# NARUC Partnership Program

**Public Utilities Commission of Ohio**
**Ministry of Energy of Ghana**
**Energy Commission of Ghana**
**and**
**Public Utilities Regulatory Commission of Ghana**
**sponsored by**

**United States Agency for International Development**

# Ohio Power Siting Board

## Siting Considerations

Kim Wissman
Executive Director
Ohio Power Siting Board
On behalf of NARUC

USAID
FROM THE AMERICAN PEOPLE

N A R U C
National Association of Regulatory Utility Commissioners

# Socioeconomic and Environmental Considerations

- Economic growth is directly related to energy growth

"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."

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

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.

USAID
FROM THE AMERICAN PEOPLE

The Public Utilities Commission of Ohio

NARUC
National Association of Regulatory Utility Commissioners

# 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:

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

**Detailed description of the proposed facility, including alternatives (not always required for generation anymore)**

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

- Description of the study area or geographic boundaries selected
- Map which includes the study area and depicts the general sites evaluated
- A comprehensive list of all siting criteria utilized by the applicant, including any quantitative or weighting values assigned to each
- A description of relevant factors, or constraints, utilized by the applicant
- Description of the process by which the applicant utilized the siting criteria
- A description of the sites selected for evaluation, their final ranking, and the rationale for selecting the proposed and any alternative site(s)
- Description of any qualitative or other factors utilized
- Constraint map utilized for the study
- Summary table comparing the sites, utilizing the technical, financial, environmental, socioeconomic, and other factors identified in the study
- Design and equipment alternatives shall be included where the use of such alternatives influenced the siting decision

# Technical Data -- Generation Site

Geography and topography - a map (five-mile radius)

- The proposed facility
- Major population centers and geographic boundaries
- Major transportation routes and utility corridors
- Bodies of water which may be directly affected
- Topographic contours
- Major institutions, parks, recreational areas
- Residential, commercial and industrial buildings

An aerial photograph (one-mile radius), indicating the location of the proposed facility in relation to surface features

A map of showing the following features:

- Topographic contours
- Existing vegetative cover
- Land use and classifications
- Individual structures and installations
- Surface bodies of water
- Water and gas wells
- Vegetative cover that may be removed during construction

# Technical Data -- Generation Site

Geology and seismology.

- A map with the geological features of the site and the location of test borings
- Suitability description of the site geology and plans to remedy any inadequacies
- Describe the suitability of soil for grading, compaction, and drainage, and describe plans to remedy any inadequacies

Hydrology and wind

- Provide the natural and the man-affected water budgets, including the ten-year mean and critical (lowest seven-day flow in ten years) surface flows and the mean and extreme water tables during the past ten years for each body of water likely to be directly affected by the proposed facility
- An analysis of the prospects of floods and high winds for the area, including the probability of occurrences and likely consequences of various flood stages and wind velocities, and plans to mitigate any likely adverse consequences
- Existing maps of aquifers which may be directly affected by the proposed facility

# Technical Data -- Transmission Site

Geography and topography

- Map (area one thousand feet on each side of a transmission line alignment) and the area within the immediate vicinity of a substation site or compressor station
- Proposed transmission line alignments, including proposed turning points
- Any proposed substation or compressor station site locations
- Major highway and railroad routes
- Identifiable air transportation facilities, existing or proposed
- Utility corridors
- Proposed permanent access roads
- Lakes, ponds, reservoirs, streams, canals, rivers, and swamps
- Topographic contours
- Soil associations or series
- Population centers and legal boundaries of cities, villages, townships, and counties

Slope and soil mechanics

- A description of the soils in the areas where slopes exceed twelve per cent
- Discuss the rationale as to suitability of the soils for foundation construction

# Layout and construction - Generation

**Site activities**

- Test borings
- Removal of vegetation
- Grading and drainage provisions
- Access roads
- Removal and disposal of debris
- Post-construction reclamation

**Layout**

- Electric power generating plant
- Fuel, waste, and other storage facilities
- Fuel and waste processing facilities, if any
- Water supply and sewage lines
- Transmission lines
- Substations
- Transportation facilities and access roads
- Security facilities
- Grade elevations where modified during construction
- Any other pertinent installations

# Layout and construction - Generation

**Structures**

- Estimated overall dimensions
- Construction materials
- Color and texture of facing surfaces
- Artist's pictorial sketches of the proposed facility from public vantage points
- Any unusual features

**Plans for construction** -- describe the proposed construction sequence

**Future plans--** describe any plans for future additions of electric power generating units for the site (including the type and timing) and the maximum electric power generating capacity anticipated for the site

**Equipment -** describe the proposed equipment

**Emission control and safety equipment**

- All proposed major emission control equipment
- The reliability of the equipment and the reduction in efficiency for partial failure
- Equipment proposed for control of effluents discharged into bodies of water and receiving streams
- All proposed major public safety equipment

## Layout and construction - Transmission

**Site activities-** clearing, construction methods and reclamation operations, including:

- Surveying and soil testing
- Grading and excavation
- Construction of temporary and permanent access roads and trenches
- Stringing of cable and/or laying of pipe
- Removal and disposal of construction debris such as crates, pallets, etc.
- Post-construction reclamation

# Layout and construction - Transmission

A map of the site of major transmission line associated facilities such as substations or compressor stations, showing the following features:

- Final grades after construction, including site and access roads
- Proposed location of major structures and buildings
- Fenced-in or secured areas
- Estimated overall dimensions

Describe reasons for the proposed layout and any unusual features

Describe plans for any future modifications in the proposed layout, including the nature and approximate timing of contemplated changes

*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

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 and 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

# Social and ecological data - Generation

***Noise***

Describe the ***construction*** noise levels expected at the nearest property boundary

- Dynamiting activities
- Operation of earth moving equipment
- Driving of piles
- Erection of structures
- Truck traffic
- Installation of equipment

Describe the ***operational*** noise levels expected at the nearest property boundary

- Generating equipment
- Processing equipment
- Associated road traffic

Indicate the location of any noise-sensitive areas within one mile of the proposed facility

Describe equipment and procedures to mitigate the effects of noise emissions

USAID FROM THE AMERICAN PEOPLE

N A R U C
National Association of Regulatory Utility Commissioners

## *Social Impacts*
## Assess Potential Noise Impacts

- What type of existing noise exists in the area?

- Increased noise during construction

# Socioeconomic and land use impact analysis

Proposed transmission line alignments, including proposed turning points

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 (e.g., schools, hospitals, churches, government facilities, etc.)

Transportation corridors

Existing utility corridors

Noise-sensitive areas

Agricultural land

# Ecological impact - generation

***Site information***

Map containing a one half-mile radius from the proposed facility including

- the facility boundary
- undeveloped or abandoned land such as wood lots, wetlands, or vacant fields

The results of a survey of the vegetation within the site boundary and within a one-fourth mile distance from the site perimeter

Results of a survey of the terrestrial and aquatic animal life within the site boundary and within a one-fourth mile distance from the site perimeter

A summary of any studies which have been made addressing the ecological impact of the proposed facility

A list of major species from the surveys of terrestrial and aquatic biota. "Major species" are those which are of commercial or recreational value, or species designated as endangered or threatened

# 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
- Encourage the use of “brownfield sites”

.

## Economics and other social good

$ $

- Estimate the annual total and present worth of construction and operation payroll
- Estimate the construction and operation employment and estimate the number that will be employed from the region
- Estimate the increase in county, township, and city tax revenue accruing from the facility
- Estimate the economic impact of the proposed facility on local commercial and industrial activities
- Probable impact on public services and facilities
- The impact on regional development, including housing, commercial and industrial development, and transportation system development
- Compatibility of the proposed facility and the anticipated resultant regional development with current regional plans

## 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

# Aesthetic information

**Aesthetic Impact**

The aesthetic impact of the proposed facility with reference to plans and sketches, including the following:

- The views from such sensitive vantage points as residential areas, lookout points, scenic highways, and waterways
- Structure design features
- How the facility will affect the aesthetic quality of the site and surrounding area
- Measures that will be taken to minimize any visual impacts created by the proposed facility

The degree of compatibility of a new transmission line will vary with the viewer and the setting. Lines located on high ridges or wide-open spaces are likely to be identified as having a negative aesthetic impact. New transmission lines are more likely to ‘blend-in’ with surroundings where existing transmission facilities exist and in industrial and commercial areas where light poles, other utility facilities, billboards and other larger structures are present. Routing transmission lines along property edges where visually screening tree-lines are commonly found, rather than bisecting parcels, and utilizing natural visual screens along existing corridors (e.g., railway corridors) are also effective ways to minimize aesthetic impacts

# Cultural Resources and Noise

Potential and identified recreational areas

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

Data and related information on noise emissions generated by the proposed transmission line and associated facilities including construction noise

(1) Construction noises could include:

- Dynamiting or blasting activities
- Operation of earth moving and excavating equipment
- Driving of piles
- Erection of structures
- Truck traffic
- Installation of equipment

(2) Operation and maintenance: estimate the effect of noise due to the operation or maintenance of the transmission line and associated facilities

(3) Mitigation procedures: describe any equipment and procedures designed to mitigate noise emissions during both the site clearing and construction phase, and during the operation and maintenance of the facility to minimize noise impact.

*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

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/site 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/site 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

USAID
FROM THE AMERICAN PEOPLE

The Public Utilities Commission of Ohio

NARUC
National Association of Regulatory Utility Commissioners

*Environmental Impacts*

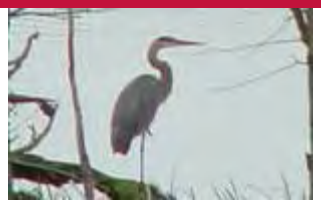
# Identify Stream Quality

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/site 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

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/site 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/site 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




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

- Construction: estimate the probable impact of the construction of the facility on commercial, recreational, threatened, or endangered species, including impacts from route/site 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/site clearing and any impact to natural nesting areas
- (3) 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

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
- 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

Procedures to be followed in the event of failure of air pollution control equipment, including consideration of the probability of occurrence, expected duration and resultant emissions

"The devil with the food chain.

I *like* mercury."

# 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

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
- 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
- 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

***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

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

USAID
FROM THE AMERICAN PEOPLE

N A R U C
National Association of Regulatory Utility Commissioners

## *Social Impacts*
## Impacts to Agriculture

# Agricultural impacts

Identify on a map of all agricultural land

Provide, for all agricultural land identified

- 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

USAID
FROM THE AMERICAN PEOPLE

N A R U C
National Association of Regulatory Utility Commissioners

# An example to follow

USAID FROM THE AMERICAN PEOPLE

NARUC National Association of Regulatory Utility Commissioners

# Project Summary and Facility Overview

This Application seeks a Certificate of Environmental Compatibility and Public Need from the Ohio Power Siting Board ("OPSB") for the Cincinnati Gas & Electric Company's (CG&E) proposed Hillcrest-Eastwood 138 kilovolt (kV) transmission line Project.

The scope of the proposed project involves the construction of a new single circuit 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

USAID
FROM THE AMERICAN PEOPLE

N A R U C
National Association of Regulatory Utility Commissioners

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.

USAID
FROM THE AMERICAN PEOPLE

NARUC
National Association of Regulatory Utility Commissioners

***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.

**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. 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 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.

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.

USAID
FROM THE AMERICAN PEOPLE

N A R U C
National Association of Regulatory Utility Commissioners

# 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.

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.**

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.

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.

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.

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.

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 Sc***

- ***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.
- ***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.

***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.

***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 occurances of the attribute, a score of 0 was assigned.

***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.

USAID
FROM THE AMERICAN PEOPLE

# Chart 1

National Association of Regulatory Utility Commissioners

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

# Chart 2

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

# Chart 2 Con't

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

***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 Hagemans 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 Hagemans Crossing Road.

***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.

USAID
FROM THE AMERICAN PEOPLE

The Public Utilities Commission of Ohio

NARUC
National Association of Regulatory Utility Commissioners