EXHIBIT JC-5

BEFORE THE

NEW JERSEY BOARD OF PUBLIC UTILITIES

IN THE MATTER OF THE PETITION OF JERSEY CENTRAL POWER & LIGHT COMPANY PURSUANT TO N.J.S.A. 40:55D-19 FOR A DETERMINATION THAT THE OCEANVIEW 230 KV TRANSMISSION PROJECT IS REASONABLY NECESSARY FOR THE SERVICE, CONVENIENCE OR WELFARE OF THE PUBLIC

Direct Testimony

of

Timothy B. Gaul

Re: Transmission Project Siting and Route Selection

I. INTRODUCTION AND BACKGROUND

Q. Please state your name and business address.

A. My name is Timothy B. Gaul. My business address is 1250 23rd Street NW, Washington, DC 20037.

Q. By whom are you employed and in what capacity?

A. I am employed by The Louis Berger Group, Inc. ("Louis Berger"), as the Associate Vice President of Energy Services in the Planning, Facilities, and Resource Management Business Unit.

Q. Please describe your professional experience and educational background.

A. As the Associated Vice President of Energy Services, I provide management and oversight of our Transmission Services, Geographic Information Systems ("GIS") Services, and Hydropower Teams. I am also an environmental scientist and planner by training and experience, and I served both as the Project Director for Louis Berger for the Oceanview 230 kV Transmission Project (the "Project"), and as a member of the Routing Team. As a Routing Team member, I was directly involved in the development and analysis of routes, public outreach efforts, comparison of alternatives, and preparation of the Route Selection Study Report ("Routing Study").

I have a B.S. from SUNY College of Environmental Science and Forestry at Syracuse University (1997) and an M.S. from Creighton University (2000). Throughout my career I have supported a range of environmental science and planning studies, and I specialize in planning efforts for infrastructure, environmental impact assessment and modeling, natural resource inventory and permitting, and GIS analysis in support of environmental planning and compliance.

Attached as Exhibit TBG-1 is my curriculum vitae.

Q. Have you previously testified in Board of Public Utilities ("Board" or "BPU") proceedings?

A. No.

Q. Have you testified in proceedings before other utility regulatory commissions?

A. Yes, I have provided testimony before the West Virginia Public Service Commission, the Virginia State Corporation Commission, the Pennsylvania Public Utility Commission, and the Kansas Corporation Commission.

Q. Would you describe the purpose of your testimony?

A. I am testifying on behalf of Jersey Central Power & Light Company ("JCP&L"), and the purpose of my testimony is to sponsor and explain the Routing Study for the Project, which involves construction of a 230 kilovolt ("kV") high voltage transmission line beginning at the JCP&L Larrabee substation in Howell Township, Monmouth County, New Jersey and ending at the Oceanview substation in Neptune Township, Monmouth County, New Jersey. The Routing Study is attached to this testimony as Exhibit TBG-2.

II. <u>DESCRIPTION OF THE ROUTING PROCESS</u>

Q. Please provide an overview of the Routing Study.

A. The Routing Study documents the route selection methodology, public outreach process, and the Preferred Route identification process. The overall goal of the

Routing Study was to gain an understanding of the opportunities and constraints in the Study Area, develop feasible Alternative Routes, evaluate potential impacts and identify a reasonable Preferred Route for the Project. The specific goal of the Routing Study was to determine a route that minimizes the overall effect of the transmission line on the natural and human environment, complies with the applicable regulatory requirements, avoids unreasonable and circuitous routes and unreasonable costs, and minimizes special design requirements. The Preferred Route is the route that best satisfied these criteria.

Q. Who conducted the Routing Study?

A. The Routing Study was conducted by an interdisciplinary Routing Team. Members of the Routing Team have experience in electric transmission line route planning and selection, impact assessment for natural resources, land use assessment and planning, cultural resource identification and assessment, impact mitigation, and transmission engineering, design, and construction. The Routing Team members are identified in Section 2.1 of the Routing Study.

Q. Please provide a general overview of the Route Development process.

A. The Route Development process for the Project was an inherently iterative process that consisted of an initial Corridor Screening Study followed by a comprehensive Route Selection Study.

The purpose of the Corridor Screening Study was to identify the most feasible transmission path(s) ("corridors") that could potentially be used to provide a new 230 kV source into the Oceanview substation. Based on the results of the Corridor Screening Study, the most feasible corridors were retained for further analysis in the Route Selection Study.

The purpose of the Route Selection Study was to refine the most feasible corridors identified during the Corridor Screening Study by developing Potential Routes. During the Route Selection Study, the Potential Routes were further refined and assembled into Alternative Routes. The potential impacts associated with the Alternative Routes were evaluated, and, ultimately, a Preferred Route for the Project was identified.

Q. Did the Routing Team identify guidelines to follow in both the Corridor Screening Study and the Route Selection Study?

A. Yes, the Routing Team considered three types of Routing Guidelines: (i) General Guidelines, (ii) Technical Guidelines, and (iii) New Jersey Guidelines. General Guidelines establish a set of principles that guide the development of alignments with respect to area land uses, sensitive features, and considerations of economic reasonableness. Technical guidelines provide the Routing Team with technical limitations related to the physical limitations, design, ROW requirements, or reliability concerns of the Project infrastructure. New Jersey Guidelines are those specific state regulations that influence either the development of specific alignments for the Project, or, the ultimate selection of the Preferred Route. Specifically, the Routing Team attempted to minimize the following general guidelines:

- Route length, circuitousness, cost, and special design requirements;
- The removal or substantial interference with the use of existing residences;

- The removal of existing barns, garages, commercial buildings, and other nonresidential structures;
- Substantial interference with the use and operation of existing schools, recognized places of worship, cemeteries, and facilities used for cultural, historical, and recreational purposes;
- Substantial interference with economic activities, including agricultural activities;
- Creation of new linear ROW;
- Crossing of designated public resource lands such as national and state forests and parks, large camps and other recreation lands, designated battlefields, nature preserves or other designated historic resources and sites, and conservation areas;
- Crossing of large lakes and large wetland complexes, critical habitat, and other unique or distinct natural resources; and
- Substantial visual impact on residential areas and public resources.

The Routing Team also referred to technical guidelines specific to 230 kV line construction (see Section 2.4.2 of the Routing Study) and regulations established by the BPU[1], which require utility companies to use available railroad or other ROW whenever practical feasible and safe (see Section 2.4.3 of the Routing Study).

Q. Please provide a general overview of the Corridor Screening Study.

A. During the Corridor Screening Study, a range of Potential Corridors were developed to provide a 230 kV source to the Oceanview substation. The Corridor Screening Study consisted of a high-level review of available GIS data, aerial imagery and other publically available data, as well as specific transmission

[1] *N.J.A.C.* 14:5-7.1.

system information provided by JCP&L. The network of Potential Corridors was developed by: (i) following the routing guidelines described above; (ii) identifying large area constraints; (iii) identifying small area constraints; and (iv) identifying opportunity features.

Large area routing constraints are defined as constraints that cover large areas. Examples of large area constraints for the Project are: (i) areas that have dense residential development; (ii) large federal facilities such as the Earle Naval Weapons Station; and (iii) sensitive recreation or historic areas, such as the Allaire State Park and Monmouth Battlefield State Park. Large area constraints are avoided to the extent practicable and are considered unfavorable for developing Potential Corridors.

Small area routing constraints encompass other features types that are found within smaller geographic areas, or site-specific locations. Examples of small area constraints are: (i) individual residences; (ii) commercial and industrial buildings; and (iii) wetland areas. Section 2.5 of Routing Study provides additional detail on routing constraints.

Opportunity features are defined as locations where the proposed transmission line might be located with the least impact to the natural and human environment. Practical routing opportunities included sharing and/or paralleling existing ROWs and linear features, including: (i) transmission lines; (ii) a railway; and (iii) state roads, including Interstate 195, State Routes 18, 33 and 66.

Using the above information, the Routing Team developed a range of Potential Corridors (Corridors A through H) , which were intended to serve as a basis for further evaluation and refinement in subsequent phases of the Project and served to focus the early data gathering and field reconnaissance efforts of the Routing Team.

The Potential Corridors (Corridors A through H) were evaluated at a high level for potential fatal flaws using a selected set of criteria which included environmental variables, system operations requirement variables, constructability variables, facilities co-location variables, Routing Team input, and other land use concerns. The Potential Corridors were also compared with respect to factors such as overall length, estimated number of corner structures that may be required, approximate new ROW acreage required, and probable studies/permits required. Additional factors considered include land use, residential and commercial development, road setback requirements, potential aesthetic impacts, and distance from known cultural resources.

Based on this high level evaluation, five Potential Corridors were eliminated from further consideration (Corridors A, E, F, G and H). Section 3.1.3 of the Routing Study details why these Potential Corridors were eliminated from further consideration. Corridors B, C and D were identified as the most feasible corridors and retained for further analysis in the comprehensive Route Selection Study.

Q. Please provide a general overview of the Route Selection Study.

A. The Routing Team developed specific alignments (referred to as Potential Routes) along each of the three feasible corridors (Corridors B, C, and D) that were identified during the Corridor Screening Study. Potential Routes are an early iteration of the routing process that involves the development of conceptually based routes and general consideration of these routes with respect to large and small area constraints and opportunity features.

The Route Selection Study employed the same routing guidelines and criteria developed during the Corridor Screening Study. However, additional information on small area constraints and opportunity features was collected during the Routing Study. For example, the Corridor Feasibility Study relied on GIS parcel data to estimate the number of residences or businesses located within or adjacent to the Potential Corridor. As part of the Routing Study, individual buildings were digitized based on aerial imagery and the features were confirmed in the field by reviewing the Potential Routes from public roads. Similarly, opportunity features such as the Conrail Shared Assets Operations ("CSAO") railway and State Route 195 were evaluated in more detail to determine appropriate placement of the Potential Route centerline to ensure compliance with applicable regulations (i.e., regulations regarding utility placement within NJDOT ROW).

Once developed, the Routing Team reviewed each Potential Route in the field. Field efforts included reviewing the Potential Routes from public points of access and documenting/verifying locations of residences and other small area constraints. The field investigations resulted in changes to the Potential Routes. Additional changes resulted from efforts to avoid residences and other buildings, such as garages, barns, and commercial structures, or other similar constraints discovered in the field.

Alternative Routes were then developed by using a qualitative and quantitative screening process used to eliminate or modify segments of the Potential Routes that were not considered suitable for additional study. The eliminations or adjustments were based on the likelihood of impacts on residential developments, natural resources, or other developed infrastructure.

III. SELECTION OF THE PREFERRED ROUTE

Q. Describe the alternatives analysis and selection of the Preferred Route.

A. The Routing Team developed three complete Alternative Routes (Alternative Routes B, C and D) and one "Option" from the network of Potential Routes. The 0.6-mile-long Option was developed for Alternative Routes C and D. Alternative Routes C and D use an existing transmission ROW that traverses the Children's Center of Monmouth County School parking lot. The Option would detour Alternative Routes C and D from the existing ROW between the Atlantic and Oceanview substations to avoid crossing the Monmouth County Children's Center parking lot.

The Alternative Routes and the Option for Alternative Routes C and D were assessed and compared with respect to ROW or constructability challenges (ROW constraints, design challenges and construction challenges), their potential impacts on any noted natural resources (water resources, vegetation, wildlife and soils), and with respect to human uses (land use, recreation and aesthetics and cultural resources). From that analysis, the Routing Team recommended selection of Alternative Route C (without the Option) as the Preferred Route for the Project.

A. Right-of-Way and Constructability

Q. **Describe how the Routing Team assessed potential engineering and construction challenges.**

A. Constructability is a term used to discuss the feasibility of a proposed transmission line, as it relates to engineering and construction concerns. Constructability evaluates the use of existing transmission corridors, engineering challenges, and accessibility issues of a proposed route. Major factors that affect constructability include, but are not limited to, steep topography, condensed ROWs, high turn angles, proximity to major highways, accessibility, and cost. Additional issues to consider when evaluating constructability are: (i) ease of moving equipment, materials, and workers to the construction sites; (ii) relative ease of ensuring public and worker safety; (iii) logistical difficulties associated with obtaining the required easements for the transmission line; and (iv) the actual amount of time and materials needed for construction, which can correlate to the total length of the corridor. Potential engineering challenges are important to consider when routing a transmission line. Sharp angles, excessive road and stream crossings, condensed ROW alignments, steep topography, and unnecessary length are all elements that could result in increased environmental impacts, social impacts and operational limitations.

Q. Does the Preferred Route have minimal ROW and construction challenges compared to the Alternative Routes B and D?

A. Yes. Although all three Alternative Routes are similar in length, the Preferred Route is the only Alternative Route that can be constructed entirely within existing JCP&L ROW. Between the Larrabee and Atlantic substations, the

Preferred Route would be constructed within the existing ROW occupied by the Atlantic – Larrabee 230 kV and Smithburg – Atlantic 230 kV transmission lines. The existing ROW in this area is approximately 200 feet wide with the existing lines strung on one set of double-circuit steel lattice structures. The structures are offset to one side leaving 100 feet of space available within the ROW for the new line. Between the Atlantic and Oceanview substations, the Preferred Route would involve rebuilding the existing Oceanview – Atlantic 230 kV Transmission Line, which is constructed on wooden H-frame structures along a 100 foot wide ROW. To accommodate the additional 230 kV circuit within the existing ROW along this portion of the route, JCP&L would remove the existing structures and rebuild the ROW with two new steel monopole structures that would carry the three circuits.

Alternative Route D would traverse within new ROW for the first 0.2 miles, parallel an active CSAO railway for 8.3 miles, and then follow the same path as Route C for 6.8 miles into the Atlantic and Oceanview substations. For the first 8.3 miles parallel to the CSAO railway, Route D would involve replacing the existing Farmington to Larrabee 34.5 kV Transmission Line located within the railway ROW with a double-circuit 230/34.5 kV Transmission Line and acquisition of 50 feet of additional ROW. Therefore, Alternative Route D would require the acquisition of additional ROW from private landowners, including the purchase of several homes (approximately 4) based on the level of existing development adjacent to the railway, and an easement or license agreement with CSAO. The transmission line engineering design would also require a combination of paralleling the railway and cantilevering (overhanging) over the railway.

Alternative Route B would follow the same path as Route C for the first 4.7 miles and then parallel I-195 and State Route 18, which are both limited access highways, into the Oceanview substation for part of the route. Utilities within the State of New Jersey can occupy highway ROW; however, the New Jersey Department of Transportation ("NJDOT") has identified specific requirements for utility crossings or occupation of highway ROW within the Utility Accommodation Code (N.J.A.C. 16:25). Because of these requirements, the Route B centerline (i.e., the transmission structures) is aligned parallel to, but outside of the limited access highway ROW in the adjacent private lands. Although the ROW for Alternative Route B overlaps a portion (up to 50 feet) of NJDOT ROW, thereby reducing the amount of ROW required across private lands, this route would nonetheless require significant acquisition of new ROW, including the purchase of several homes (approximately 9) based on the level of existing development adjacent to both highways. Moreover, overlapping existing road ROW and crossing limited access highways would present design and engineering challenges that must be coordinated with NJDOT and meet the design and safety requirements identified in N.J.A.C. 16:25. Route B would involve crossing approximately 20 highway ramps, which would require special design considerations (i.e., wooden poles if placed within the highway ROW, setback requirements, etc.) and coordination with NJDOT.

From a ROW and constructability perspective, Alternative Route C (without the Option) is preferred to the remaining Alternative Routes because the entire route can be constructed within existing JCP&L ROW and the Project can use existing access roads in many cases. The Preferred Route is also anticipated to require fewer angled structures compared to Alternative Route B, which follows the highway. Using an existing ROW and access roads (to the extent possible) will result in less ROW acquisition, vegetation clearing (including ongoing periodic tree trimming), and earth disturbance, thereby reducing the overall environmental and social impact.

B. <u>Natural Environment</u>

Q. Describe how the routing team assessed potential natural environmental impacts.

A. Natural environmental impacts include potential impacts to vegetation and habitat, surface waters, and conservation and recreation lands. The Routing Team evaluated the Alternative Routes with respect to the natural environment using publically available data including mapped wetlands, streams, conservation lands, potential threatened and endangered species habitat, floodplain information, soil information and aerial imagery (see Section 4.3 of the Routing Study). In determining the Preferred Route, the Routing Team assessed what Alternative Route had the overall minimal environmental impact.

Q. Does the Preferred Route have an overall lower environment impact compared to the other Alternative Routes B and D?

Yes. Although the Preferred Route crosses a larger amount of NJDEP mapped wetlands compared to the other Alternative Routes (Alternative Routes B and D), Alternative Route C will be located entirely within an existing transmission ROW that is currently maintained in accordance with JCP&L's vegetation management program. JCP&L may need to conduct some limited tree clearing within the existing ROW for Alternative Route C[2]. In contrast, Alternative Route B has the largest amount of forest clearing (approximately 71.2 acres) and Alternative Route D requires approximately 31.5 acres of forest clearing.

Forest clearing can result in environmental and land use impacts including wildlife habitat fragmentation and modification (i.e., different species occupy forested landscapes as opposed to scrub-shrub landscapes), wetland function modification (i.e., converting forested wetlands into emergent wetlands), soil erosion, increased storm water runoff, and removal of aesthetic buffers for adjacent property owners. Therefore, Alternative Route C would result in minimal changes to the existing plant communities and wildlife habitat compared to Alternative Routes B and D.

Not only does the Preferred Route require the least amount of forest clearing, but it has the highest percentage of length within existing transmission line ROW and is comparable in length to Alternative Routes B and D. Although the Preferred Route crosses the largest amount of wetlands, permanent impacts to wetlands, including the conversion of forested wetlands to scrub-shrub or emergent wetland, would occur only from the placement of structure foundations.

[2] JCP&L may also seek to acquire additional tree clearing rights outside of the existing ROW. However, the total amount of tree clearing for Route C is still anticipated to be significantly less compared to the alternative routes.

For these reasons, the Preferred Route is likely to have the overall least impact on the environment compared to the other Alternative Routes B and D.

Additional information on environmental impacts associated with the Project is included in Section 4.3 of the Study Report and the testimony of Kirsty Cronin.

C. Human Use

Q. Describe how the Routing Team assessed potential impacts to human use.

A. Human or built environment impacts include direct and indirect impacts to residential, commercial and industrial development, institutional uses (e.g., schools, places of worship, cemeteries, and hospitals), cultural resources, and land use. Construction of a new transmission line can result in changes in land use and aesthetic impacts to residents, commuters and travelers, employees, and recreational uses.

Q. Please describe how the Routing Team evaluated compatibility with existing land use.

A. The Alternative Routes are located entirely within Monmouth County, New Jersey, the fourth largest county in the state and one of the fastest growing. Several types of land uses are located within the Study Area. Dense residential and commercial development is the predominant land use along the Potential Corridors identified in the Route Screening Study, particularly in the north and east portions of the Study Area, with lesser amounts of forested land (mostly associated with Allaire State Park) and agricultural land. Major land use features within the Study Area include Naval Weapons Station Earle, Allaire State Park, Shark River County Park, as well as numerous golf courses/country clubs scattered throughout the Study Area. There is significant development throughout the Study Area.

Route D crosses the developed areas for the greatest distance (10.6 miles or 70 percent of its length), while the Preferred Route only crosses developed areas for approximately 40 percent of its total length or 7.0 miles.

The ROW for Routes C and D would traverse a similar number of parcels (164 and 184, respectively), with Route B crossing the fewest amount of parcels (129). However, Route B would impact 77 new parcels and landowners not previously affected. The Preferred Route can be constructed and operated entirely within an existing transmission ROW. In comparison, JCP&L would have to acquire substantial amounts of new ROW for Routes B (about 100 acres) and D (about 50 acres, depending on the amount of overlap with existing transmission ROW along the railway).

Q. **Please describe how the Project's potential impact on residential areas was evaluated.**

A. The Routing Team identified the number of residences located within 500, 250 and 100 feet of the Alternative Routes through aerial imagery and field confirmation. Based on this review, Route D would traverse within 500 and 250 feet of the highest number of residences (588 and 225 residences, respectively). The majority of these residences (405) are located within 500 feet of the existing transmission ROW used by both Routes D and C.

Between the Atlantic and Oceanview substations, both Routes C and D would traverse through or adjacent to residential areas within existing ROW between Jumping Brook Road and Summit Drive, including the Fox Chase and South Point residential communities and residential communities located in the Green Grove section of Neptune Township. In this area, the existing transmission lines will be rebuilt on double-circuit single pole steel structures and the new Larrabee – Oceanview 230 kV line will be constructed on a parallel set of single pole steel structures. Residents in this area will be temporarily impacted during construction, but the overall use of the ROW will not significantly change.

The remaining 183 residences located within 500 feet of Route D are primarily associated with residential development within the Borough of Farmingdale. In this area the transmission line would traverse the center of town adjacent to the active railway in new ROW. Construction through Farmingdale would be challenging and would impact several new residences—including four residences located within the proposed 100-foot ROW. Because no buildings can be located within the ROW, these four residences would potentially be displaced for construction of the proposed transmission line. In comparison, the Preferred Route is located 100 percent (16.1 miles) within existing transmission line ROW and does not currently have any residences within the ROW.

Route B would traverse within 500 feet of the second highest number of residences (556 residences). The majority of these residences are located adjacent to Routes 18 and 138. Only 5 miles of Route B would be constructed entirely within existing transmission ROW. Therefore, Route B would result in new impacts to nearly all residences located along its route because new ROW would need to be acquired for construction of a transmission line. Nine of these residences are located within the proposed 100-foot ROW and would potentially be displaced for construction of the proposed transmission line. Along Route 18, the new transmission line would traverse the residential communities of Knox Hill, Shark River Hills, and the North Wall/Glendola section of Wall Township. Along Route 138, the new transmission line would traverse the Allaire Country Club Estates residential community. In these areas the transmission line would be constructed on new ROW adjacent to the roadway. A few communities (including Winding Ridge and the Gables section of Neptune Township) located on the opposite side of Route 18 from the transmission line would potentially have views of the new transmission line.

The existing Atlantic – Oceanview double-circuit 230 kV transmission line (and Routes C and D) pass through the Children's Center of Monmouth County parking lot. As discussed above, to avoid the school, Routes C and D could be diverted south of the existing ROW, but this would result in additional ROW acquisition from private and public landowners, including land currently held in a conservation easement and portions of a property currently used as a daycare facility. A diversion would result in new impacts to residences located along Jumping Brook Road.

Q. Please describe how the Project's potential impact on aesthetics was evaluated.

A. JCP&L attempted to minimize aesthetic impacts by considering existing land use and evaluating routes that could rebuild existing transmission lines, parallel existing transmission lines, or parallel other existing infrastructure. Routes that use or parallel existing transmission line generally result in fewer overall land use or aesthetic impacts than those that parallel roads, railroads, or require virgin ROW.

Route B uses a highway ROW for the majority of its length. Paralleling a highway can increase visual impacts for area travelers, as structures would be more frequent due to the curves in the road and structures would be visible from long periods of time while driving the roadway. Removing trees and building structures taller than the tree line would also increase the visibility of the transmission line on the adjacent areas. While road ROWs can be considered previous disturbance to the land, the addition of a transmission line would create new vertical structures that could be seen for longer distances. In addition, Route B would be constructed adjacent to neighborhoods, resulting in visual aesthetics impacts to the residences.

The Preferred Route uses existing cleared transmission line ROWs for 100 percent of its length and minimizes visual impacts due to the currently diminished scenic integrity of the corridor due to the existing vertical structures and cleared ROW. Route D also uses or parallels existing transmission and railway ROW for 100 percent of its length; however, the width would have to be expanded along the railway to accommodate the proposed 230 kV circuit. Removing trees and building structures taller than the tree line would increase the visibility of the transmission line on the adjacent areas. Therefore, Route C would be the preferred alternative from a recreational and aesthetic perspective, due to the use of existing transmission line ROWs and eliminating the need to clear forest cover and parallel roadways in high use areas.

Q. Please discuss how potential impacts on cultural resource were considered.

A. Background research for cultural resources impacts consisted of a review of the files maintained by the New Jersey Historic Preservation Office ("NJHPO") pertaining to historic and archaeological resources that have been previously listed or determined to be eligible for listing in the National Register of Historic Places ("NRHP") and/or the New Jersey Register of Historic Places ("NJRHP") within 0.5 mile of the centerline of the Alternate Routes. All three Alternative Routes are within 0.5 mile of a few previously identified historic resources and cross at least one historic district. Placing a new transmission line adjacent to an existing transmission line greatly reduces potential impacts to architectural resources, since the historic viewshed from the property has previously been altered by the existing line, in addition to other development in the site vicinity. The Preferred Route is expected to result in fewer impacts to cultural resources because it will be constructed within an existing transmission ROW. Between the Larrabee and Atlantic substations, the route will parallel an existing transmission line. The new steel monopole structures are anticipated to be shorter than the existing steel lattice structures. The segment from Atlantic to Oceanview will involve rebuilding an existing transmission line. While the rebuilt structures will be taller, they will replace existing structures as opposed to introducing a new linear feature into the landscape.

Q. Based on the your analysis, does the Preferred Route have fewer human use impacts compared to the Alternative Routes B and D?

Yes. The Preferred Route will be constructed entirely with an existing transmission line ROW where no residences are located. As such, the Preferred Route would have minimal impact on existing land use, minimal adverse impacts upon the human environment and viewshed, and minimal adverse impacts on cultural resource areas. This is especially important due to the amount of development that has occurred in this area.

In comparison, JCP&L would have to acquire new ROW for Alternative Routes B (about 100 acres) and D (about 50 acres, depending on the amount of overlap with the existing 34.5 kV transmission ROW along the railway) and likely purchase one or more residences located within the ROWs. Moreover, Alternative Routes B and D would have significant aesthetic impacts compared to the Preferred Route due to the fact that a new transmission line would be introduced in certain areas along Alternative Routes B and C, and the Company would have to clear forest cover in these areas.

After analyzing and comparing the three Alternative Routes against potential impacts to the built environment, Alternative Route C is preferred over the other alternatives.

D. Public Outreach

Q. How was public input incorporated into the process?

A. Two public open house meetings were conducted to present the Preferred Route, provide information about the Project, and solicit input from interested members of the public. The meeting was advertised in local newspapers and property owners located within approximately 250 feet of the transmission centerline received letters notifying them of the upcoming open house meetings. JCP&L representatives informed local and state officials in advance of the open house meetings. At the meeting, attendees received a project factsheet, information on the BPU Process, comment cards and a Project Area map. The public information meetings provided an opportunity for residents and other interested parties to review project information displays and discuss the project with JCP&L and Louis Berger representatives. Sixteen people attended the open house meetings and six comment cards were completed during the meetings. JCP&L reviewed these comments and followed up as appropriate to answer any outstanding questions. No significant opposition to the Preferred Route was expressed during either public meeting.

E. <u>The Preferred Route</u>

Q. Please describe the route that the Routing Team has recommended.

A. The Preferred Route heads north from the Larrabee substation within the existing Larrabee – Atlantic 230 kV and Smithburg – Atlantic 230 kV transmission ROW for approximately 11.6 miles. This includes approximately 2.5 miles through Allaire State Park, within the same ROW, before reaching a point just east of the Atlantic substation. From the Atlantic substation, Route C heads southeast within the existing Oceanview – Atlantic 230 kV transmission corridor for approximately 4.5 miles into the Oceanview substation. The entire 16.1 mile-long route would be constructed within existing transmission ROW through Howell, Wall, Colts Neck and Neptune townships and Tinton Falls Borough located in Monmouth County, New Jersey.

Between the Larrabee and Atlantic substations, the route will be constructed adjacent to an existing transmission line. Between the Atlantic and Oceanview substations, the route will be constructed by rebuilding an existing transmission line (currently on H-frame structures) on steel monopoles and constructing the Oceanview 230 kV Transmission Line on an adjacent set of steel monopole structures.

Q. Is the Company recommending that the Option for Alternative Route C be adopted?

A. No. The existing Atlantic – Oceanview double-circuit 230 kV transmission line (and Routes C and D) pass through the Children's Center of Monmouth County parking lot. As discussed above, to avoid the school, Routes C and D could be diverted south of the existing ROW through lands under conservation easement, but this would result in additional ROW acquisition, including portions of a property currently used as a daycare facility. The Option was ultimately not recommended because Alternative Route C can be constructed within the existing ROW through the Children's Center of Monmouth parking lot, and avoids impacts to the school's operations. Moreover, the Routing Team believes that no reasonable alternatives that avoid the school would reduce impacts to the natural and human environment. The Option would have required acquisition of approximately 7.3 acres of new ROW, including land held in conservation easement by the Township of Neptune, and approximately 3.7 acres of new tree clearing. This diversion would also result in new impacts to residences located along Jumping Brook Road. In addition, JCP&L's existing transmission line already traverses the school's parking lot.

Q. Please describe why Alternative Route C was selected as the Preferred Route.

A. The Routing Team considers the cumulative social, environmental, and financial impacts associated with constructing Route C to be less than any other Alternative Route. Route C can be constructed entirely within JCP&L's existing transmission ROW. Any other alternative would require the acquisition of additional ROW and likely the purchase of one or more residences located within the 100-foot-wide ROW.

From an environmental perspective, the Preferred Route will require fewer acres of forest clearing than any of the other Alternative Routes. Although all of the Alternative Routes would have engineering challenges, Routes B and D would be more challenging in areas where the routes would parallel limited access highways or railway ROW, and would likely require the removal of residences. Any route selected would result in changes to the existing viewshed; the Preferred Route would be constructed adjacent to existing transmission lines, while Routes B and D would involve constructing a transmission line through a new corridor in some areas. Therefore, Routes B and D would have a greater impact on the existing viewshed than the Preferred Route.

Q. In your expert opinion, does the Preferred Route represent a reasonable route for the Oceanview 230 kV Reinforcement Project?

A. Yes. As detailed above, the Routing Team selected Alternative Route C as the Preferred Route. The entire 16.1-mile-long route can be constructed within an existing transmission ROW, which will minimize impacts to the natural and human environment. The Preferred Route best minimizes the overall effect of the Project on the natural and human environment, while avoiding unreasonable and circuitous routes, unreasonable costs, and special design requirements. The Preferred Route also best complies with the BPU's requirements concerning the use of existing ROW.

Q. Does this conclude your direct testimony?

A. Yes, it does.

TIMOTHY GAUL, Associate Vice President, Energy Services

Mr. Gaul is an environmental planner and scientist and the Associate Vice President of Louis Berger's Energy Services Group. He specializes in electric transmission siting studies, infrastructure planning efforts, ecological assessments, land and resource management plans, and information management efforts for major infrastructure development projects. Mr. Gaul has experience conducting a range of environmental planning studies including: transmission line siting studies, macro corridor analyses, watershed analyses, environmental assessments (EAs), environmental impact statements (EISs), ecological risk assessments, natural resource inventories, and road and transportation plans. He has experience in all aspects of transmission line route selection and permitting and has recent project experience working on several major transmission infrastructure development projects for Dominion Virginia Power, Allegheny Energy, American Electric Power, FirstEnergy, PPL Electric Utilities, and Public Service Electric & Gas (PSE&G). Mr. Gaul has also provided environmental planning support for a range of federal agencies including the U.S. Forest Service (USFS), National Park Service (NPS), Bureau of Indian Affairs, Bureau of Land Management, Department of Defense, and USACE.

FIRM Louis Berger Group

EDUCATION
- MS, Biology 2000
- BS, Environmental and Forest Biology 1997

REGISTRATIONS / CERTIFICATIONS
- Certified GIS Professional

RELEVANT PROJECT EXPERIENCE
ELECTRIC UTILITIES

Grain Belt Express Clean Line, Clean Line Energy. Project Director for the siting and permitting of 750 miles of 600 kV HVDC transmission line from western Kansas to Indiana. Lead the siting effort, supporting agency coordination, public outreach, siting efforts, and provided expert witness testimony.

Greater Fort Wayne Area Reliability Project, AEP, Fort Wayne Indiana
Project Director for two projects providing siting and permitting of 15 miles of double circuit 345/138 kV transmission line and ~15 miles of 765 kV transmission line to support Indiana Michigan Power Company, a subsidiary of AEP.

Wythe Area Improvement Project, AEP
Berger siting and environmental analysis lead for a ~20 mile double circuit 138 kV transmission line from the Jacksons Ferry Substation to the Wythe Substation, in Southern Virginia with one circuit terminating at the Progress Park Substation. Provided support for the Virginia Corporation Commission process.

Allegheny Energy/American Electric Power, Potomac Appalachian Transmission Highline (PATH) Siting and Environmental Study. Project manager and siting expert for the route selection studies and permitting efforts associated with the West Virginia and Virginia portions (230 miles) of the PATH 765-kilovolt (kV) transmission line. Project extended across three states, from just north of Charleston, West Virginia, through Frederick, Virginia and into Kemptown, Maryland and included the siting of a 500/765 kV substation. Before PJM demand projections removed the project from further consideration, all siting studies were completed, direct testimony was submitted, and field surveys for cultural resources, wetlands, and T&E species were completed for more than half of the project.

Allegheny Energy, Trans Allegheny Interstate Line (TrAIL) Line Routing Study and Environmental Analysis. In June, 2006, PJM Interconnection approved an expansion plan calling for the construction of a new 500-kilovolt transmission line from Southern Pennsylvania to Northern Virginia. Mr. Gaul **managed** the routing study and environmental effects analysis for 180 miles of the project. He was responsible for daily client contact, organizing and facilitating data gathering efforts, managing staff allocation, budgets, and schedule. As part of this project he provided expert witness testimony for regulatory proceedings in West Virginia, Pennsylvania, and Virginia. This project is currently under construction.

Central Electric Power Cooperative, Macrocorridor Study and Environmental Impact Statement for the McClellanville 115 project. Led the preparation of the draft macrocorridor study for the ~20 mile McClellanville 115 kV transmission line. Project Director for the Environmental Impact Statement (in development) by the USDA Rural Utilities Service and the US Forest Service, Francis Marion National Forest.

AEP 765 kV Project Feasibility Study. Project Manager for a feasibility study investigating the potential siting and permitting constraints, opportunities, timelines, and costs for six different potential major transmission connections in AEP's service region (confidential project, locations not provided)

Dominion Virginia Power, Meadow Brook to Loudoun 500 kV Line Permitting. Project Manager for permitting and regulatory compliance for 62 miles of 500 kV line, including: the delineation of wetlands along 62 miles (approximately 2,000 acres) of right-of-way; survey and assessments of sensitive migratory birds, sensitive plant surveys, and sensitive mussel habitats; a review of all stream crossings for the Virginia Marine Resources Commission; and preparation of architectural and archaeological surveys in support of Section 106 compliance for the Virginia Department of Historic Resources. This effort also included the preparation of two Environmental Assessments under National Environmental Policy Act (NEPA) compliance for the line's crossing of two National Parks, the Appalachian Trail and the Manassas National Battlefield.

PPL and PSE&G, Susquehanna to Roseland 500 kV Line. Senior technical advisor. PPL and PSEG contracted the Louis Berger/Commonwealth Team to conduct siting efforts for this 150 mile line across two states, provide expert witness testimony, provide engineering and design support, permitting, and public outreach support. Mr. Gaul serves as a senior technical advisor for this effort and provides technical review and analysis support for routing efforts, public outreach, and contract oversight.

Allegheny Energy, Osage-Whiteley 138 kV Project. Project Manager and siting expert for the route selection studies and permitting efforts associated with this interstate project involving 15 miles of 138 kV transmission line between Pennsylvania and West Virginia.

First Energy-JCP&L, Montville Whippany 115/230 kV Project - Project Director and siting lead for siting of a 230 kV connection between the Montville and Whippany Substations in central NJ. Efforts included management, siting, regulatory agency coordination, and permitting for the 10-15 mile 230 kV project.

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First Energy-JCP&L, Oceanview – Larrabee 230 kV Project - Project Director and siting lead for siting of 16.1 miles of 230 kV line. Efforts included management, siting, regulatory agency coordination, and permitting for the 230 kV project.

FirstEnergy, Transmission Reinforcement Study. Project Manager. FirstEnergy contracted Louis Berger and Commonwealth Associates to evaluate a range of electric solutions for constructing 30 miles of 115 kV transmission line in eastern Pennsylvania to improve reliability. Efforts included review of potential siting feasibility of several 115 kV routes and potential site identification for four substations.

U.S. FOREST SERVICE

U.S. Forest Service (USFS) Intermountain Rural Electric Association (IREA), Floyd Hill Distribution Tie Line Project, EA. Senior reviewer and advisor for development of this EA on a three-mile crossing of National Forest Lands in Colorado.

USFS, Thunder Basin National Grassland, Wyoming. Project manager and GIS specialist for a Roads Analysis for the Thunder Basin National Grassland, Wyoming, in accordance with FS-643, *Roads Analysis: Informing Decisions About Managing the National Forest Transportation System*. Served as facilitator for all interdisciplinary meetings, conducted the road valuation and risk analysis, and compiled a database for tracking risk and value rankings for each maintenance level 3 and higher road on the National Grassland.

USFS, Roads Analysis Process (RAP) Report for the Decommissioning of the Navy's Extremely Low Frequency (ELF) Transmitter on the Chequamegon National Forest, northern Wisconsin. Managed the analysis, modeling, and preparation of the RAP report, lead agency meetings for individual road risk and value assessments, and served as technical representative for the RAP at public scoping meetings.

USFS, Uwharrie National Forest Roads Analysis Process Report, North Carolina. Managed the production of the Uwharrie National Forest (North Carolina) Roads Analysis Process Report, in accordance with FS-643, *Roads Analysis: Informing Decisions About Managing the National Forest Transportation System*. Responsible for agency coordination, oversight and review of all analyses, preparation of the risk and value analysis, and assessment of hydrologic condition, aquatic communities, and forest resource access.

USFS, EA for Herbicide Treatments on the Long Cane Ranger District of the Sumter National Forest, South Carolina. Managed the preparation of an EA for Herbicide Treatments on the Long Cane Ranger District of the Sumter National Forest in South Carolina. For this analysis, major concerns focused on the indirect effects of herbicide treatments on wildlife, migratory bird use of regeneration sites, and forest composition effects.

USFS, Cullasaja Falls Recreation Improvement Project Biological Inventory and Assessment on the Nantahala National Forest, North Carolina. Project Manager for the Cullasaja Falls Recreation Improvement Project Biological Inventory and Assessment on the Nantahala National Forest, North Carolina. Responsible for project management of field surveys, analysis and assessment of wildlife and aquatic inventory analysis.

USFS, Valle II Project EA (Proposed Restorative Treatment of the Forests of the Cerro Grande Fire Area) on the Santa Fe National Forest, New Mexico. Responsible for mapping and analysis of GIS information relative to areas under consideration for fire management activities.

USFS, Land and Resource Management Plan Amendment and EA for the Lincoln National Forest, New Mexico. Deputy project manager for the land and resource management plan amendment and EA for the Lincoln National Forest in New Mexico. The Lincoln National Forest proposes to amend its Forest Plan to meet current Federal wildland fire management policy, direction, and terminology. Proposed changes to the Forest Plan include allowing for the use of wildland fire for resource benefit, removing the option to use wildland fire in areas containing wildland/urban interface (WUI), allowing for prescribed fire in wilderness, and requiring suppression of all human-caused ignitions.

USFS, Bethesda Analysis Area EA on the Enoree Ranger District of the Sumter National Forest, South Carolina. Project manager for the preparation of the Bethesda Analysis Area Environmental Assessment on the Enoree Ranger District of the Sumter National Forest (South Carolina). Also responsible for preparation of the analyses of timber and vegetation management effects on forest vegetation, soil, and visual and noise resources.

USFS, Lower Enoree Watershed Assessment, South Carolina. Deputy Project Manager, study included three separate analyses including; an ecosystem analysis, hydrologic condition analysis, and roads analysis all performed at the watershed scale. Responsible for the assessment of forest conditions, water quality analyses, and managing the preparation of the Hydrologic Condition Analysis and Roads Analysis.

USFS, Little Mountain Analysis Area EA on the Long Cane Ranger District of the Sumter National Forest, South Carolina. Responsible for preparation of the analyses of timber and vegetation management effects on forest vegetation, soil, and visual and noise resources.

USFS, EA for Proposed Modifications of Forest Highway 50 on the Pisgah National Forest, North Carolina. Major concerns focused on soil and water issues related to paving or not paving several portions of an 8 mile stretch of FS road. Conducted a field survey to support the modeling and assessment of erosion and sediment input to streams adjacent to the proposed road paving and maintenance operations. Analyses concerning soil erosion and water yield estimates will utilize the Forest Service Water Erosion Prediction Project Model (WEPP).

USFS, EA for the Land Between the Lakes Open Area Vegetation Management Plans, Kentucky. Conducted analyses of water quality and aquatic community concerns, and performed analyses using the Soil and Water Assessment Tool (SWAT) model to determine hazard and risk for a herbicide treatment program.

USFS, Little Muskingum Watershed Assessment, Wayne National Forest, Ohio. Responsible for inventory and assessment of forest vegetation and structure and technical support for analyses of water quality, aquatic community, and hydrologic conditions analyses.

USFS, Pine Creek Watershed Assessment, Wayne National Forest, Ohio. Responsible for inventory and assessment of forest vegetation and structure, analyses of water quality, aquatic communities. Provided GIS support through ortho-photo rectification, remote sensing, and land cover identification.

USFS, Shaver's Fork Watershed Assessment, Monongahela National Forest, West Virginia. Responsible for inventory and assessment of forest vegetation and structure and technical support for analyses of water quality, aquatic community, and hydrologic condition analyses.

USFS, Wayne National Forest Prescribed Fire Program EA, Ohio. Mapped and analyzed prescribed fire area boundaries, and planned and coordinated with both FS personnel and field personnel regarding property boundaries and required T&E survey boundaries.

USFS, EIS on Oil and Gas Leasing in the Finger Lakes National Forest, New York. Responsible for mapping and assessing impacts associated with the various leasing alternatives. In addition to mapping and GIS based natural resource analyses, he supported the assessment of potential noise and visual impacts.

U.S. ARMY CORPS OF ENGINEERS

USACE Kansas City, Environmental Indefinite Delivery Indefinite Quantity (IDIQ). Ecological technical lead supporting the USACE in development of a research compendium to support the development of a Restoration Management Plan for the Missouri River Recovery Program.

USACE Mobile, Upper Turkey Creek Feasibility Study. Technical lead for the Upper Turkey Creek Flood Damage Reduction and Ecological Restoration Feasibility Study. Managed field assessments, ecological restoration treatment planning, and ecological restoration report preparation. Responsible for mapping and analysis of GIS information in support of field survey efforts and stream restoration planning and flow modeling.

USACE Omaha, South Dakota Title VI Land Transfer EIS. Team lead. This project involved a Congressional mandate for the transfer of Federal lands to the State of South Dakota for recreation and wildlife management purposes, and to several Native American Tribes. Acted as the team lead for GIS mapping and data analysis, and was also responsible for the analysis and assessment of potential visual impacts.

Quantico Marine Corps Base, Wetland Delineation and EA for Basic School Improvements. Lead wetland delineator and water resources analyst for NEPA compliance supporting major development efforts at the MCBQ Basic School.

ARMY NATIONAL GUARD

Army National Guard, EA for the Marmet Lock Improvement Project, Charleston, West Virginia. Modeled the effects of the anticipated increase in truck traffic along the entire transport route from the lock to the dredge disposal site using the FHWA's Highway Capacity Software.

Army National Guard, EA for the West Virginia ARNG Regarding Helicopter Flight Operations over the Monongahela National Forest, West Virginia. Responsible for data gathering, client coordination and contract management, and was involved in editing the EA document.

OTHER DEPARTMENT OF DEFENSE

Base Realignment and Closure Environmental Compliance (five EAs). **Interdisciplinary team member and senior analyst** responsible for assessing and reporting on water resource concerns under BRAC programs at Fort Bragg, Fort Meade, Fort Dix, Fort Detrick, and Devens Airforce Base (four EAs).

Roads Analysis Process (RAP) Report for the decommissioning of the Navy's Extremely Low Frequency (ELF) Transmitter on the Chequamegon National Forest, Wisconsin. Managed the analysis, modeling, and preparation of the RAP report, lead agency meetings for individual road risk and value assessments, and served as technical representative for the RAP at public scoping meetings.

EA for the U.S. Air Force on the Long Range Air Launch Target (LRALT) system. Technical lead. Project provided a realistic threat simulation for testing Theater Missile Defense systems over the Pacific Ocean. As leader for this project, participated in client coordination and alternatives and issues development, as well as data gathering, analysis, and technical writing for the EA. As the technical lead for this project, responsible for analysis of the oceanic testing environment, technical aspects of environmental effects from missile launch debris and effluent, compilation and editing of report, and client coordination for modeling and analysis.

NATIONAL PARK SERVICE

National Park Service (NPS), Water Resource Scoping Report for the Denali National Park and Preserve, Alaska. The report provides an overview of water-related legislation, summarizes the hydrologic environments in the park, and identifies and provides an analysis of high-priority water resource issues and management concerns. Project responsibilities included **project management,** researching and identifying water resources issues relating to hydrology, development impacts, scoping meeting facilitation, and GIS analyses.

NPS, EA for Wrangell-St. Elias National Park and Preserve, Alaska. The proposed project would establish the first and only formal NPS campground in the park. The campground is located on sensitive wetland habitat along a lakeshore, which required analysis of classification of vegetation types from infrared imagery and available botanical studies to determine wetland impacts.

NPS, EA to Support Rehabilitation Efforts on the Roosevelt Ice Pond Dam in Hyde Park, New York. Responsible for project management and GIS analyses and modeling. GIS activities for this project included general mapping and efforts to determine peak flows for development of appropriate dam rehabilitation methods.

NPS, EA to Support Rehabilitation Efforts on the Val Kil Pond in Hyde Park, New York. Responsible for both project management and GIS analyses and modeling. GIS activities for this project included general mapping and review of historical imagery to assess changes in pond size and structure over time.

NPS, Potomac Gorge Wetland Inventory, Mapping, and Characterization Project, a Joint Venture between the Nature Conservancy and the NPS. Identified wetlands from satellite imagery and performed field inventory of the type and vegetation composition of all identified wetlands within the Potomac Gorge (which forms the boundary between Maryland/Washington, DC and Virginia).

NPS, Delaware Water Gap National Recreation Area McDade Trail EA Amendment and Monitoring Plan, Pennsylvania. Responsible for TR55 modeling and hydrologic analysis in support of culvert design and sediment and erosion control design efforts.

NPS, EA for the Mount Rushmore Fourth of July Fireworks Program, South Dakota. Responsible for analyses of vegetation and fire risk, noise, and all GIS mapping and analysis.

NPS, EA for the Blue Ridge Parkway, Regarding Reconstruction of a Bridge and Other Park Facilities and Restoration of Eroded Areas at the Otter Creek Campground, Amherst County, Virginia. The current bridge design results in debris buildup and flooding during severe storm events, causing massive stream bank erosion and subsequent sedimentation of Otter Creek and Otter Lake downstream, loss of riparian areas, and threatens visitor health and safety, as well as the stability of Park structures. High waters also flood a nearby sewage system, causing untreated wastewater to be discharged into the Creek. Analyzed impacts of the alternatives on air quality, the sanitation system, land use, and impacts from construction noise on park operations and resources.

NPS, EA for the NPS Denver Service Center that analyzed the construction and operation of a new Corinth Civil War Interpretive Center in Corinth, Mississippi, to be operated and maintained as part of the Shiloh National Military Park, Tennessee. Responsible for the analysis of noise impacts from the proposed construction and operation of the interpretive center. This resource was of particular concern due to the potential of activities to affect a nearby elementary school and daycare center.

U.S. FISH AND WILDLIFE SERVICE

U.S. Fish and Wildlife Service, GIS Database Development, Mapping, and Training for the Chassahowitzka Refuge Complex, Florida. Provided **introductory and advanced training** in GIS to the Chassahowizka Refuge Complex, which includes the Chassahowizka, Crystal River, Egmont Key, Passage Key, and Pinellas Refuges. A custom training curriculum was developed to coincide with the needs of the refuges' CCP planning process. Additional tasks included the development a GIS database for the refuge and creation of maps for the final CCP.

GENERAL SERVICES ADMINISTRATION

General Services Administration, EA Analyzing Deer Management at a Federal Facility, Silver Spring, Maryland. Conducted field investigations of vegetation type and abundance both within the project area and in comparable sites in the region to characterize deer impacts on forest understory.

STATE AND LOCAL GOVERNMENTS

District of Columbia Comprehensive Plan, Environmental Technical Report. Led the preparation of an environmental baseline report in support of the District's Comprehensive Planning Process. Also served as GIS team lead for the project, coordinating GIS analysis for habitats, water resources, environmental hazards, and all mapping efforts.

Nottawasaga and Lake Simcoe Target Load Study, **Lake Simcoe Regional Conservation Authority. Team lead** for the Lake Simcoe and Nottawasaga River phosphorous load target setting study. Supported the development of a phosphorus target setting strategy for a rapidly developing watershed north of Toronto, California. Regularly presented results and status to the Project Technical Advisory Committee comprised of local municipality leaders in Ontario, managed GIS analysis efforts, and lead the production of the final report.

TRIBAL EXPERIENCE

EA to Support the Development of a Forest Management Plan for Naragansett Indian Tribe of Rhode Island. For the Naragansett (a Category 4 – Minimally Forested Reservation), forest planning centers around management of forest resources for firewood, wildlife, culturally significant species, and protection of forest resources from insects and disease. For this project, GIS analysis primarily focused on correlation of forest inventory data with Tribal land use patterns to determine appropriate management prescriptions for different land areas.

Forest Management Plan and associated EA for the Mississippi Band of Choctaw Indians. Project Manager. For the Choctaw (a Category 1 – Major Forested Reservation), forest planning centers around multiple use management of forest resources for timber production, recreation, and protection of forest resources from insects and disease. For this project, GIS analysis correlates forest inventory data with Tribal land use patterns, recent imagery, and for developing appropriate management strategies for the 7 major communities that comprise the Mississippi Band of Choctaw lands.

ADDITIONAL INFORMATION (FOR INFORMATION ONLY)

Education

MS, Biology, Creighton University, 2000
BS, Environmental and Forest Biology, College of Environmental Science and Forestry at Syracuse University, 1997

Registrations/Certifications

Certified GIS Professional (GISP)

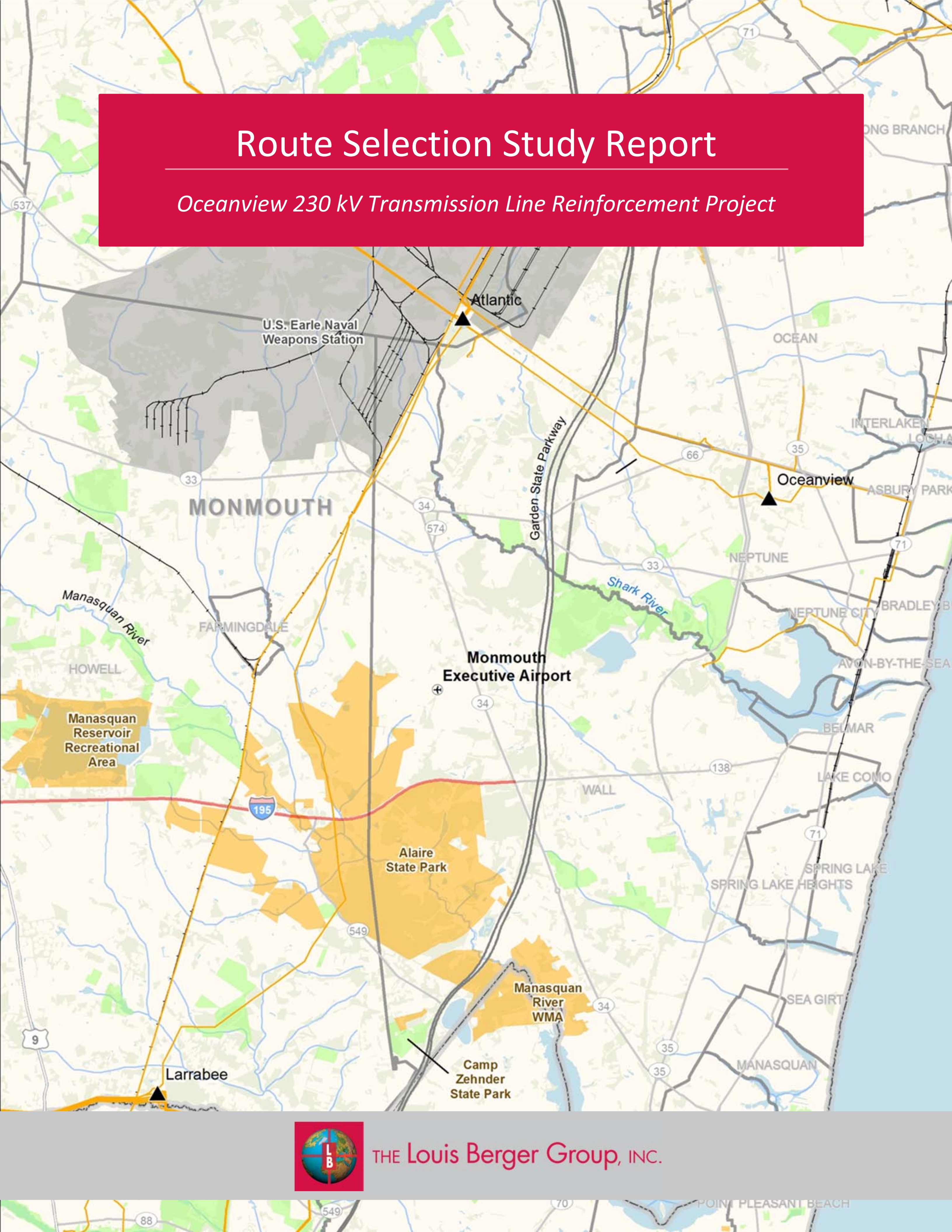
Training

Wetland Delineation and Management Training Course - U.S. Army Corps of Engineers (USACE)-approved, 2002

Exhibit TBG-2

Route Selection Study Report

Oceanview 230 kV Transmission Line Reinforcement Project



THE Louis Berger Group, INC.

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Acronyms and Abbreviations

ACHP	American Council for Historic Preservation
APE	Area of potential effects
CSAO	Conrail Shared Assets Operations
EHV	Extra-high voltage
ENSP	N.J. Division of Fish and Wildlife's Endangered and Nongame Species Program
ESRI	Environmental Systems Research Institute
GNIS	U.S. Geological Survey's Geographic Names Information System
HPO	Historic Preservation Office
kV	Kilovolt
mcf	Million cubic feet
msl	Mean sea level
NAIP	National Agricultural Imagery Program
NESC	National Electrical Safety Code
NRHP	National Register of Historic Places
NHD	National Hydrography Dataset
NHP	New Jersey Natural Heritage Program
NJAC	New Jersey Administrative Code
NJBPU	New Jersey Board of Public Utilities
NJDEP	New Jersey Department of Environmental Protection
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resources Conservation Service of the U.S. Department of Agriculture
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
OHV	Off-highway vehicle
ONLM	Office of Natural Lands Management
OPGW	Optical ground wire
PE	Potential eligible
PJM	PJM Interconnection, LLC
ROW	Right-of-way
SHPO	State historic preservation officer
T&E	Threatened and endangered (species)
USACE	United States Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WMA	Wildlife Management Area

EXECUTIVE SUMMARY

Jersey Central Power & Light ("JCP&L"), a wholly-owned subsidiary of FirstEnergy Corp. ("FirstEnergy"), has identified the need to construct a new, single-circuit 230 kV transmission line source into the Oceanview substation located in Neptune Township, Monmouth County, New Jersey. The Oceanview substation is currently supplied via one double-circuit 230 kV transmission line from the Atlantic substation located approximately 4 miles west of the Oceanview substation. Both circuits are located on wooden H-frame structures between the Atlantic and Oceanview substations. As part of its ongoing commitment to enhance its transmission system reliability, JCP&L has determined that a third 230 kV transmission source into the Oceanview substation is necessary to mitigate the simultaneous outage of the existing, double-circuit 230 kV radial transmission line supply to the Oceanview substation and the resultant outage to the lower voltage circuits and substations supplied through the Oceanview substation. PJM Interconnection, LLC ("PJM"), the regional transmission organization that coordinates the movement of electricity and oversees transmission system reliability in all or part of 13 states and the District of Columbia, including New Jersey, recommends that the project be built. PJM's assessment is based on existing conditions, the need for system redundancy and the potential for future demand on the system. The Louis Berger Group, Inc. ("Louis Berger") was retained by JCP&L to support the Route Selection Study process for the proposed Oceanview 230 kV Transmission Line Reinforcement Project (the "Project").

A multi-disciplinary Routing Team (see *section 2.1* below), consisting of members of JCP&L, FirstEnergy and Louis Berger, conducted a comprehensive Route Selection Study to establish a Preferred Route for the Oceanview 230 kV Transmission Line. This process started with the completion of a Corridor Screening Study in January 2011. The Corridor Screening Study resulted in the identification of a Study Area that included all reasonable Potential Corridors that could provide the new 230 kV transmission source into the Oceanview substation. Feasible Potential Corridors identified during the Corridor Screening Study were used to develop Potential Routes for review and comparison in this Route Selection Study.

The Routing Team evaluated the advantages and disadvantages of the Potential Routes based on the established routing criteria, an inventory of land use, environmental, and cultural factors along each of the routes, and additional local knowledge and past experience. Less favorable Potential Routes were eliminated and three potentially viable Alternative Routes were retained for further consideration. This iterative process resulted in the identification of the Preferred Route.

Based on an assessment of the advantages and disadvantages of the three Alternative Routes under consideration, the Routing Team selected Alternative C as the Preferred Route. This selection is based on the following factors:

- No new transmission right-of-way ("ROW") is anticipated to be required;
- No properties would need to be purchased in order to construct the line;
- Minimal impact to existing land use and natural areas including forested areas; and
- Consistent with the New Jersey Board of Public Utilities' ("NJBPU") requirement to use existing right-of-way where feasible, practicable and safe.

The Routing Team believes that the cumulative social, environmental, and financial impacts associated with constructing Alternative Route C will be less than any other Alternative Route.

1.0 INTRODUCTION

JCP&L has identified the need to construct a new, single-circuit 230 kV transmission line source into the Oceanview substation located in Neptune Township, Monmouth County, New Jersey. Louis Berger was retained by JCP&L to support the Route Selection Study process for the proposed Project. This process began with an initial Corridor Screening Study, conducted in 2011, to identify Potential Corridors for the new line. Based on the results, a comprehensive Route Selection Study was conducted to identify a Preferred Route for the new transmission line. A summary of the Corridor Screening Study and the results of the Route Selection Study are presented in this report.

1.1 Project Overview

As part of JCP&L's ongoing commitment to enhance its transmission system reliability, JCP&L, in conjunction with PJM, determined an additional 230 kV source was needed from the Englishtown-Smithburg-Larrabee 230 kV transmission line corridor to the Freneau-Atlantic-Oceanview 230 kV transmission line corridor, ultimately resulting in a new 230 kV source to the Oceanview substation. The Oceanview substation is currently supplied by two 230 kV circuits (T-2020/S-1033) from the Atlantic substation located approximately 4 miles west of the Oceanview substation. Both circuits are located on a single set of double-circuit wooden H-frame structures between the Atlantic and Oceanview substations. A third circuit from the Englishtown-Smithburg-Larrabee 230 kV corridor will mitigate the potential for a simultaneous outage of the existing, double-circuit 230 kV radial transmission line supply to the Oceanview substation and the resultant outage to the lower voltage circuits and substations supplied through the Oceanview substation.

To identify a Proposed Route for the new line, JCP&L initiated a routing study (including an initial Corridor Screening Study and a comprehensive Route Selection Study) to identify suitable routes from all potential 230 kV source points for the project (i.e., the Larrabee, Smithburg, and Englishtown substations and the 230 kV lines connecting them) to the Oceanview substation.

1.2 Project Timeline

In January 2011, a Corridor Screening Study was conducted to identify all reasonably feasible corridors from the southern 230 kV transmission line corridor to the northern 230 kV transmission line corridor, and to determine which alternatives to retain for more detailed analysis. Potential Corridors were developed between the Oceanview substation and the Englishtown, Smithburg and Larrabee substations (as well as potential taps from these existing lines to the Oceanview substation). Based on a qualitative and quantitative analysis of the identified Corridors, the Routing Team determined that the three most feasible corridors connect the Oceanview and Larrabee substations. Therefore, a comprehensive Route Selection Study was conducted to identify Potential Routes between the Larrabee and Oceanview substations. The Potential Routes were evaluated from an engineering, built environment and natural environment perspective, as described in this report.

In June 2013, JCP&L announced the Preferred Route, and presented viable Alternative Routes, at two public open houses. JCP&L intends to file a petition with the NJBPU in 2014. Following NJBPU approval, construction is expected to begin in June 2016 to meet a June 2017 in-service date.

1.3 Goal of the Route Selection Study

The goal of the Route Selection Study is to gain a detailed understanding of the opportunities and constraints in the Project Study Area (defined in *section 1.4.1*) to facilitate the development of Alternative Routes, evaluate potential impacts associated with the Alternative Routes, and, ultimately, identify a Preferred Route for the Project. The Preferred Route is defined as the route that minimizes the overall effect of the transmission line on the natural and human environment, avoids unreasonable and circuitous routes and unreasonable costs, and minimizes special design requirements. This document describes the Alternative Route identification, evaluation, and selection process for the proposed Oceanview 230 kV Transmission Line Reinforcement Project.

1.4 Project Description

JCP&L proposes to provide a third source of electric power to the Oceanview substation by constructing a new, single-circuit 230 kV transmission line between the existing Larrabee and

Oceanview substations. JCP&L initially determined that the Larrabee, Smithburg, or Englishtown substations (as well as potential taps from these existing lines to the Oceanview substation) would be appropriate sources for the proposed 230 kV transmission line. The Routing Team ultimately determined that the Potential Routes originating from the Larrabee substation represent the most feasible options that meet the Project objectives. Therefore, the new line will be referred to as the Larrabee – Oceanview 230 kV Transmission Line.

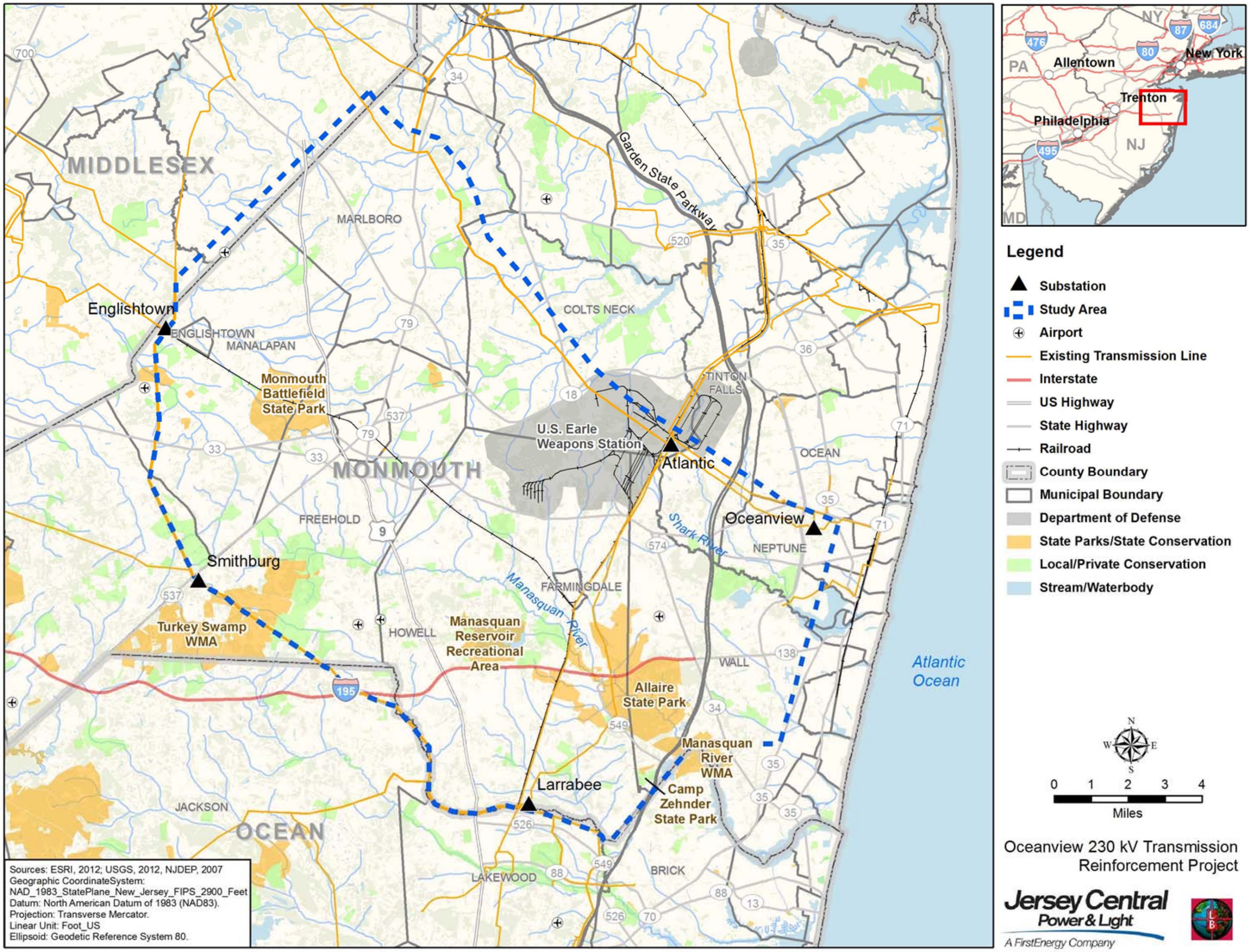
1.4.1 Project Study Area

The Study Area was initially developed for the preceding Corridor Feasibility Study by delineating a boundary that would encompass all of the potential 230 kV source points for the Project (the Larrabee, Smithburg, Englishtown, substations and 230 kV lines connecting them), the ultimate endpoint (the Oceanview substation), and those opportunity features in the area that could be logically used for developing potential alignments. One of the major factors guiding the definition of the Study Area is the presence of existing linear right-of-ways ("ROWs") (i.e., railroads, roads, pipelines and transmission lines) which might be used for developing potential alignments for the Project. This initial Study Area consisted of the South River-Atlantic 230 kV and Freneau-Atlantic 230 kV transmission corridor to the north; the Oceanview substation in Neptune Township and Route 35 to the east; the Englishtown-Smithburg-Larrabee 230 kV transmission corridor and Larrabee substation in Howell Township to the south; and the Smithburg and Englishtown substations in Freehold and Manalapan townships, respectively, to the west. **Figure 1** shows the Project Study Area. Using this established Study Area, the Routing Team began its efforts to first identify Potential Corridors for the new 230 kV line.

1.4.2 Line Characteristics and Right-Of-Way Requirements

The desired ROW width for a new 230 kV transmission line is 100 feet. Typical structure design for a 230 kV transmission line consists of steel monopoles approximately 70 to 90 feet high. Angle structures, where required by the severity of the angle, will consist of two-pole steel structures. All poles will be installed on concrete foundations and some angle structures may be guyed. Average span lengths were estimated to be approximately 600 feet.

Figure 1. Project Study Area



2.0 ROUTING PROCESS

2.1 Routing Team Members

A multi-disciplinary Routing Team performed the routing study. Team members were selected to bring a wide range of experience to the routing study to achieve a comprehensive review of all aspects of developing the route. Members of the Routing Team have experience in transmission line routing, impact assessment for a wide variety of natural resources and the human environment, impact mitigation, and construction management.

The team worked together during the Corridor Screening Study and the Route Selection Study to define the Study Area, develop routing criteria, identify routing constraints and opportunities, collect and analyze environmental and design data, solicit public input and concerns, consult with resource and permitting agencies, develop and revise the siting alternatives, and analyze and report on the selection of a Proposed Route. **Table 1** identifies the Routing Team members and their areas of responsibility.

Table 1. Routing Team Members

Routing Team Member	Company	Title	Role
John Toth	FirstEnergy	Power Line Siting Supervisor	Siting Supervisor
David Parks	FirstEnergy	Engineer	Siting
Ted Krauss	FirstEnergy	Transmission-Siting Supervisor	Siting
Walt Wlodarczyk	JCP&L	Supervisor, Engineering Services	Engineering
Tim Gaul	Louis Berger	Associate Vice President, Energy Services	Project Director
Kirsty Cronin	Louis Berger	Principal Environmental Scientist	Project Manager
Tyler Rychener	Louis Berger	GIS Specialist	GIS Analysis and Mapping
Andrew Burke	Louis Berger	GIS Specialist	GIS Analysis and Mapping
Heather Unger	Louis Berger	Environmental Scientist/Planner	Siting Support
Emily Larson	Louis Berger	Environmental Scientist/Planner	Siting Support
Kris Beadenkopf	Louis Berger	Archeologist	Cultural Resources

2.2 Data Collection

The sources of information used to develop data for the Route Screening Study are identified in the following sections.

2.2.1 Aerial Photography

Aerial photography is an important tool in the route selection process. The primary sources of aerial imagery used in the route identification, analysis, and selection effort for the Project included:

- 2011 natural color orthophoto mosaic of Monmouth, Middlesex and Ocean Counties, NJ, produced by the U.S. Department of Agriculture, Natural Resources Conservation Service, National Cartography and Geospatial Center;
- 2011 ESRI imagery, provided through Aerials Express; and
- Bing Maps imagery, which ranges in date depending on location.

Aerial photography from these sources was used in both a geographic information system ("GIS") environment and printed electronically at a scale of 1 inch = 500 feet as a set of 22-inch by 34-inch map sheets to support the planning process and gathering input at open houses. Updated information, such as the location of new residences and other constraints, was annotated on the paper maps or electronically as database notes as discovered and verified during field inspections.

2.2.2 GIS Data Sources

The study made extensive use of information in existing GIS data sets, which was obtained from many sources, including federal, state, and county governments. Much of this information was obtained through official agency GIS data access websites, some was provided directly by government agencies, and some created by the Routing Team by either digitizing information from paper-based maps or through aerial photo-interpretation. GIS data sources used in this study are presented in **Table 2**.

The use of GIS data allows for the consideration and efficient use of a wide variety of information. GIS information is a highly effective tool when used for broad-level planning studies, identifying and characterizing Study Area constraints and features, and developing environmental inventory information useful for comparisons among planning alternatives.

However, GIS data sources vary with respect to their accuracy and precision. Presentation, analysis, and calculations derived from these data sources require careful consideration when used for planning purposes. For this reason, GIS-based calculations and maps presented throughout this study should be considered reasonable approximations of the resource or geographic feature they represent and not absolute measures or counts. They are presented in this study to allow for relative comparisons among alternatives.

2.2.3 Ancillary Data Sources

Maps reviewed for the Route Selection Study include U.S. Geological Survey ("USGS") 7.5-minute topographic quadrangle maps, existing County-level and park-level natural resource maps, state and county road maps, transmission line map information and current property tax maps.

2.2.4 Route Reconnaissance

Routing Team members conducted field inspections throughout the Study Area. The team members examined potential routes by automobile from points of public access and correlated observed features, including existing transmission line ROW, railroads, large wetland complexes, large recreations sites and airports, to information shown on aerial photography, USGS 7.5 minute topographic maps, road maps, locally available development sketch maps, and other information. Relevant structures (i.e., residential, commercial and industrial buildings) were viewed, verified, and recorded on laptop computers displaying aerial photography using GIS software supported by real-time Global Positioning System ("GPS") tracking for positional information in each vehicle.

Table 2. GIS Data Sources

Category	Data Source
Aerial Imagery	
Aerial Imagery	Imagery was obtained from the following sources: the National Agricultural Imagery Program ("NAIP") was obtained from the U.S. Department of Agriculture ("USDA") covering the entire Study Area (dated 2011); ESRI imagery, which is provided through Aerials Express (dated 2011); and Bing Maps imagery, which ranges in date depending on location.
Administrative	
County Boundaries	2012 ESRI file containing boundaries and census data for all counties in the United States.
Municipality Boundaries	This dataset consists of county and municipal boundaries aggregated by the New Jersey Geographic Information Network ("NJGIN")
Hydrology	
Rivers and Lakes	National Hydrography Dataset ("NHD") - The NHD is a comprehensive set of digital spatial data prepared by the USGS and U.S. Environmental Protection Agency ("USEPA") that contains information about surface water features such as lakes, ponds, streams, rivers, springs and wells.
Water Quality Standards	The New Jersey Department of Environmental Protection ("NJDEP") has designated water quality use designations, high and exceptional value quality waters and recreation waters. This information was obtained from NJDEP (2013).
Wetlands	The New Jersey Landscape Project is a pro-active, ecosystem-level approach for the long-term protection of imperiled species and their important habitats in New Jersey. The N.J. Division of Fish and Wildlife's Endangered and Nongame Species Program ("ENSP") began the project in 1994. Its goal: to protect New Jersey's biological diversity by maintaining and enhancing imperiled wildlife populations within healthy, functioning ecosystems. Information for wetlands in the project area was obtained from the landscape project database (Version 3.1, February 2012).
100-Year Flood Hazard	Data on 100-year flood hazard areas was acquired FEMA Q3 maps.
Watershed Boundaries	Hydrologic Unit Code ("HUC")-8 boundaries were obtained from the U.S. Department of Agriculture Natural Resource Conservation Service ("USDA-NRCS").

Table 2. GIS Data Sources	
Category	**Data Source**
Conservation Lands	
Public Lands	A combination of data sources was used to determine lands owned by federal, state, and local governments; non-government agencies ("NGOs"); and private conservation easements. The Protected Areas Database of the United States ("PAD-US") (2011) forms the majority of the data. Additional data representing federal lands, public parks, and landmark areas were incorporated from ESRI (2012), Redlands, California.
State Parks, Forests, and Game Lands	Data for State Parks, Forests and Game Lands located within New Jersey prepared by the NJDEP (2008).
Easements	Private conservation easements from the National Conservation Easement Database which is comprised of voluntarily reported conservation easement information from land trusts and public agencies and from the PAD-US (2011)
Human Environment	
Points of Interest	The locations of various points of interest were derived from Institutions layer from ESRI, (2012) Redlands, California, and the U.S. Geological Survey's Geographic Names Information System ("GNIS"). This dataset includes the locations of cemeteries, churches, hospitals, parks, and schools.
Residences and Commercial Buildings	Residential and other buildings were identified through a combination of aerial imagery and field observations.
Parcel Boundaries, Ownership Information and Subdivisions	Parcel boundaries and property ownership information was obtained from Monmouth, County GIS office (2013).
Airfields and Heliports	Airfields and heliports were identified through the U.S. Geological Survey's GNIS and ESRI (2012) and the Federal Aviation Administration ("FAA") database (2012).
Transportation	U.S. road and railroad data prepared by ESRI (2012), Redlands, California.
Existing Transmission Lines and Substations	Existing transmission line and substation information provided by FirstEnergy and adjusted based on aerial photography.

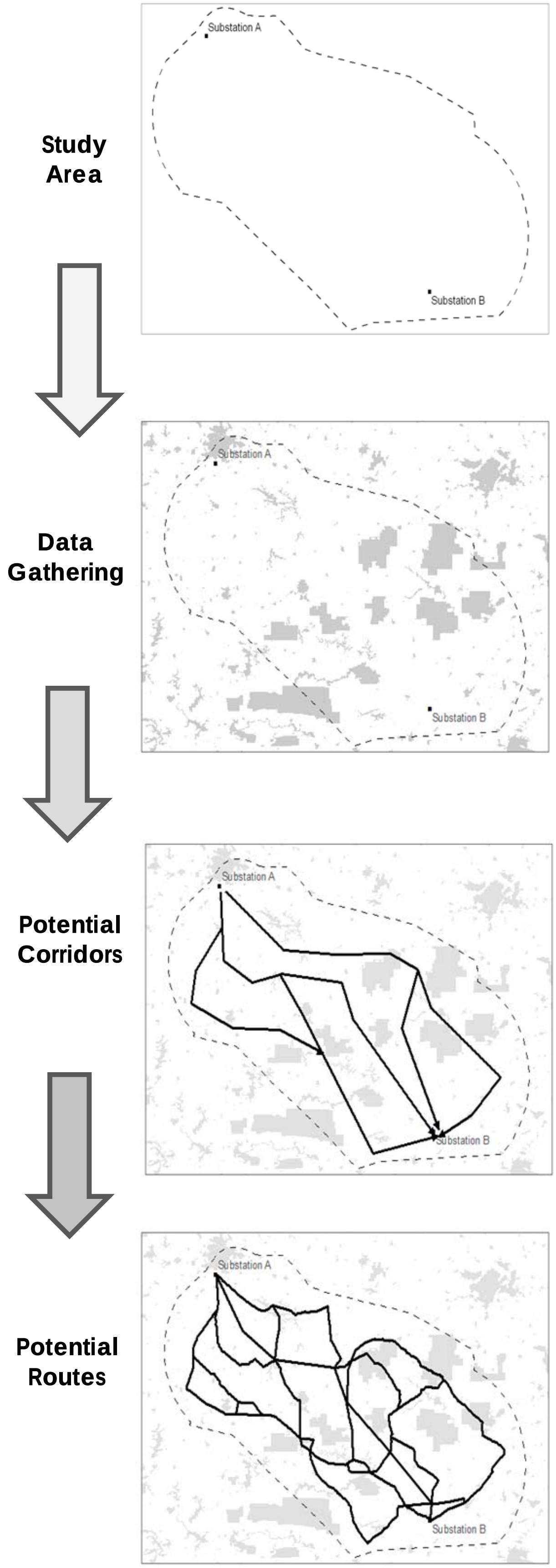
Table 2. GIS Data Sources	
Category	**Data Source**
Historic Resources	
Historic Sites and Districts	Sites and districts listed or eligible on the National Register of Historic Places ("NRHP") acquired through the database maintained by the New Jersey Historic Preservation Office ("HPO") (2012).
Land Use	
Land Use/Land Cover	Land use and land cover data were obtained from the New Jersey Landscape Project (Version 3.1, February 2012)
Sensitive Species	
Natural Heritage Inventory	Natural heritage information, including potential habitats for sensitive species was obtained from the New Jersey Landscape Project (Version 3.1, February 2012)
Geology and Soils	
Geology	Identification and descriptions of physiographic regions and bedrock were obtained from the New Jersey Department of Natural Resources.
Topographic Contours	U.S. Geologic Survey 7.5 24:000 topographic quadrangle maps (various dates).
Soils	Soil associations crossed by the routes were extracted from the United States Department of Agriculture, Natural Resources Conservation Service Soil Survey Geographic ("SSURGO") Database (2002).

2.3 Process Steps and Terminology

The Route development process is inherently iterative with frequent modifications as new constraints, opportunities, and inputs are received. Because of the evolutionary nature of the route development process, the Routing Team uses specific vocabulary to describe the routes at different stages of development.

Initial route development efforts start with the identification of large area constraints and opportunity features within the **Study Area**, which encompasses the endpoints of the project and areas in between. These areas are typically identified using a combination of readily available public data sources.

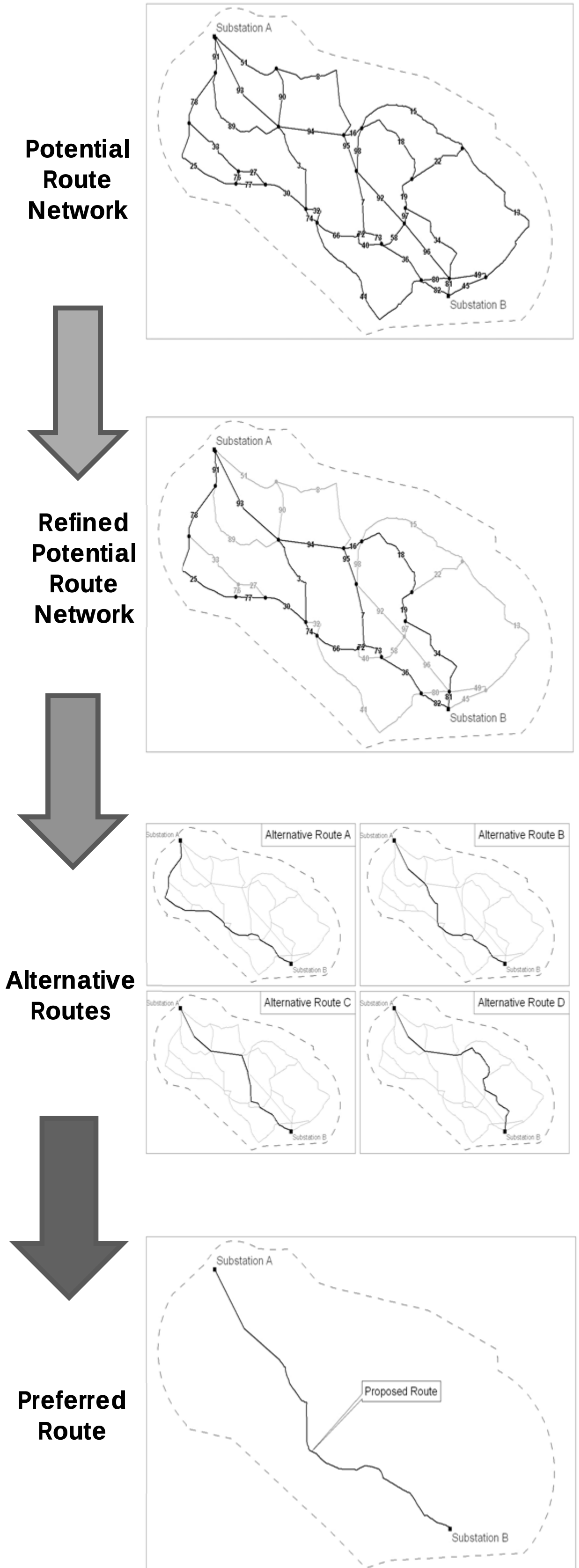
The Routing Team uses this information to develop **Potential Corridors** adhering to a series of general routing and technical guidelines. Efforts are made to develop Potential Corridors throughout the Study Area to ensure that a range of reasonable alignments are considered. Alignments are approximate at this stage, but they are revised after ongoing review and analysis. As the Routing Team continues to collect and review information, Potential Corridors are refined. The revised Potential Corridors are considered **Potential Routes.**



Where two or more Potential Routes intersect, a **node** is created, and between two nodes, a **link** is formed. Together, the Potential Routes and their interconnected links are referred to as the **Potential Route Network**. The links are independently and collectively evaluated for refinements.

As the Routing Team continues to gather information and review the links of the Potential Route Network, links are modified, removed, or added, resulting in a **Refined Potential Route Network**.

The links of the Potential Route Network are further refined and compared by the Routing Team, and a selection of the most suitable links is assembled into **Alternative Routes**. Alternative Routes are routes that begin and end at similar locations for direct comparison. Potential impacts are assessed and compared with land uses, natural and cultural resources, and engineering and construction concerns. Ultimately, through analysis and comparison of the Alternative Routes, a **Preferred Route** is identified. The Preferred Route minimizes the overall effect of the Project on the natural and human environment, avoids unreasonable and circuitous routes and unreasonable costs, and minimizes special design requirements.



2.4 Routing Guidelines

As described in Section 1.3, the overall goal of the Route Selection Study is to identify a Preferred Route that minimizes the overall effect of the transmission line on the natural and human environment, avoids unreasonable and circuitous routes and unreasonable costs, and minimizes special design requirements. The use of routing guidelines helps to reach that goal by setting forth general principals or rules of thumb that guide the development of alignments considered in the study. The Routing Team considered three types of Routing Guidelines: (i) General Guidelines, (ii) Technical Guidelines, and (iii) New Jersey Guidelines. General Guidelines establish a set of principles that guide the development of alignments with respect to area land uses, sensitive features, and considerations of economic reasonableness. Technical guidelines provide the Routing Team with technical limitations related to the physical limitations, design, ROW requirements, or reliability concerns of the Project infrastructure. New Jersey Guidelines are those specific state regulations that influence either the development of specific alignments for the Project, or, the ultimate selection of the Preferred Route.

2.4.1 General Guidelines

The following are general guidelines used for the Project, not in order of importance. The Routing Team attempted to minimize:

- Route length, circuitousness, cost, and special design requirements;
- The removal or substantial interference with the use of existing residences;
- The removal of existing barns, garages, commercial buildings, and other nonresidential structures;
- Substantial interference with the use and operation of existing schools, recognized places of worship, cemeteries, and facilities used for cultural, historical, and recreational purposes;
- Substantial interference with economic activities, including agricultural activities.
- Creation of new linear ROW;
- Crossing of designated public resource lands such as national and state forests and parks, large camps and other recreation lands, designated battlefields, nature preserves or other designated historic resources and sites, and conservation areas;

- Crossing of large lakes and large wetland complexes, critical habitat, and other unique or distinct natural resources; and
- Substantial visual impact on residential areas and public resources.

2.4.2 Technical Requirements

The Routing Team also used technical guidelines specific to 230 kV line construction, including:

- Minimize angle structures greater than 65 degrees;
- Minimize construction on slopes greater than 30 degrees (20 degrees at angle structures); and
- Minimize crossing of extra-high voltage ("EHV") transmission circuits.

2.4.3 New Jersey Guidelines

In accordance with both the NJPBU regulations (N.J.A.C. § 14:5-7.1, Requirements for electric transmission lines), and the New Jersey Department of Transportation ("NJDOT") regulations (N.J.A.C. § 16:25, Utility Accommodation) the Routing Team identified a range of existing infrastructure ROWs in the development of Potential Corridors for the Project. Under NJBPU guidelines, utility companies must use available railroad or other ROW whenever practicable, feasible, and safe. Where practical and feasible, transmission structures are to be located in accordance with topography to minimize visual impacts. NJDOT's utility accommodation regulations specify that public utilities have the right by law to occupy highway ROW, subject to the provisions identified in Chapter 25 and Department approval. While ROW sharing is encouraged if it can be done in accordance with NJDOT guidelines, the NJDOT generally restricts longitudinal occupancy of limited access highway ROW. In addition, guidance from the NJDEP regarding large linear infrastructure projects (including transmission lines) identifies the use of similar ROW as a positive criterion.

The NJBPU is the State entity responsible for regulating public utilities, including electric utilities such as JCP&L. JCP&L will file a petition with the NJBPU requesting a determination that the Project is necessary for the service, convenience or welfare of the public. JCP&L intends to file the Petition with the NJBPU in March 2014. The Petition will include information on the Project, including, *inter alia*, the need for the Project, description of the line and ROW, engineering components, construction schedule, and Project in-service date. As part of the process, public hearings may be held to allow citizens, interested stakeholders, and governmental entities to participate in the review and approval process. The NJBPU will hold any required hearings and evaluate the Petition and all relevant information in the record. Following the hearings, the NJBPU will determine whether the proposed Project meets the applicable standards for approval.

2.5 Routing Constraints

The Routing Team identified and mapped routing constraints in the Study Area. Constraints were defined as specific areas that should be avoided to the extent feasible during the route selection process. Constraints are generally divided into two groups based on the size of the geographic area encompassed by the constraint: (i) large area constraints and (ii) small area constraints.

The first group (large area constraints) includes constraints that cover large areas of land in the Study Area. Large area constraints are avoided to the extent practicable and are considered unfavorable by the Routing Team for developing Potential Corridors and Potential Routes.
The final list of large area constraints consisted of:

- Urban areas, including towns, small villages, and other high concentrations of commercial and industrial development areas.
- National Register Historic Districts and adjacent areas.
- U.S. Department of Defense sites, including Naval Weapons Station Earle.
- Recreational areas such as parks and large recreational reservoirs, including Allaire State Park and Monmouth Battlefield State Park.
- Large streams, wetlands, or unique natural resource features.
- Designated State Forests, State Parks, Natural Lands Trust preserves, and other natural and conservation areas, including New Jersey green acres and public wildlife management areas.

The Potential Corridors, and later the Potential Routes, are initially developed to avoid large area constraints, to the extent practicable. Later, the alignments were adjusted where feasible to avoid and maximize distance from small area constraints. Small area constraints encompass other feature types that are found within smaller geographic areas, or site-specific locations. Small area constraints generally consist of:

- Individual residences (including houses, anchored mobile homes, and multi-family buildings) purposes.
- Commercial and industrial buildings.
- Cemeteries.
- Places of worship.
- Schools.
- Hospitals.
- Recorded sites of designated historic buildings and sites, including any specified buffer zone around each site.
- Wetland areas.
- Specific recreational sites, facilities, and trails.
- Communications towers.
- Designated scenic vista points.

During the Corridor Screening Study, small area constraints were considered only at a high level while the Route Selection Study involved the collection of more specific information on small area constraints. For example, the Corridor Screening Study relied on GIS parcel data to estimate the number of residences or businesses located within or adjacent to a Potential Corridor. In contrast, during the Route Selection Study, individual buildings were digitized based on aerial imagery and the features were confirmed in the field by reviewing the Potential Routes from public roads.

2.6 Routing Opportunities

The Routing Team defined routing opportunities as locations where the proposed transmission line might be located with the least impact to the natural and human environment. Practical routing opportunities considered in the Study Area included sharing and/or paralleling existing ROWs and linear features, including:

- Existing transmission corridors: Smithburg – Atlantic, Larrabee – Atlantic, Atlantic – Oceanview, Englishtown – Smithburg, Freneau – Atlantic, N.J.T. Aberdeen – Freneau, Atlantic – Red Bank, and Larrabee – Smithburg transmission circuits;
- Railroads: Conrail Shared Assets Operations (“CSAO”);
- Road corridors: including, Interstate 195 (I-195), State Routes 18, 33 and 66, Allaire Road, Lakewood Road, Allenwood Road, Lenoir Road and Belmar Boulevard; and
- Distribution circuits.

Existing transmission lines provided the best opportunities for parallel alignments. In addition, alignments along the CSAO Railway, I-195, State Routes 138, 33 and 18 and other local roads were also considered as initial opportunities. The Routing Team also considered alignments parallel to parcel boundaries and tree lines as an opportunity to avoid bisecting properties where existing ROWs were not available.

3.0 ROUTE DEVELOPMENT

The Route Development process for the Project consisted of an initial Corridor Screening Study conducted in 2011 followed by a comprehensive Route Selection Study. The purpose of the Corridor Screening Study (described in section 3.1.1) was to identify the most feasible transmission path(s) ("corridors") that could potentially be used to provide a new 230 kV source into the Oceanview substation. The Corridor Screening Study consisted of a high-level review of available GIS data, aerial imagery and other publically available data, as well as specific transmission system information provided by JCP&L. Corridors developed during the Corridor Screening Study were not intended to be considered final alignments; instead, the Potential Corridors intended to serve as a basis for further evaluation and refinement (through detailed route reconnaissance, engineering reviews, agency consultation, public outreach, etc.) in subsequent phases of the Project.

Based on the results of the Corridor Screening Study, the most feasible corridors were retained for further analysis in the Route Selection Study. As described in section 1.3, the purpose of the Route Selection Study was to refine the Potential Corridors identified during the Route Screening Study to develop a Potential Route Network, combine the most feasible Potential Links into Alternative Routes, evaluate potential impacts associated with the Alternative Routes, and, ultimately, identify a Preferred Route for the Project.

3.1 Corridor Screening Study

During the Corridor Screening Study, a range of Potential Corridors were developed to provide a 230 kV connection between the southern 230 kV corridor and the northern 230 kV corridor, and ultimately provide additional 230 kV service to the Oceanview substation. The network of Potential Corridors was initially developed by following the routing guidelines described in section 2.4 and considering an array of route concepts or themes. Several Potential Corridors focused on a direct connection between the Larrabee substation and the Atlantic substation by either following existing transmission lines within existing ROW, paralleling existing ROW or creating a direct route to the Oceanview substation. Additional corridors were developed to consider more direct paths between the Larrabee and Oceanview substations; these routes do not follow any existing transmission lines, but instead generally follow roads. Other options included corridors that would take advantage of existing transmission between the Larrabee, Englishtown, Atlantic and Oceanview substations, as well as tap points along the Freneau – Atlantic 230 kV and Smithburg – Larrabee 230 kV transmission lines. Another Potential Corridor would follow the existing CSAO Railway that extends north to south from the vicinity of the Larrabee substation and east to west from the Englishtown Substation vicinity.

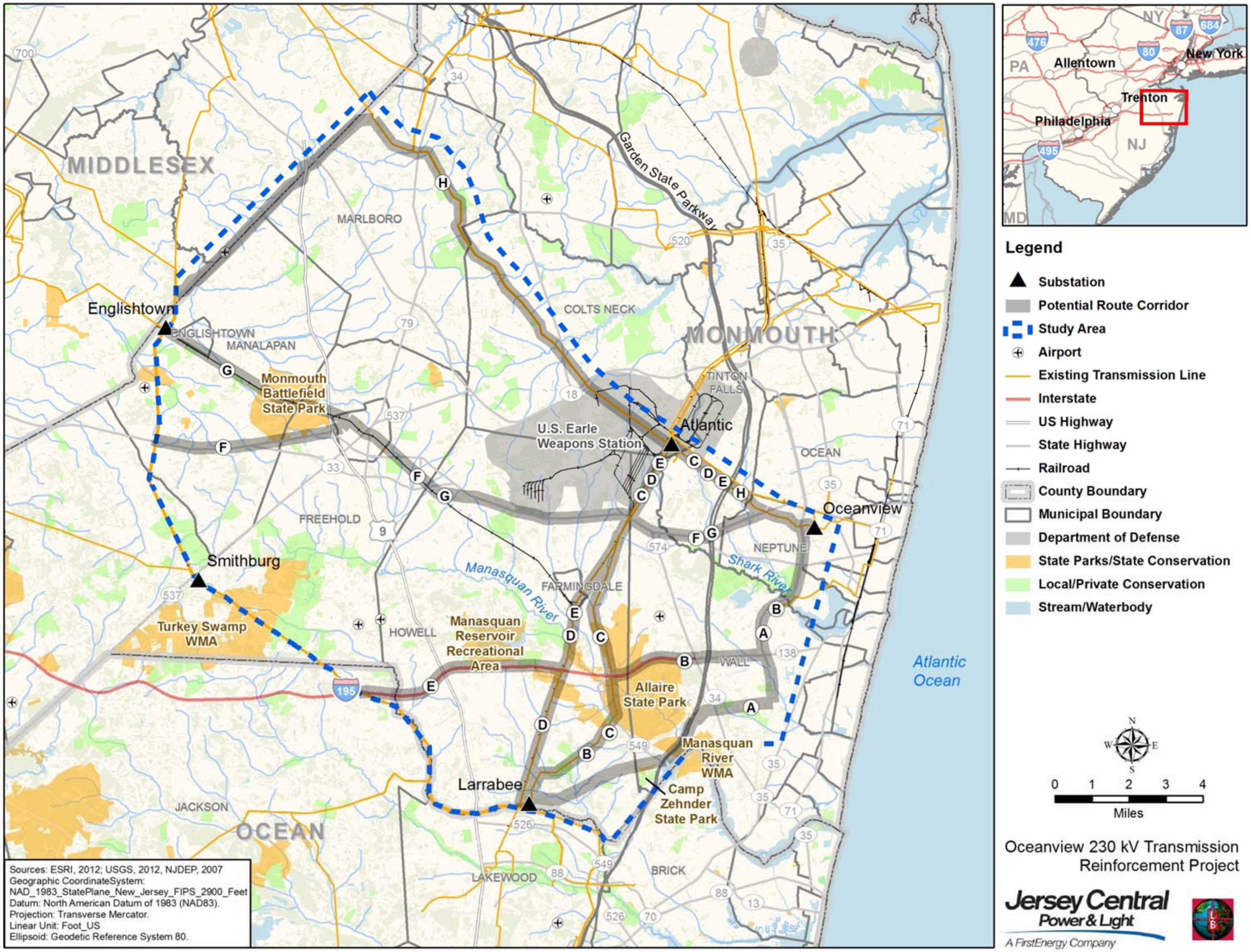
The Routing Team identified eight Potential Corridors (Corridors A, B, C, D, E, F, G, and H) during the Corridor Screening Study that provided logical directional connections into the Oceanview substation. These corridors are described below and identified in **Figure 2**.

3.1.1 Corridor Descriptions

Corridor A was developed to provide the most direct route between the Oceanview and Larrabee substations. It does not parallel any existing transmission corridors for a significant length of the line; however, Corridor A does use several road ROWs between the two substations. From the Larrabee substation, the route heads northeast along the Lakewood-Allenwood Road for approximately 3.5 miles passing Camp Zehnder State Park to the north. Past the state park the route turns to the north to follow the Garden State Parkway ROW for the crossings of the Allaire State Park and the Manasquan River Wildlife Management Area. After crossing Atlantic Avenue, Corridor A follows Allaire Road to the east before making a 90 degree turn to the north crossing over Wreck Pond Brook to follow State Route 18 to the Oceanview substation.

Corridor B incorporates both the utilization of existing transmission corridors and the most direct path between Larrabee and Oceanview substations. From the Larrabee substation, Corridor B heads north within the existing Larrabee – Atlantic 230 kV and Smithburg – Atlantic 230 kV transmission ROW, continuing through Allaire State Park. At the intersection of I-195, Corridor B diverts from the existing transmission ROW to the east. The route follows I-195 for approximately 4 miles before diverting to the north to follow the same path along Route 18 as Corridor A into the Oceanview substation.

Figure 2. Corridors of Interest



Corridor C was developed to use as much existing transmission line ROW as possible, while still maintaining a relatively short distance between the project substations. From the Larrabee substation, potential Corridor C heads north within the existing Larrabee – Atlantic 230 kV and Smithburg – Atlantic 230 kV transmission ROWs, continuing through Allaire State Park to a point located just east of the Atlantic substation. Corridor C will not connect to the existing Atlantic substation. From this point, Corridor C heads southeast within the existing Oceanview to Atlantic 230 kV transmission ROW to the Oceanview substation.

Corridor D was developed to use existing transmission line ROW, while avoiding Allaire State Park. From the Larrabee substation, potential Corridor D heads north parallel to an existing railroad and 34.5 kV transmission corridor. Along this segment, the corridor is adjacent to the Allaire State Park boundary, but does not cross into the park. Prior to crossing New Jersey State Highway 33, the corridor diverges from the railroad and is within the existing Larrabee – Atlantic 230 kV and Smithburg – Atlantic 230 kV transmission ROWs, to a point just east of the Atlantic Substation. Like Corridor C, Corridor D is within the existing Oceanview to Atlantic 230 kV transmission ROW into the Oceanview substation.

Corridor E was developed to provide an alternative from the Smithburg – Larrabee 230 kV transmission corridor to the Oceanview substation while avoiding additional congestion at the Larrabee substation. Corridor E originates at the intersection of the Smithburg – Larrabee 230 kV transmission line and I-195. Corridor E then parallels I-195 for approximately 6.3 miles east to the intersection with an existing railroad and 34.5 kV distribution corridor. From here, Corridor E turns north and follows the same path to the Oceanview substation as potential Corridor D.

Corridor F was developed to provide a new line from the Englishtown – Smithburg 230 kV transmission line to the Oceanview substation without requiring additional development at either the Larrabee or Atlantic substations. The corridor was also developed to avoid crossing the Monmouth Battlefield State Park and Naval Weapons Station Earle, and to follow the CSAO Railway. Corridor F originates along the Englishtown – Smithburg 230 kV transmission corridor at the intersection with State Highway 33. The corridor follows State Highway 33 for approximately 2.5 miles then diverges along the State Highway 33 business route, south of the Monmouth Battlefield State Park, to the intersection with US Highway 9, a distance of approximately 3.2 miles. After crossing US Highway 9, the corridor follows new ROW through residential development for 0.3 mile to Lenoir Road. Corridor F follows Lenoir Road for 0.2 mile so the roads end at the intersection with Bannard Street. Here the corridor continues straight in new ROW for approximately 270 feet to an existing railroad ROW. Corridor F follows the existing railroad for 3.2 miles to rejoin State Highway 33. The corridor then follows the highway for 9.4 miles then diverges to follow State Highway 66 northeast for 1.7 miles to the Oceanview to Atlantic 230 kV transmission ROW. Corridor F is located within this ROW for the last 1.5 miles to the Oceanview substation.

Corridor G was developed to provide a direct connection between the Englishtown and Oceanview substations and to follow the existing CSAO Railway and road corridors. From the Englishtown substation, Corridor G follows an existing railway corridor approximately 5.6 miles to the southeast, crossing the Monmouth Battlefield State Park. From here, the corridor follows the same path as Corridor F to the Oceanview substation.

Corridor H was developed to maximize use of the South River – Atlantic 230 kV transmission ROW. This corridor originates along the Englishtown – Deep Run 230 kV transmission line, approximately 1 mile north of the Englishtown substation. To reach the River – Atlantic 230 kV transmission line, Corridor H would require new ROW along the Monmouth County line – a distance of approximately 7.4 miles. Corridor H then traverses within the River – Atlantic 230 kV transmission line ROW southeast approximately 12.6 miles to the Atlantic substation. The corridor then follows within Oceanview – Atlantic 230 kV transmission line ROW into the Oceanview substation.

3.1.2 Corridor Comparison

The Potential Corridors were evaluated at a high level using a selected set of criteria which included environmental variables, system operations requirement variables, constructability variables, facilities co-location variables, JCP&L staff input, and other land use issues variables. The corridors were also compared on a macro-constraint level that considered factors such as overall length, estimated number of corner structures that may be required, approximate new ROW acreage required, and probable studies/permits required. **Table 3** presents a comparison of each corridor based on length, use or parallel of existing infrastructure, approximate new ROW acreage required, acreage of wetlands crossed, number of historic properties crossed, and number of parcels crossed. Additional factors considered include land use, residential and commercial development, road setback requirements, potential aesthetic impacts, and distance from known cultural resources.

Table 3. Corridor Comparison

Corridor	Length (miles)	Existing Transmission ROW	Parallel to Rail ROW	Parallel to Road ROW	New ROW Needed[1]	Wetland Crossed (acres)	Historic Properties	Parcels Crossed
A	13.3	2%	0%	85%	Up to 98%	45.1	10	72
B	13.3	38%	0%	62%	Up to 62%	71.6	13	45
C	16.2	100%	0%	0%	0%	241.1	9	140
D	15.5	49%	51%	0%	Up to 51%	247.8	9	228
E	17.3	44%	22%	33%	Up to 55%	223.1	8	153
F	19.3	8%	16%	74%	Up to 92%	101.7	11	228
G	19.5	8%	45%	48%	Up to 92%	134.3	13	231
H	24.7	70%	0%	0%	30%	272.6	11	313

3.1.3 Corridor Screening Study Results

Based on this high level evaluation, the following five corridors were eliminated from further consideration: Corridors A, E, F, G and H. The eliminated corridors generally fell into one of the following five categories, which are described below: (1) Inconsistent with NJBPU guidelines; (2) Controlled access highway Co-Location Policy; (3) Route length; and (4) Development density. **Table 4** identifies the reason(s) why each of these corridors was eliminated.

Compliance with NJBPU Guidelines

Under NJBPU regulations, whenever an electric distribution company constructs an overhead transmission line, is shall make use of available railroad or other rights-of-way whenever

[1] Assumed Standard Width required = 100-feet. Corridor sharing with existing linear infrastructure will reduce overall amount of new ROW required. However, during the Corridor Feasibility stage of the Project the anticipated amount of overlap was not identified.

practicable, feasible and safe, subject to agreement with the owners. In addition, where possible, transmission towers are to be located in accordance with topography to minimize visual impacts.

Controlled Access Highway Co-Location Policy

NJDOT's utility accommodation regulations specify that public utilities have the right by law to occupy highway ROW, subject to the provisions identified in Chapter 25 (N.J.A.C. § 16:25 Utility Accommodation) and Department approval. While ROW sharing is encouraged if it can be done in accordance with NJDOT guidelines, the NJDOT generally restricts longitudinal occupancy of limited access highway ROW.

Route Length

Additional route length results in increasing natural and social impacts and Project costs, especially when the route requires a significant portion of new ROW. Therefore, any corridors that are considerably longer than other potentially viable routes are considered less desirable.

Development Density

One of the routing objectives is to avoid traversing urban areas, including towns, small villages, and other high concentrations of commercial and industrial development areas with a new transmission line ROW. Routes that traverse a high percentage of urban development or number of parcels are considered less desirable because they result in impacts to a greater number of people.

Table 4. Eliminated Corridors of Interest

Corridor	Type of Conflict			
	NJBPU Guidelines	Limited/Controlled Access Highway Co-Location	Route Length	Development Density
A	**X**			
E		**X**	**X**	
F			**X**	**X**
G			**X**	**X**
H	**X**		**X**	**X**

Although Corridor A is similar in length to Corridor B, Corridor A would require a significant amount of new ROW, which is inconsistent with NJBPU guidelines. Therefore, Corridor A was eliminated. The Routing Team eliminated Corridor E from further consideration due to the overall length and the amount of development present along both sides of I-195, which would potential require the displacement of one or more residences in order to site parallel structures outside of the interstate ROW, as required by NJDOT. Corridor E would also require siting and construction of a new switching station at the point where the route would tap into the existing Larrabee – Smithburg 230 kV Transmission Line. Corridors F, G and H were eliminated primarily because each would result in a route that is at least six miles longer than the shortest route. As such, these three corridors would traverse the greatest percentage of developed areas and number of parcels. In addition, Corridor H, which is by far the longest path, would require the greatest amount of new ROW.

Based on a comparison of the corridors using available information, the Routing Team identified the most feasible three Potential Corridors (Corridors B, C and D) to be evaluated in the subsequent Route Selection Study and used to develop Potential and Alternative Routes. Corridor B is the shortest corridor (13.3 miles) and provides a direct path between the Larrabee and Oceanview substations. Corridor B follows existing transmission lines for 38 percent of its length without adding excessive length and crosses the smallest number of parcels (45), thus minimizing the number of landowners impacted. However, Corridor B parallels Interstate 195 and State Route 18, which may be problematic due to adjacent development once detailed alignment considerations are integrated into the process.

Corridors C and D take advantage of existing transmission lines to the highest extent. Corridor C is within an existing ROW for 100 percent of its length. Corridor D is parallel to both an existing railroad and 34.5 kV transmission line for 51 percent of its length.; however, new ROW would need to be acquired adjacent to this ROW to provide sufficient width for the new transmission line. This could be challenging in developed areas, notably within the Borough of Farmingdale. Between the Atlantic and Oceanview substations, Corridor D would be located within the same transmission ROW as Corridor C. These two Potential Corridors are within close proximity to more residents than Corridor B. However, since they are largely within existing transmission line ROW, the current land use would ultimately remain the same, and any additional easement agreements may be easier to obtain. Corridors B, C and D are consistent with NJBPU guidelines and are the most consistent with existing land use in the vicinity.

3.2 Route Selection Study

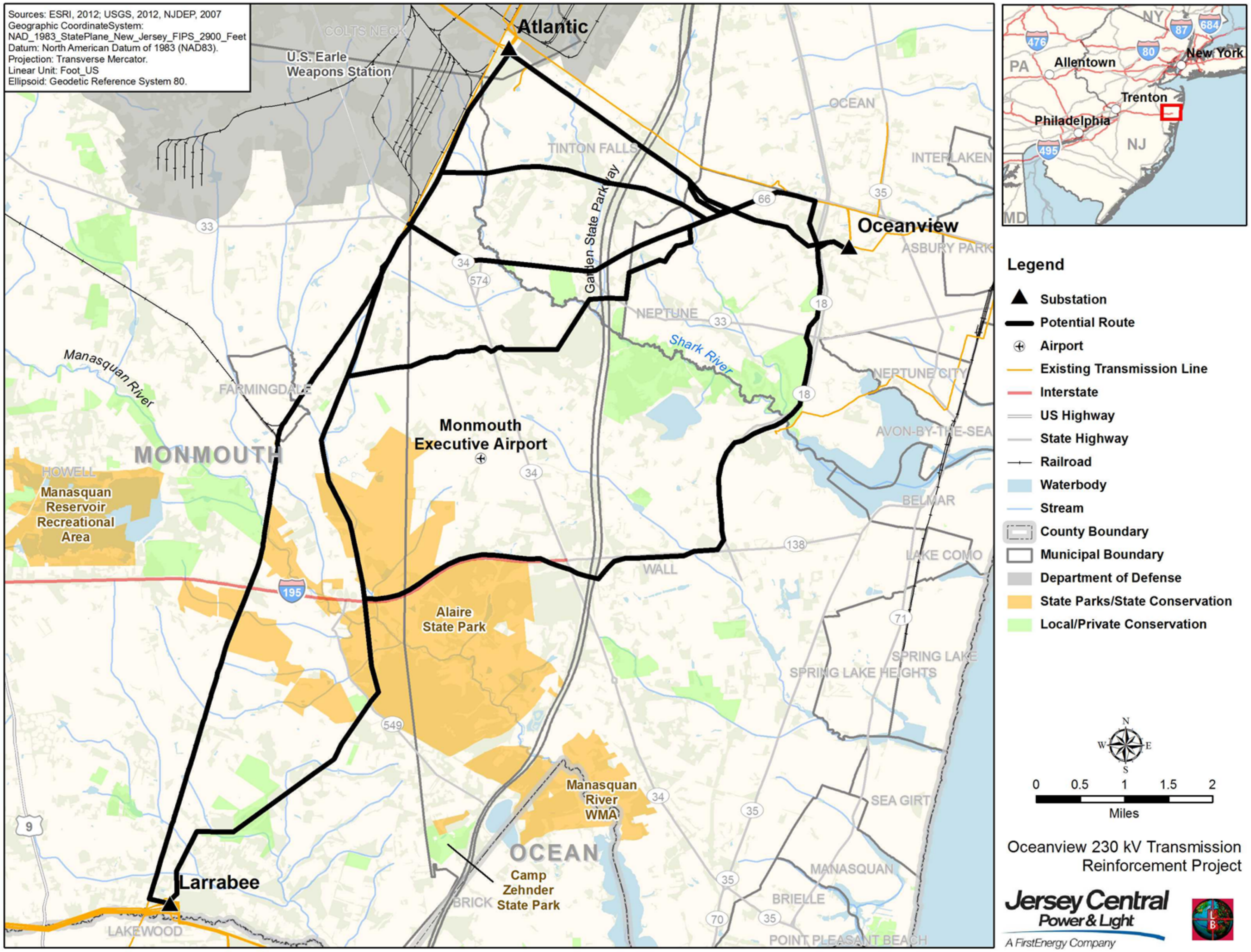
The Routing Team developed specific alignments (referred to as Potential Routes) for the three feasible corridors identified during the Corridor Screening Study. Potential Routes are an early iteration of the routing process that involves the development of conceptually based routes and general consideration of these routes with respect to constraints and opportunity features in the Study Area.

3.2.1 Development of Potential Routes

Based on the results of field reconnaissance and further study, Potential Routes were developed to consider specific alignments for corridors B, C, and D. Between Larrabee and Atlantic substations a potential route along Corridor C can be located within the existing ROW. Between the Atlantic and Oceanview substations, Potential Routes along corridors C and D can be located within the existing Oceanview – Atlantic 230 kV transmission ROW. In this area, potential alignments were considered both within and outside of the existing ROW, including options along Route 33, Route 66, Belmar Boulevard and Shark River Road. In addition, Potential Routes were also considered through large undeveloped forested areas to enter the Oceanview substation from the south. The Potential Route Network is shown in **Figure 3.**

Once the initial Potential Route network was developed, the Routing Team reviewed each route in the field. Field efforts included reviewing the Potential Routes from public points of access and documenting locations of residences and other small area constraints. The initial link network was examined in the field in February 2012. Subsequent field inspections were conducted in April 2012 and April 2013. The Routing Team digitally recorded photographs, comments, and routing notes on laptops over aerial photography using GIS software supported by real time GPS tracking for positional information.

Figure 3. Potential Route Network



The team used a GPS unit, along with the mapped coordinates of the Potential Routes superimposed on road/street mapping software, to track precise locations and record the path of the field work. Residences (single family, multi-family, modular homes, and mobile homes), outbuildings (garages, sheds, barns, etc.), commercial buildings, and other potentially sensitive receptors (e.g., cemeteries, churches, and schools) within 500 feet of each Potential Route center line were identified and recorded using database software. At various points, e.g., in locations where homes or structures are near the existing or proposed ROW, areas of environmental concern were noted, and various other routing challenges were identified. Photographs were taken at selected or representative locations throughout the Potential Route Network.

The field investigations resulted in changes to the Potential Route alignments. Additional changes resulted from efforts to avoid residences and other buildings, such as garages, barns, and commercial structures, or other similar constraints discovered in the field that were not identifiable on the aerial imagery, such as new residences. Based upon these field investigations, some links were dropped altogether as they did not conform to the routing objectives or criteria. The Routing Team identified these changes and updated the Potential Route Network accordingly.

3.2.2 Development of Alternative Routes

A qualitative and quantitative screening process was employed to eliminate or modify route links from the Potential Route network that were not considered suitable for additional study. The eliminations or adjustments were based on the likelihood of impacts on residential developments, natural resources, or other developed infrastructure. For example, Potential Route alignments along Corridor B were reviewed and adjusted to ensure that all structures would be located outside of the NJDOT ROW in order to comply with NJDOT ROW sharing regulations prohibiting the construction of steel monopoles within limited access highway ROW, as well as to minimize impacts to densely populated residential areas along Route 18 and Interstate 195. Similarly, Potential Routes developed along Corridor D were adjusted to minimize acquisition of required ROW adjacent to CSAO Railway.

As described in section 3.2.1, several Potential Route links around the Children's Center of Monmouth County were considered, including options along Route 33, Route 66, Belmar Boulevard and Shark River Road.[2] However, routes along these roadways would require the acquisition of ROW located outside of the existing roadway ROW and disrupt numerous property owners (residential and commercial). Route 33 is constrained by residential and commercial development along both sides of the road, including Collingwood Park and the Monmouth Memorial Cemetery; paralleling Route 33 would likely require the displacement of one or more residences/buildings. Route 66 is constrained by a gas pipeline located along the west side and commercial and residential development located along the east side. Potential links through large undeveloped forested areas were also considered to avoid the school and enter the Oceanview substation from the south. However, these links would require a circuitous route to avoid displacement of residential and commercial properties, the acquisition and clearing of new ROW and new impacts to wetland areas,. In addition, based on guidance provided by the NJDEP and NJBPU, creations of new ROW is discouraged unless no other route is feasible, practicable, or safe.

The Routing Team developed three complete Alternative Routes from the network of Potential Routes and one Option to avoid crossing the Children's Center of Monmouth property. The Alternative Routes are summarized below[3] and shown on **Figure 4**.

Alternative Route B

Route B begins at the Larrabee substation, heads north within the existing Larrabee-Atlantic 230 kV and Smithburg-Atlantic 230 kV transmission ROW for approximately 4.7 miles, including traversing approximately 1.2 miles through Allaire State Park. At the crossing of Interstate 195, Route B diverts to parallel Interstate 195 and State Highway 138 for approximately 4.3 miles, including another approximately 0.9 miles through Allaire State Park. The route follows State Highway 138 before diverting to the north to follow Route 18 for

[2] Transmission facilities are currently located within the Children's Center of Monmouth property.
[3] Note that the individual distances identified in the Alternative Route descriptions may not add up to the total route length identified in Table 5 due to rounding.

approximately 4.0 miles before the intersecting with the existing Atlantic – Oceanview 230 kV Transmission Line and turning east for approximately 0.4 mile into the Oceanview substation.

Alternative Route C (Preferred Route)

Route C heads north from the Larrabee substation within the existing Larrabee-Atlantic 230 kV and Smithburg-Atlantic 230 kV transmission ROW for approximately 11.6 miles. The route traverses approximately 2.5 miles through Allaire State Park, within the same ROW, before reaching a point just east of the Atlantic substation. From the Atlantic substation, Route C heads southeast within the existing Oceanview–Atlantic 230 kV transmission corridor for approximately 4.5 miles into the Oceanview substation.

Alternative Route D

From the Larrabee substation Route D heads east for approximately 0.2 mile in new ROW before intersecting an existing railway and 34.5 kV transmission ROW. Route D turns north and parallels the railway for approximately 8.3 miles. After crossing State Highway 33, Route D diverges from the railway and traverses within the existing Larrabee-Atlantic 230 kV and Smithburg-Atlantic 230 kV transmission ROW for approximately 2.3 miles to a point just east of the Atlantic substation. Like Route C, Route D traverses within the existing Oceanview – Atlantic 230 kV transmission ROW for approximately 4.5 miles into the Oceanview substation.

Option for Routes C and D

A 0.6-mile-long Option was developed for Alternative Routes C and D that would detour from the existing ROW between the Atlantic and Oceanview substations to avoid crossing a school parking lot. Prior to crossing Jumping Brook Road, the Option diverges from the existing Oceanview–Atlantic 230 kV transmission ROW and heads south for approximately 300 feet. The Option continues in a southeast direction for approximately 0.45 mile traversing through Neptune Township property held in a conservation easement and an office park parking lot before crossing over Green Grove Road. At Green Grove Road, the Option follows Route 66 for approximately 0.1 mile before intersecting with the existing Atlantic – Oceanview 230 kV transmission ROW.

Figure 4. Alternative Routes