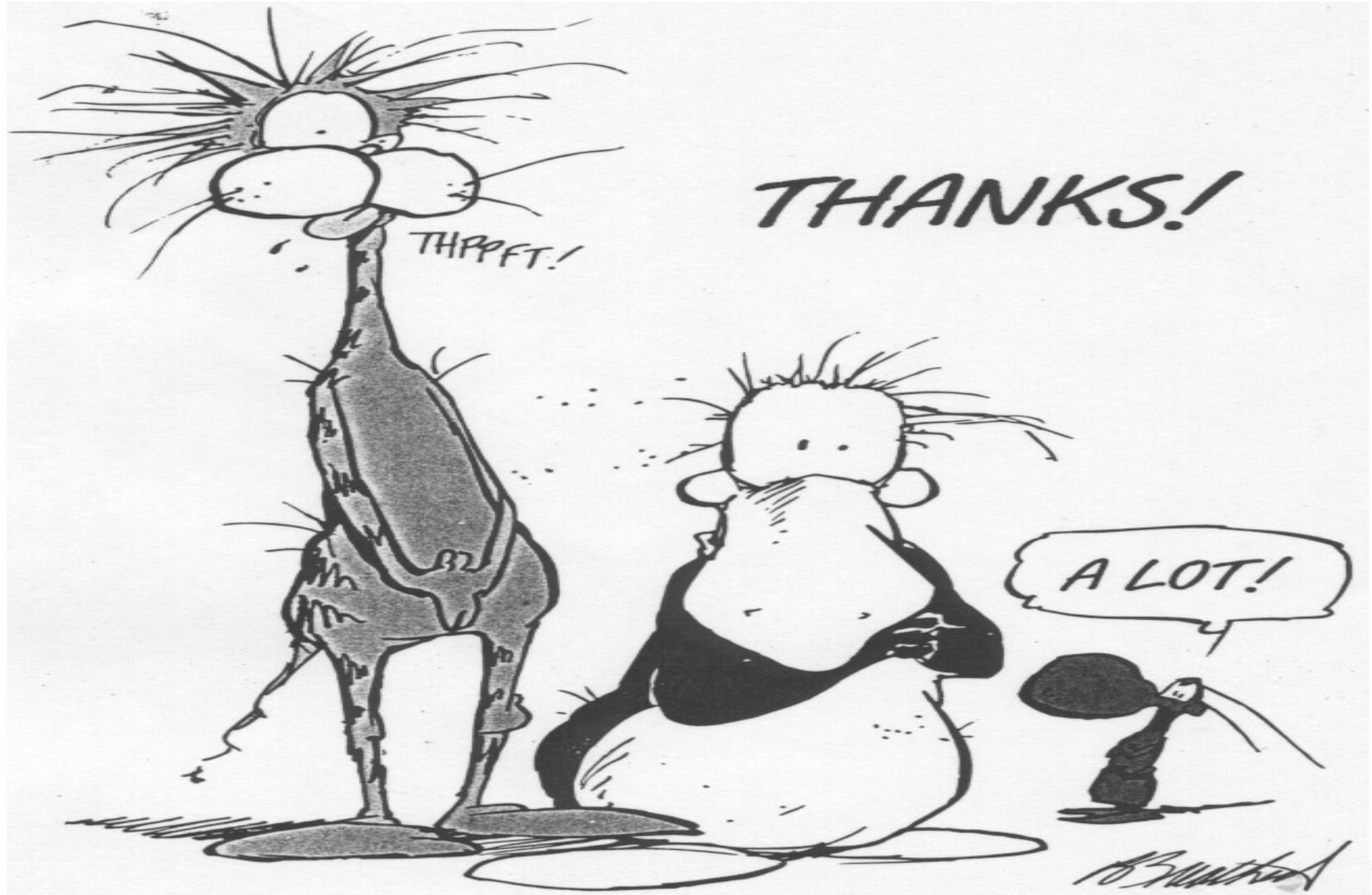
-Winston Churchill



Ohio Power Siting Board

www.OPSB.ohio.gov





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