EXHIBIT JC-6

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 MONTVILLE - WHIPPANY 230 KV TRANSMISSION PROJECT IS REASONABLY NECESSARY FOR THE SERVICE, CONVENIENCE OR WELFARE OF THE PUBLIC

Direct Testimony

of

Peter W. Sparhawk

Re: Transmission Project Siting and Route Selection

I. INTRODUCTION AND BACKGROUND

Q. Please state your name and business address.

A. My name is Peter W. Sparhawk. My business address is 350 Eagleview Boulevard, Suite 250, Exton, PA 19341.

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

A. I am employed by The Louis Berger Group, Inc. ("Louis Berger"), as the Director of Transmission Services in the Power and Energy Business Unit.

Q. Please describe your professional experience and educational background.

A. As the Director of Transmission Services, I provide management and oversight of our Transmission Services Team. I served both as the Project Director for Louis Berger for the Montville – Whippany 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 graduated from Cornell University in Ithaca, New York in 1985 with a Bachelor of Arts degree in History. I also completed a Certificate Program for the Environmental Manager in 1996 at the University of Washington. I have 25 years of experience in preparing, coordinating, and managing environmental, infrastructure, and energy projects, including federal and state environmental impact statements and assessments, environmental compliance and permitting efforts, and state certification applications for transmission line projects. My experience with energy projects includes licensing and permitting for electric

transmission lines, gas-fired generation, wind power, and hydroelectric facilities. I have conducted and overseen numerous environmental analyses and coordinated license applications to state energy agencies and siting boards for power facilities and infrastructure in various states throughout the United States. Specifically, my electric transmission line experience includes routing and siting, licensing, permitting, consultation with resource agencies, expert witness testimony, and everyday coordination with Louis Berger's utility clients.

Attached as Exhibit PWS-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 Pennsylvania Public Utility Commission for the following PPL Electric projects: Susquehanna – Roseland 500 kV Transmission Line; Brunner Island – West Shore 230 kV Transmission Line; Honey Brook – Twin Valley 138/69 kV Transmission Line; and North Lancaster – Honey Brook 138/69 kV Transmission Line.

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 Montville – Whippany 230 kV Transmission Line Reinforcement Project (the "Project"), which involves construction of a 230 kilovolt ("kV") high voltage

transmission line beginning at the JCP&L Whippany Substation in East Hanover Township, Morris County, New Jersey and ending at the Montville Substation in Montville Township, Morris County, New Jersey. The Routing Study is attached to this testimony as Exhibit PWS-2.

II. DESCRIPTION OF THE ROUTING PROCESS

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, geographic information systems ("GIS") data analysis and management, 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 Montville 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:

- 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 Montville 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. 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 routing opportunities.

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 Picatinny Arsenal; and (iii) sensitive recreation or historic areas, such as the Boonton Reservoir and Mount Hope Mine Historic District. Large area constraints are avoided to the extent practicable and are considered unfavorable for developing Potential Corridors.

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

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 the 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 287, Interstate 80, Interstate 280 and U.S. Route 202.

Using the above information, the Routing Team developed a range of Potential Corridors, 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 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 angled 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, all Potential Corridors originating from the Wharton Substation and some of the Potential Corridors originating from the remaining substations (Greystone, Stoneybrook, Whippany and Roseland) were eliminated from further consideration. Section 3.1.1 of the Routing Study details why these Potential Corridors were eliminated from further consideration. The remaining Potential Corridors originating from Greystone, Stoneybrook, Whippany and Roseland were identified as 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) between the Montville Substation and the Greystone, Stoneybrook, Whippany and Roseland Substations. 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 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 New Jersey Transit railway and I-80 were evaluated in more detail to determine appropriate placement of the Potential Route centerline to ensure compliance with applicable regulations.

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 verifying and documenting 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, and other small areas constraints discovered in the field.

Based on further analysis, the Routing Team determined that the most feasible routes connect the Whippany or Roseland Substations to the Montville Substation. Section 3.3.1 of the Routing Study describes why the Greystone and Stoneybrook substations were eliminated from further consideration. Alternative Routes were then developed between the Montville Substation and the Whippany and Roseland substations 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. Following field reconnaissance and initial analysis, the Routing Team developed three preliminary Alternative Routes (Alternative Routes A, B and C) and two Alternate Segments from the Potential Route Network. The Alternate Segments, identified as A2 and A3, were developed for Alternative Route A to provide options to divert the Project away from a heavily developed area that presently contains one or more overhead transmission lines and underground natural gas pipelines. The Routing Team initially selected Route A as the Preferred Route and retained the two Alternate Segments for consideration.

The Alternative Routes were assessed and compared with respect to ROW or constructability challenges (ROW constraints, design challenges and construction challenges), potential impacts on any noted natural resources (water resources, vegetation, wildlife and soils), and human uses (land use, recreation and aesthetics and cultural resources). Based on this analysis, Alternative Route A was originally selected as the Preferred Route because it was the shortest, most direct route into the Montville Substation and paralleled or rebuilt existing transmission lines for its entire route. Two public open house meetings were held on November 13 and 14, 2013 in Parsippany, New Jersey, to present the original Preferred Route (Route A), Alternate Segments to the Preferred Route (subsequently referred to as Alternative Routes A2 and A3), and information about the Montville – Whippany 230 kV Transmission Line Reinforcement Project. As indicated on the initial Project factsheet and the informational boards

presented during the November meetings, "JCP&L [was still] evaluating alternative segments [Alternative Routes A2 and A3] that could replace portions of the preferred route in Parsippany and Montville."

Subsequent to the November 2013 open house meetings, the Routing Team developed three Alternative Routes (plus one Option for Route A3), based on the three Preliminary Alternative Routes (Routes A3, B, and C). The Alternative Routes and Option that the Routing Team advanced for further analysis were Alternative Route A3, Alternative Route A3 with Option, Alternative Route B, and Alternative Route C. The Routing Team recommended Alternative Route A3 as the Preferred Route.

Q. Describe why the Routing Team eliminated Route A, the original Preferred Route .

A. Route A (the original Preferred Route) was developed to parallel the PSE&G Susquehanna – Roseland 500/230 kV circuits from the Arlington Plaza shopping center to the Montville Substation. JCP&L does not have any existing ROW adjacent to the PSE&G Susquehanna – Roseland 500/230 kV circuits between Alba Place and Lake Shore Drive in Parsippany-Troy Hills Township. In addition, a Texas Eastern gas line is located within the PSE&G ROW. Based on discussions with PSE&G following the November 2013 open house meetings, PSE&G was not willing to allow JCP&L to construct within their existing ROW. Therefore, in order to construct Alternative Route A, JCP&L would need to obtain new ROW adjacent to the PSE&G ROW. NERC standards require that this ROW would need to be a minimum of 100 feet wide. At a minimum,

paralleling the Susquehanna – Roseland line through this area is anticipated to require the purchase of 14 residential homes. This assumes that the Montville – Whippany line could be constructed 5 feet east of the PSE&G/Texas Eastern gas line ROW and aerially overlap the gas ROW. If overlap of the gas ROW is not permitted by Texas Eastern, paralleling through this area would result in the need to purchase up to 24 residential homes. Therefore, Alternative Route A was eliminated from further analysis in favor of Route A3.

Q. Describe why the Routing Team eliminated Preliminary Alternative Route A2.

A. Alternative Route A2 followed the same path as Alternative Route A3 from the Whippany Substation north to Van Riper Avenue. From north of Van Riper Avenue, Alternative Route A2 would continue to parallel/rebuild the existing Montville-Whippany 34.5 kV circuits prior to entering the Montville Substation, while Route A3 diverts to the east near Changebridge Substation. Just north of Van Riper Avenue, constructing Alternative Route A2 would require the acquisition of new ROW in order to construct the 230 kV line parallel to the existing 34.5 kV line and gas line. Alternative A3 avoids this congested area by using an existing, underutilized JCP&L easement. Furthermore, separating the 230 kV and 34.5 kV circuits onto individual poles provides additional reliability benefits, because the failure of a single pole will not remove both circuits from service. Further, this would enable fewer, shorter, and therefore less obtrusive, poles to be used in the construction of the proposed transmission line. Therefore, Route A2 was eliminated from further analysis.

Q. In developing the Preferred Route (A3), did the Routing Team make any modifications to the Preliminary Alternative Route A3?

A. Yes. Based on further evaluation of the existing transmission ROW through this area, adjacent natural gas line ROW, discussions with PSE&G, a detailed engineering review, and information gathered at the open house meetings, JCP&L ultimately selected a modified version of Preliminary Alternative Route A3 as the Preferred Route for the Project. The preliminary Alternative Route A3 involved rebuilding the majority of the existing 34.5 kV line. However, the additional analysis indicated that JCP&L has sufficient ROW in most cases along the A3 Route. Therefore, JCP&L proposes to parallel the majority of the existing 34.5 kV sub-transmission lines instead of rebuilding the circuits. JCP&L proposes paralleling the 34.5 kV lines to the extent possible for the following reasons:

- It would be challenging to schedule an extended outage of the existing double-circuit 34.5 kV sub-transmission line in order to rebuild;
- Rebuilding is significantly more expensive than paralleling;
- Rebuilding would require taller transmission structures and shorter transmission spans (i.e., a greater number of transmission structures);
- Rebuilding has the potential to increase the length of outages if a single pole fails (because both the 230 kV and 34.5 kV structures would be on the same pole);
- In most areas, JCP&L has enough ROW to accommodate a parallel line; and

- The two short segments of the route that will be rebuilt are in areas that pose little risk of pole/car accidents.

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 fewer ROW and construction challenges compared to the remaining Alternative Routes?

A. Yes. From an engineering and constructability perspective, Route A3 is preferred to the remaining potential routes because it is the shortest route, parallels or rebuilds existing transmission for the majority of its route and minimizes the amount of new ROW acquisition. Route A3 also has good access as it is primarily located adjacent to existing transmission lines. Using an existing ROW and access roads to the extent possible will result in less ROW acquisition and vegetation clearing and earth disturbance, thereby reducing the overall Project cost and environmental impact.

Natural Environment

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 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 which Alternative Route had the least overall environmental impact.

Q. Does the Preferred Route minimize the overall environmental impact compared to the other Alternative Routes?

Yes. Route A3 would result in the least environmental impact because it rebuilds and/or parallels existing transmission line for the majority of its route. Route A3

would require tree clearing through Troy Meadows and ROW that is currently undeveloped; however, it would require significantly less tree clearing than Routes B and C.

Forest clearing can result in environmental and land use impacts including wildlife habitat fragmentation and modification (e.g., different species occupy forested landscapes than scrub-shrub landscapes), wetland function modification (e.g., converting forested wetlands to emergent wetlands), soil erosion, increased stormwater runoff, and removal of aesthetic buffers for adjacent property owners. Route A3, which uses the most existing ROW, would require the least amount of forest clearing (approximately 41.6 acres) while Route C, which uses the least existing ROW, would require the largest amount of forest clearing (approximately 113 acres). Route B, which parallels or rebuilds existing transmission for about 74 percent of its route, would require approximately 80 acres of forest clearing. The total amount of tree clearing for Route A3 is still significantly less than that required for Routes B or C. In addition, since a significant portion of Route A3 consists of existing cleared transmission ROW, permanent impacts to wetlands, including the conversion of forested wetlands to scrub-shrub or emergent wetland, would primarily occur from the placement of structure foundations.

Additional information on environmental impacts associated with the Project is included in Section 4.3 of the Routing Study and the testimony of Kirsty M. Cronin (Exhibit JC-7).

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, recreation, 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 existing land use along the Alternative Routes.

A. The Routing Team used a combination of GIS data, aerial imagery, parcel data and field review to evaluate land use along the Alternative Routes. Alternative Routes connecting the Whippany and Montville Substations are located entirely within Morris County; the tenth most populated county in the state. Alternative Routes connecting the Roseland and Montville Substations are located within Morris and Essex Counties; Essex County is the third most populated county in the state. Several types of land uses are located within the Study Area. The refined Study Area is generally comprised of three major land uses, including significant suburban developments, upland forests under state control for wildlife management and recreation purposes, and broad areas of lowland wetland/floodplains conserved under natural heritage easement. The combination of an abundance of lowland/conservation lands and significant residential and commercial development demand has resulted in a land use pattern that fluctuates between broad conservation area and densely packed residential housing.

Major urban areas in the Study Area include: Boonton, Montville, Troy Hills, Lake Hiawatha, Pine Brook, Roseland, and Parsippany. In general, intervening residential development patterns connect these areas, making identification of suitable routes between them often challenging. Major land use features within the Study Area include Troy Meadows Nature Preserve, Great Piece Meadows State Park, Morris Canal and West Essex Park, as well as numerous golf courses/local parks scattered throughout the Study Area.

The ROW for Route A3 would only traverse 88 parcels. The ROW for Route B would traverse 91 parcels and the ROW for Route C would traverse the greatest number of parcels, 138. In addition, the majority of the parcels crossed by Route C are not currently crossed by a transmission ROW while many of the parcels crossed by Route A3 and about half of Route B are presently encumbered by an existing transmission line ROW.

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

A. There is significant development throughout the Study Area. Route A3 is the shortest route at 7 miles, but crosses the largest amount of urban areas as a result of the concentrated residential development located between the northern side of I-80 and the Montville Substation. As a result of congestion in this area, Route A3 would traverse existing JCP&L ROW to the east for short distances through undeveloped areas dominated by wetlands and forest. Using the existing JCP&L ROW reduces the number of residences within 500 feet of the transmission centerline, but would increase environmental impacts. Route B would traverse

adjacent to some commercial development located along Interstate 280. North of Lake Hiawatha, Route B would traverse the same developed areas crossed by Route A3. Route C would traverse commercial and residential areas primarily located adjacent to I-80 and the CSX railway.

The Routing Team identified the number of residences located within 500, 250, 100 and 75 feet of the Alternative Routes through aerial imagery and field confirmation. Based on this review, no residences are located within the ROW for Route A3, assuming a standard 120-foot ROW width. However, in a few locations along Route A3, a 100-foot-wide ROW will be used where JCP&L presently has only 100 feet of ROW, or to avoid the acquisition of residential properties where JCP&L will seek new ROW. Route A3 would avoid the need for non-standard ROW design or the potential acquisition of residential parcels. Route B also avoids the need to acquire any residential parcels. Two residences are located within the ROW for Route C adjacent to the CSX railway, assuming a standard 120-foot ROW width.

Route C would traverse within 250, 100 and 75 feet of the highest number of residences. Routes A3, the Route A3 Option and Route B would traverse within 75 feet of a similar number of residences. The Route A3 Option would result in crossing within 250 feet of 22 fewer residences and within 500 feet of 27 fewer residences compared to Route A3.

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 existing ROW or parallel existing transmission lines generally result in fewer overall land use or aesthetic impacts than those that parallel roads, railroads, or require new or unused ROW.

Each of the Alternative Routes minimizes visual impacts where the routes parallel existing transmission lines, roads and railways. Routes B and C would require the greatest amount of new ROW, including new ROW through two recreation areas (West Essex Park and Great Piece Meadows). Routes B and C parallel roads and/or railways for portions of their respective routes. Paralleling these linear transportation corridors can increase visual impacts for area travelers, as more structures would be required in these areas due to the curves in the road and structures would be visible while traveling. Removing trees and building structures taller than the tree line could also increase the visibility of the transmission line on the adjacent areas. While road and railway ROWs can be considered previous land disturbance, the addition of a transmission line would create new vertical structures that could be seen for longer distances.

Routes A3, the Route A3 Option and the northern section of Route B cross through urban and developed areas located north of I-80 and Route 46. All three options would involve paralleling the existing Montville – Whippany 34.5 kV circuits across I-80 and Route 46. At this point, Route A3 and the Route A3 Option would take a 1.6-mile-long jug handle to the east using a combination of

existing, unoccupied JCP&L ROW, JCP&L-fee owned property, and new ROW. Monopoles through this area would be 110 to 130 feet in height. This jug handle would consist of a new 100- to 120-foot-wide ROW through a forested wetland area, which would result in new visual impacts to residential properties located in close proximity to the ROW. Route A3 and the Route A3 Option would also include another 0.6-mile-long jug handle to the east within a JCP&L easement. Additional clearing would be required to accommodate the new 230 kV transmission line. The 230 kV transmission line structures would be approximately 110 to 130 feet tall through this area.

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

A. Background research for cultural resource impacts consisted of a review of the files maintained by the New Jersey Historic Preservation Office ("NJHPO") pertaining to historic architecture 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 previously identified historic resources and cross at least one historic district. A total of 16 architectural historic properties are located within a 0.5-mile radius of at least one of the Alternative Routes. There are 76 archaeological sites within a 0.5-mile radius of the three Routes. Of these 76 sites, only two are listed on or previously determined eligible (SHPO Opinion; Determination of Eligibility) for listing on the NRHP/NJRHP. Placing a new transmission line adjacent to an existing

transmission line greatly reduces potential impacts to historic 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.

As the second longest Route B has a high potential to impact cultural resources. A total of 5.2 miles would be built in either existing ROW or within partial existing ROW; 2.5 miles would be located within new ROW. There are 9 historic properties and 39 previously recorded archaeological sites within a 0.5-mile radius of this alternative. In addition, the majority of the archaeological sites are in the vicinity of proposed new ROW.

Route C also has a high potential to impact cultural resources. Eleven historic properties, including an historic district, are within 0.5 mile of Route C but it only directly crosses over the historic district, Morris Canal. There also are 37 archaeological sites within a 0.5-mile radius of Route C and the route directly crosses previously identified archaeological sites 28-Mr-221 and 28-Ex-37 in areas where Route C would involve the construction of new ROW. Therefore, Route C is anticipated to result in the greatest potential impacts to historic properties and archaeological sites because the route would involve the most construction within new ROW.

Route A3 and the Route A3 Option have a moderate potential to impact cultural resources. Route A3 would require 0.8 mile of new ROW and the Route A3 Option would require 0.9 mile of new ROW. Portions of Route A3 and the Route A3 Option would involve additional construction of a new transmission line in unoccupied corridors. However, both options are in close proximity to the

existing circuits and would not be expected to significantly increase potential impacts to cultural resources. Route A3 and the Route A3 Option are adjacent to an approximately 15-acre historic property, the Van Duyne – Jacobus House. This route and route option will use existing ROW in the area around the Van Duyne – Jacobus House; therefore, this historic property would not be impacted directly by the project. Within a 0.5-mile radius, there are a total of 20 sites near Route A3 and the Route A3 Option. Route A3 and the Route A3 Option cross archaeological site 28-Mr-132 in an area of new construction and archaeological site 28-Mr-263 within existing ROW.

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

Yes. The Preferred Route minimizes potential direct and indirect impacts to residential, commercial and industrial development, institutional uses, cultural resources, and land use. The Preferred Route would rebuild and/or parallel existing transmission line for the majority of its route. Therefore, the Preferred Route would result in minimal cumulative land use and aesthetic impacts. The Preferred Route deviates from paralleling the existing transmission corridor through the most developed portion of the Study Area. In this area, the Preferred Route would use a combination of new ROW and an undeveloped JCP&L easement. Although this detour would result in land use changes by clearing a new ROW, doing so significantly reduces the number of residences within 500 feet of the new transmission line. Based on public comments received throughout the course of the Project, JCP&L adjusted the centerline of Route A3 (located

within existing JCP&L ROW) through the Montville Chase residential community approximately 15 feet closer to the existing natural gas line (and farther away from adjacent residences). The Preferred Route is the shortest route and would require the least amount of new ROW. The Alternative Route A3 Option would further minimize impacts by increasing the distance between the transmission line and residential properties. The Alternative Route A3 Option would involve exchanging the existing 170-foot-wide ROW through the Meadows of Montville with a new 170-foot-wide ROW located slightly farther to the west on The Meadows at Montville property, allowing the transmission line to be constructed farther away from The Meadows at Montville units. JCP&L is willing to construct this Option if the Meadows at Montville is willing to exchange ROW.

IV. PUBLIC OUTREACH

Q. How was public input incorporated into the process?

A. The Preliminary Alternative Routes, including the original Preferred Route, were presented to the public for comment during two public open house meetings held on November 13 and 14, 2013. Prior to conducting public open house meetings JCP&L contacted local, county and State officials to discuss the Project.

On October 30, 2013, JCP&L mailed public notices to all property owners located generally within 200 feet of the ROW for the original Preferred Route and Alternate Segments to notify them about the November 13th and 14th open house meetings. During this same time, JCP&L published a Project website to provide information regarding the Project need, the siting process, and the Preferred Route

and Alternate Segments. The website also included an electronic form to facilitate collection of public comments. On November 7, 2013, JCP&L placed an advertisement in the following local newspapers to notify the public of the scheduled open houses:

- Daily Record
- The Progress
- Hanover Eagle
- Morris NewsBee
- Star Ledger (published November 12, 2013).

Two public meetings were held on November 13 and 14, 2013 at the Holiday Inn in Parsippany, New Jersey, to present the original Preferred Route (Route A), Alternate Segments (subsequently referred to as Routes A2 and A3) and to provide information about the Montville – Whippany 230 kV Transmission Line Reinforcement Project. At the meeting, attendees received a project factsheet, information on the NJBPU Process, comment cards, and 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, Louis Berger, and other utility representatives. The factsheet contained a brief statement on project need, a description of the siting process, and a preliminary project timeline. The public meetings were organized in an open house format and consisted of several stations that identified the Project processes.

The November 13th open house meeting was attended by 28 people and eleven comment cards were completed during this meeting. The November 14th open house meeting was attended by 23 people and one comment card was completed during this meeting. Comments were also collected from the public before and after the open house meetings through the Project website, emails, and a toll-free phone number. The maps with the original Preferred Route (Route A) and Alternate Segments (Routes A2 and A3) presented at the open houses were also posted online so stakeholders could review and provide comments even if they were unable to attend the open houses.

In addition, JCP&L met with Montville and Parsippany-Hills-Troy townships on several occasions before and after the open house meetings. JCP&L also attended a public Montville Township committee meeting on June 10, 2014 to present information on the Project.

JCP&L reviewed comments and followed up with the commenters as appropriate to answer any outstanding questions. In addition, JCP&L provided the commenters with the Project website and a phone number (888-808-4234) for them to obtain additional information about the Project or provide comments.

Based on public comments received throughout the course of the Project, JCP&L made the following modifications to the final Alternative Routes:

- Adjusted the centerline of Route A3 (located within existing JCP&L ROW) through the Montville Chase residential community approximately 15 feet closer to the existing natural gas line (and farther away from adjacent residences). The final location of the transmission centerline will

need to be approved by Spectra Energy Partners, LP, the owner of the Algonquin Gas Transmission pipeline.

- Identified a route "Option" through The Meadows at Montville residential community that would involve exchanging JCP&L's existing 170-foot-wide ROW for a new 170-foot-wide ROW located slightly farther to the west on The Meadows at Montville property, thereby allowing the proposed transmission line to be constructed farther from The Meadows complex.

Finally, On November 10, 2014, JCP&L held two additional public open houses to announce that Route A3 had been selected as the Preferred Route and to solicit additional input. Prior to these open houses, on October 28, 2014, JCP&L mailed public notices to all property owners located generally within 200 feet of the ROW for the Preferred Route and the original Preferred Route (Route A) to notify them about the November 10th open house meetings. Local newspaper ads announcing the open house were published on November 5 and 6, 2014. Approximately 150 people signed in during the November 2014 open houses and thirty-one comments were received. JCP&L considered the additional public input provided during and after the November 10, 2014 open houses during the process of finalizing the route selection.

V. THE PREFERRED ROUTE

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

A. The Routing Team recommends Alternative Route A3 as the Preferred Route. The Preferred Route begins at the Whippany Substation and heads north along the

existing Montville – Whippany 34.5 kV transmission corridor for approximately 3 miles, including 2.1 miles through the Troy Meadows natural area. The first approximately 0.8 mile of the route is also parallel to the Stoneybrook – Whippany and Greystone – Whippany lines, which both turn west to connect to the Stoneybrook and Greystone Substations. In this area, Route A3 would rebuild the existing 34.5 kV line within the existing transmission ROW. After the existing 230 kV lines divert to the west, Route A3 would be constructed parallel to the existing 34.5 kV transmission line until crossing I-80 and Route 46.

After crossing Route 46, Route A3 would diverge to the east of the existing transmission line through a forested/wetland area for approximately 1.6 miles to avoid development adjacent to the existing Susquehanna – Roseland 500/230 kV circuits. Approximately 1.1 miles of this diversion would use a currently undeveloped JCP&L easement or property JCP&L owns in fee. Just south of John Henry Drive, Route A3 would continue north, paralleling the existing 34.5 kV circuits for approximately 1,500 feet. At this point, Route A3 diverges again east of the existing transmission line to use a partially developed JCP&L easement and avoid development for approximately 0.6 mile. From here, Route A3 would continue north, paralleling the existing 34.5 kV circuits into the Montville Substation.

Q. Please describe why Alternative Route A3 was selected as the Preferred Route.

A. The Routing Team believes that the cumulative social, environmental, and financial impacts associated with constructing Route A3 will be less than any

other Alternative Route. Route A3 is the shortest route into the Montville Substation. The majority of Route A3 parallels or rebuilds existing transmission lines. Approximately 89 percent (6.2 miles) of Route A3 can be constructed entirely within or partially within existing transmission ROW. Route A3 avoids traversing a densely populated portion of the Study Area that would require non-standard design in order to construct adjacent to existing electric transmission and natural gas lines.

Project cost is expected to increase with route length, the number of individual property owners involved, the number of angled structures required, and amount of grading, vegetation clearing, and environmental mitigation required. Total estimated cost[2], including engineering, construction and ROW acquisition for Route A3 is approximately $35.5 million; while total estimated costs for Routes B and C are $50.4 million and $78.3 million, respectively.

From an environmental perspective, Route A3 significantly minimizes new impacts to forested and natural areas compared to Routes B and C. As stated in this report, the Study Area is largely split between dense residential and commercial development and sensitive wetland and other natural areas. New Jersey routing guidelines emphasize the use of existing utility and infrastructure corridors over new ROW where feasible, practical and safe.

[2] The estimated total cost for the proposed Alternative Routes is an order-of-magnitude estimate developed using averages of recent costs for similar projects and without an in-depth analysis of field investigation. The estimated cost is subject to change as the constructability of the Project, sequence of construction, and other factors that may affect cost are identified and analyzed as the Project progresses.

Q. In your expert opinion, does the Preferred Route represent the most reasonable route for the Montville – Whippany 230 kV Transmission Line Project?

A. Yes. As detailed above, the Routing Team selected Alternative Route A3 as the Preferred Route. 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.

Exhibit PWS-1

PETER SPARHAWK Director, Transmission

Mr. Sparhawk is Berger's Director of Transmission and has 25 years of experience in preparing, coordinating, and managing environmental, infrastructure, and energy projects, including state certification applications for transmission line and generation projects, siting and permitting, federal and state environmental impact statements and assessments, and environmental compliance. Mr. Sparhawk's energy experience includes licensing and permitting for electric transmission lines and substations, gas-fired generation, hydroelectric, and wind facilities. He has conducted and overseen numerous environmental analyses and coordinated license applications to state energy agencies and siting boards for power facilities and infrastructure throughout the United States. His substantial electric transmission line experience includes routing/siting, licensing, permitting, consultation, expert witness testimony before the Pennsylvania Public Utility Commission (PaPUC), and everyday coordination with Louis Berger's utility clients. He provides quality assurance/quality control and program management for Louis Berger's efforts with FirstEnergy and PPL Electric, and has served as project manager or director for three dozen transmission projects for PPL Electric since 2008 and more than a dozen projects for FirstEnergy since 2011. Notably, he has recently served as routing and permitting project manager for PPL Electric's 101-mile Susquehanna- Roseland 500 kV project in Pennsylvania and FirstEnergy's 114-mile Bruce Mansfield-Glenwillow 345 kV transmission line project in Ohio.

FIRM Louis Berger Group

EDUCATION
- BA, History

REGISTRATIONS / CERTIFICATIONS
- Certificate, Environmental Manager
- Environmental Professional per ASTM Standard E1527
- HAZWOPER 40-hour OSHA training / 8-hour Refresher

YEARS EXPERIENCE 25
YEARS WITH FIRM 10

RELEVANT PROJECT EXPERIENCE

PPL Electric Utilities, Susquehanna-Roseland 500 kV Electric Transmission Line Project, Northeast Pennsylvania. Project manager for routing and permitting of 100-mile long extra high voltage electric transmission line through a multi-county, multi-township area from a PPL substation near Berwick, Pennsylvania to the Delaware River near Bushkill, Pennsylvania. Responsible for leading the effort to select the line route, including approximately 100 alternative route segments which were subsequently combined to form three alternative routes across eight counties, which were presented to federal, state, and local agencies as well as the general public. Tasks included overall project siting management; route selection and verification; public outreach assistance, including participation in 15 open houses; presentations and participation in government agency and community meetings; preparation of a Full Siting Application (Certification Application) to the Pennsylvania Public Utility Commission to construct and operate the line; provided direct testimony and served as an expert witness before the PUC Administrative Law Judge in PUC hearings; coordination of efforts and permits with the National Park Service, Delaware Water Gap National Recreation Area; overall coordination of permitting field studies and tasks, including wetland delineations, cultural resources, threatened and endangered species, erosion and sediment control, and others; and various permit applications and approvals with USACE, State agencies, the Delaware River Basin Commission, NPS, and County Conservation Districts; and support during project construction.

FirstEnergy Transmission/Substation Siting and Permitting Projects, New Jersey, Pennsylvania, and Ohio. Project Reviewer, project manager, siting lead, or project director for the siting and/or permitting of numerous FirstEnergy projects since 2011, including submission of over 10 applications to the New Jersey Board of Public Utilities (BPU), Ohio Power and Siting Board (OPSB) and Pennsylvania Public Utility Commission (PUC). Services have included transmission feasibility studies, transmission and substation siting studies, public outreach and open houses, preparation of applications to the state utility commissions (i.e., PAPUC, OPSB, and NJBPU), environmental permitting and mitigation, federal and state agency consultation, mapping and GIS analysis, cultural resources consultation and mitigation, and Phase I Environmental Site

Assessments. Mr. Sparhawk has been directly involved with the following projects:

- *New Jersey*: Montville – Whippany 230 kV Reinforcement, Oceanview 230 kV Transmission Line Reinforcement and other potential 115 kV and 230 transmission line projects in New Jersey.
- *Ohio*: Bruce Mansfield – Glenwillow 345 kV Transmission Line; Glenwillow Substation; Harmon – Toronto 345 kV Transmission Line; South Canton – Star 345 kV and Burger – Cloverdale 138 kV Extensions to and Installation of the Harmon Substation; Sammis – Wylie Ridge 345 kV, East Akron – Sammis 138 kV and Sammis – Lowellville 138 kV Extensions to and installation of Toronto Substation; Harmon – Star 345 kV Transmission Line; Nevada Substation; Cloverdale – Dale 138 kV Transmission Line and Dale Substation; Leroy Center Substation.
- *Pennsylvania*: Homer City – Handsome Lake 345 kV Transmission Loop; Armstrong – Kittanning 138 kV and Armstrong – Kissinger 138 kV Transmission Line Relocation; Elko – Forest 230 kV and Brookville – Elko 138 kV Loops to Squab Hollow Substation, Western PA; Customer-requested 138 kV Transmission Loop Project, Western PA.

FirstEnergy Bruce Mansfield–Glenwillow 345 kV Transmission Line, Beaver County, Pennsylvania and Columbiana, Mahoning, Trumbull, Portage, Summit and Cuyahoga Counties, Ohio. Project manager responsible for team efforts and client coordination for transmission line routing and permitting project for a proposed 115-mile-long 345-kV transmission line in Pennsylvania and Ohio. Project includes route reconnaissance, over 150 miles of wetland delineation, threatened and endangered species consultation and field surveys, preparation of Certificate Application and Letters of Notification to the Ohio Power Siting Board for the transmission line and associated switching substation, public outreach support, and environmental permitting.

PPL Electric Utilities, North Lancaster-Honeybrook 138/69 kV Transmission Line, Lancaster County, Pennsylvania. Project manager for proposed North Lancaster to Honeybrook 138/69 kV electric transmission line routing study. Project involves siting a new 138/69 kV transmission line between the proposed North Lancaster Substation and the Honeybrook Tap near Honey Brook, Pennsylvania. Directed project team and preparation of Full Siting Application (Certification Application) to the Pennsylvania Public Utility Commission. Provided direct testimony to the PUC on behalf of PPL Electric and served as the project's siting expert witness before the Administrative Law Judge.

PPL Electric Utilities, Brunner Island-West Shore 230 kV Transmission Line Project, Pennsylvania. Project manager for route selection services and PaPUC documentation support for the proposed 16-mile Brunner Island–West Shore 230 kV Transmission Line Project in York and Cumberland Counties, Pennsylvania. Directed project team and preparation of Full Siting Application to the Pennsylvania Public Utility Commission, supported PPL in its public outreach and open house, and provided direct testimony and served as witness before the Administrative Law Judge during PUC hearings.

PPL Electric Utilities, Manor-Graceton 230 kV Transmission Line Project, Pennsylvania. Project manager for route selection services and PaPUC documentation support for the proposed Manor-Graceton 230 kV transmission line between Conestoga Township, Lancaster County and the Pennsylvania-Maryland border in Peach Bottom Township, York County. This segment of line is approximately 14.5 miles long and is being replaced/supplemented as part of

the PPL Electric Utilities Assess Optimization Strategy (AOS) program. Directed project team and preparation of Letter of Notification to the Pennsylvania Public Utility Commission.

PPL Electric Utilities, Blooming Grove-Hemlock 138/69 kV Transmission Line Project, Pennsylvania. Assisted project manager for route selection services and PaPUC documentation support for this proposed 138/69kV Transmission Line Project, a new line to be located in Blooming Grove Township, Pike County, Pennsylvania. Helped direct project team and preparation of Letter of Notification to the Pennsylvania Public Utility Commission.

PPL Electric Utilities, Otter Creek-Conastone 230 kV Transmission Line Project, Pennsylvania. Project manager for route selection services and PaPUC documentation support for the proposed Otter Creek - Conastone 230 kV transmission line between Chanceford Township and the Pennsylvania-Maryland border in Hopewell Township. This segment of line is approximately 12 miles long and is being replaced/supplemented as part of the PPL Electric Utilities Assess Optimization Strategy (AOS) program. Directed project team and preparation of Letter of Notification to the Pennsylvania Public Utility Commission.

PPL Electric Utilities, Martins Creek-Siegfried 230 kV Transmission Line, Northampton County, Pennsylvania. Project manager for environmental analysis and PaPUC documentation for this proposed rebuild of a portion of 230 kV line between the Siegfried Substation and the last structure in Northampton County before the line turns east toward the Martins Creek Substation. The line is being replaced/supplemented as part of the PPL Electric Utilities AOS program. Directed project team and preparation of Letter of Notification to the Pennsylvania Public Utility Commission, and supported PPL in its public open house meeting.

PPL Electric Utilities, Lackawanna 500/230 kV Substation Permitting, Blakely, Pennsylvania. Project manager for permitting of this 17-acre 500/230 kV substation site in Lackawanna County, Pennsylvania. Louis Berger's work for this proposed substation, which is associated with PPL Electric's Susquehanna-Roseland project, includes wetland delineations and mitigation, archaeological investigations, erosion and sedimentation control/post-construction stormwater management plans and associated National Pollutant Discharge Elimination System (NPDES) permits, and PADEP Chapter 105 permits through a Joint Permit Application. The proposed project requires the filling of over 3 acres of wetlands, which were formed following the clearing of the site in 1970.

Glenville Energy Park, LLC, Power Plant, Glenville, New York. Project analyst for a New York State Article X application for a Certificate of Environmental Compatibility and Public Need for a proposed 520-MW combined-cycle, natural gas-fueled power generation facility located in an existing industrial park near the Mohawk River. Analyzed existing and proposed land and recreational uses; assessed impacts on sensitive receptors; evaluated compatibility with regulations, and comprehensive plans; assisted with environmental site assessment documentation; responded to interrogatories from the State Department of Public Service; and provided insight to other project team staff and attorneys.

ADDITIONAL INFORMATION (FOR INFORMATION ONLY)

Education

BA, History, Cornell University, 1985

Registrations/Certifications

- Certificate, Environmental Manager, University of Washington, 1996
- Environmental Professional per ASTM Standard E1527
- HAZWOPER 40-hour OSHA training / 8-hour Refresher

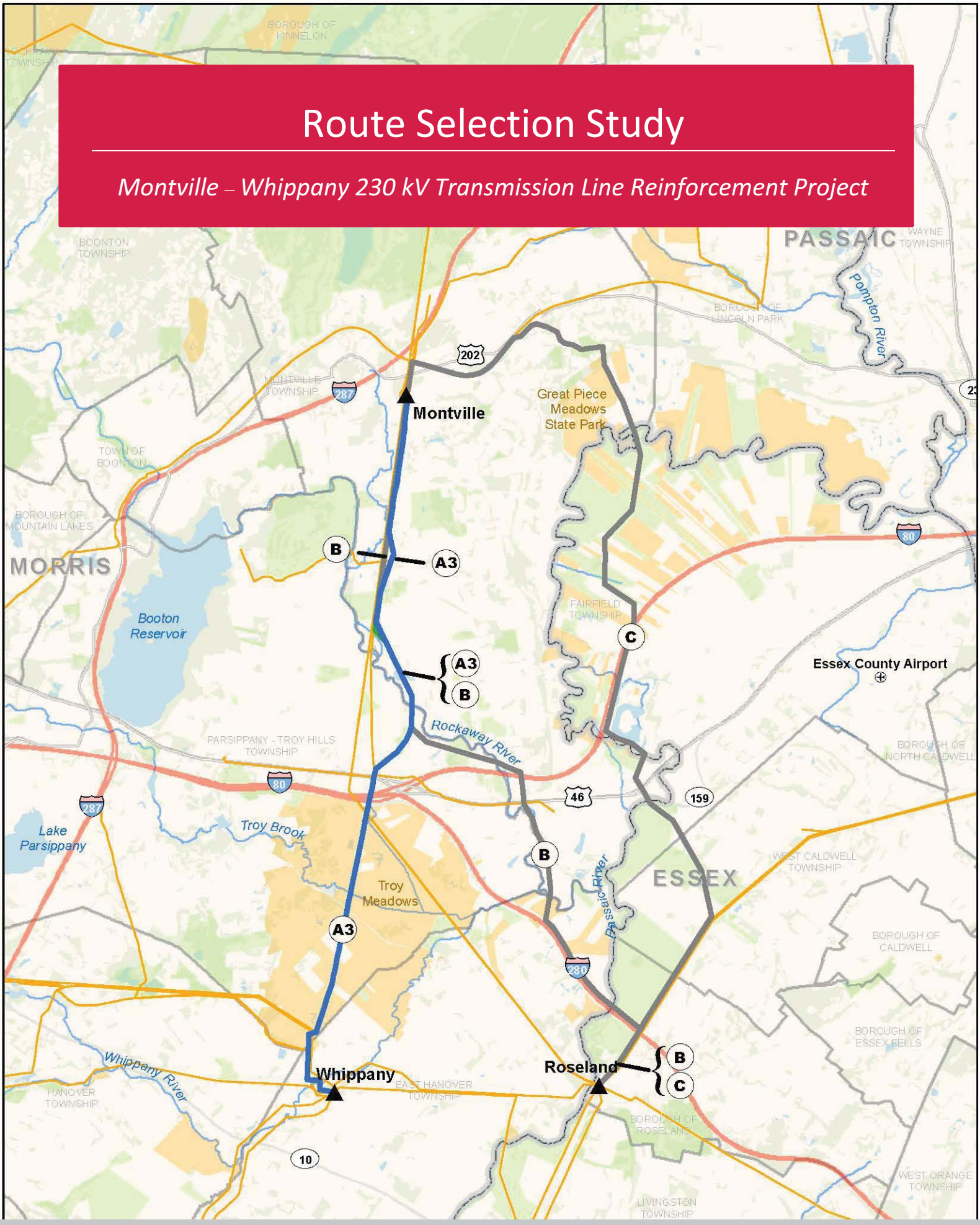
Office Location

Exton, Pennsylvania

Exhibit PWS-2

Route Selection Study

Montville – Whippany 230 kV Transmission Line Reinforcement Project



Louis Berger

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Acronyms and Abbreviations

ACHP	American Council for Historic Preservation
APE	Area of potential effects
EHV	Extra-high voltage
EPA	U.S. Environmental Protection Agency
ESRI	Environmental Systems Research Institute
HPO	Historic Preservation Office
JCP&L	Jersey Central Power & Light
kV	Kilovolt
mcf	Million cubic feet
msl	Mean sea level
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
NJHPO	New Jersey Historic Preservation Office
NJPDES	New Jersey Pollutant Discharge Elimination System
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
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
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 Montville Substation located in Montville Township, Morris County, New Jersey. The Montville Substation is currently supplied via the Montville – Roseland 230 kV Transmission Line and the Kittatinny – Newton 230 kV Transmission Line. 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 Montville Substation is necessary to mitigate the simultaneous outage of the existing Montville – Roseland 230 kV Transmission Line followed by the loss of the Kittatinny – Newton 230 kV Transmission Line, which supply the Montville Substation, and the resultant outage to the lower voltage circuits and substations supplied through the Montville 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, identified the Project as a baseline Regional Transmission Expansion Plan ("RTEP") upgrade with a required June 2017 in-service date. 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 Montville – Whippany 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 Montville 230 kV Transmission Line. This process started with the development of a Project Study Area in June 2012. The Study Area included all reasonable Potential Corridors that could provide the new 230 kV transmission source into the Montville Substation. Feasible Potential Corridors 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 resource factors along each of the routes, and additional local knowledge and past experience. Less favorable Potential Routes were eliminated and 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 Alternative Routes under consideration, the Routing Team selected Alternative A3 as the Preferred Route. This selection is based on the following factors:

- Alternative Route A3 is the shortest route into the Montville Substation.
- Consistent with the New Jersey Board of Public Utilities' ("NJBPU") requirement to use existing right-of-way ("ROW") where feasible, practicable and safe. The majority of the route is located adjacent to existing transmission lines and/or within existing JCP&L ROW.
- Minimal amount of new transmission ROW needed.
- No expansion beyond the existing fence line is necessary at the Whippany Substation.
- Most cost-effective compared to other Alternative Routes.
- Maintains a reasonable balance between social and environmental impacts.

The Routing Team believes that Alternative Route A3 meets the transmission system need while minimizing the cumulative social, environmental, and financial impacts associated with constructing a new 230 kV line.

1.0 INTRODUCTION

JCP&L has identified the need to construct a new, single-circuit 230 kV transmission line source into the Montville Substation located in Montville Township, Morris 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 the development of Potential Corridors. Potential Corridors (see *section 3.1*) are developed based on broad routing "concepts" that are typically based on avoidance of large area constraints or alignments that incorporate notable opportunity features in the Study Area. Feasible Potential Corridors were further refined into a Potential Route Network and later assembled into Alternative Routes. A quantitative and qualitative analysis process was used to evaluate the Alternative Routes and identify a Preferred Route for the new transmission line. 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 to the Montville Substation. The Montville Substation is currently supplied by the single-circuit Montville – Roseland 230 kV Transmission Line and the single-circuit Kittatinny – Newton 230 kV Transmission Line. A third circuit will mitigate the potential for a simultaneous outage of the existing, double-circuit 230 kV radial transmission line supply to the Montville Substation and the resultant outage to the lower voltage circuits and substations supplied through the Montville Substation.

To identify a Preferred Route for the new line, JCP&L initiated a Comprehensive Route Selection Study to identify suitable routes from all potential 230 kV source points for the project (i.e., the Whippany, Stoneybrook, Roseland, West Wharton and Greystone Substations) to the Montville Substation.

1.2 Project Timeline

In 2012, Potential Corridors were developed between the Montville Substation and the Whippany, Roseland, West Wharton, Stoneybrook and Greystone Substations. Potential Corridors were also developed between the Montville Substation and existing 230 kV lines. Feasible Potential Corridors were developed into a Potential Route Network. Based on a qualitative and quantitative analysis of the identified Potential Route Network, the Routing Team determined that the most feasible routes to the Montville Substation originate from the Whippany and Roseland Substations. Therefore, the Routing Team identified Alternative Routes from the Whippany or Roseland Substations to the Montville Substation. The Alternative Routes were evaluated from an engineering, built environment and natural environment perspective, as described in this report.

In November 2013, JCP&L presented the original Preferred Route (Route A) and two Alternate Segments (subsequently referred to as Alternative Routes A2 and A3) at two public open houses. Alternative Route A was originally selected as the Preferred Route because it was the shortest, most direct route into the Montville Substation and paralleled or rebuilt existing transmission lines for its entire route. Alternative Routes A2 and A3 have these same characteristics, except the routes divert away from congested corridors in one or two locations by using existing, underutilized JCP&L ROW. Based on further evaluation of the existing transmission ROW through this area, adjacent natural gas line ROW, discussions with PSE&G and a detailed engineering review, information gathered at the open house meetings, and in the interest of capturing these additional reliability benefits, JCP&L ultimately selected a modified version of Alternative Route A3 as the Preferred Route for the Project. The modified version of Alternative Route A3 provides an additional reliability benefit by making use of the available ROW to separate the 230 kV and 34.5 KV circuits onto individual poles, such that the failure of a single structure will not remove both circuits from service. Further, this would enable fewer, shorter, and therefore less obtrusive, poles to be used in the construction of the proposed transmission line.

JCP&L held two additional open house meetings in November 2014 to announce the new Preferred Route. JCP&L intends to file a petition with the NJBPU in the first quarter of 2015

requesting a determination that the Project is reasonably necessary for the service, convenience or welfare of the public. Following NJBPU approval, and after obtaining other required federal, state, and local permits and approvals, construction is expected to begin in September 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 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 Montville – Whippany 230 kV Transmission Line Reinforcement Project.

1.4 Project Description

JCP&L initially determined that the Whippany, Roseland, Wharton, Stoneybrook or Greystone Substations as well as existing 230 kV transmission lines, via a tap, would be appropriate sources for the proposed 230 kV transmission line. The Routing Team ultimately determined that the Potential Routes originating from the Whippany or Roseland Substations represent the most feasible options that meet the Project objectives. As described in *section 5.0*, after further evaluation, the Routing Team identified a Preferred Route between the Whippany and Montville Substations. Therefore, the new line will be referred to as the Montville – Whippany 230 kV Transmission Line.

1.4.1 Project Study Area

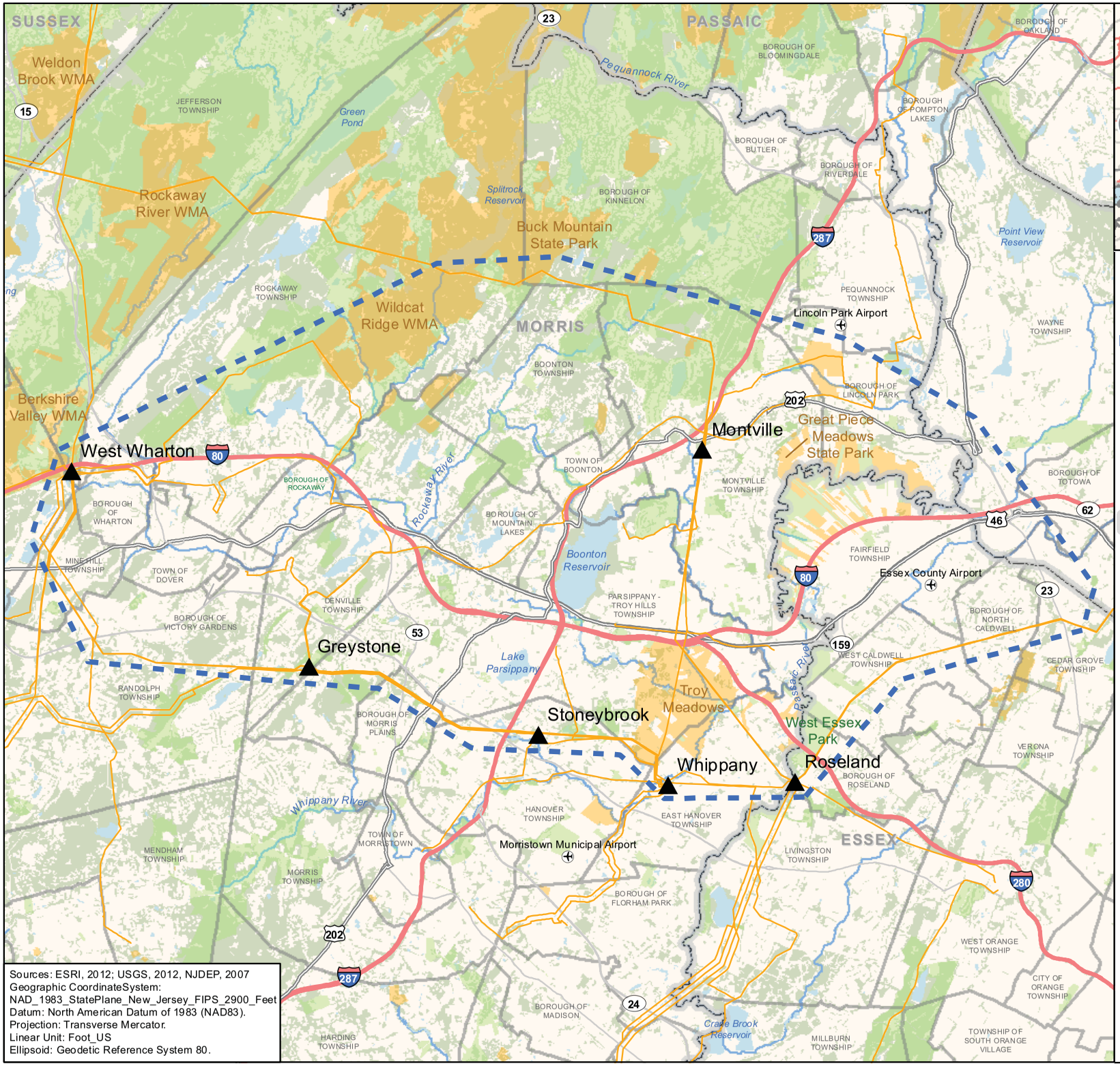
The Study Area was initially developed by delineating a boundary that would encompass all of the potential 230 kV source points for the Project (the Whippany, Roseland, Stoneybrook and Greystone Substations), the ultimate endpoint (the Montville Substation), opportunity features in the area that could be logically used for developing potential alignments and any physical or

natural barriers that would be considered constraints. One of the major factors guiding the definition of the Study Area is the presence of existing linear rights-of-way ("ROWs") (i.e., existing railroads, roads, pipelines and transmission lines), which could be used for developing potential alignments for the Project. The preliminary Study Area boundaries consisted of the Montville Substation in Montville Township to the north; the Wharton Substation to the east located in Wharton Borough; the Whippany and Roseland Substations to the south in East Hanover Township; and the Greystone Substation in Denville Township to the west. **Figure 1** shows the initial Study Area. Using this established Study Area, the Routing Team began its efforts to first identify Potential Corridors for the new 230 kV line.

Subsequently, the Routing Team refined the Study Area by eliminating routes originating from the Greystone and Stoneybrook Substations from further consideration and conducting more detailed field reconnaissance of routes between the Whippany and Roseland Substations. The refined Study Area (shown on Figures 4, 6, 7, 8 and 9) is generally bound to the north by the Montville Substation, to the east by the intersection of Route 46 and Horseneck Road in Fairfield Township, to the south by the Whippany and Roseland Substations, and to the west by the Boonton Reservoir and I-287.

1.4.2 Line Characteristics and Right-Of-Way Requirements

The desired ROW width for the new 230 kV transmission line is 120 feet. However, the final ROW width is dependent on structure type, height, span length, and other factors. Typical structure design for a 230 kV transmission line consists of steel monopoles approximately 70 to 90 feet high. Actual design will vary based on the amount of ROW acquired and whether or not the structures can be underbuilt. Underbuilding consists of a lower voltage line (often a distribution line) constructed beneath a transmission line on the same structure. 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. Average span lengths are expected to be approximately 650 to 800 feet.



Sources: ESRI, 2012; USGS, 2012, NJDEP, 2007
Geographic CoordinateSystem:
NAD_1983_StatePlane_New_Jersey_FIPS_2900_Feet
Datum: North American Datum of 1983 (NAD83).
Projection: Transverse Mercator.
Linear Unit: Foot_US
Ellipsoid: Geodetic Reference System 80.

Legend

- Substation
- Project Study Area
- Airport
- Existing Transmission Line
- Interstate
- US Highway
- State Highway
- Railroad
- County Boundary
- Municipal Boundary
- Local/Private Conservation
- State Conservation
- Waterbody
- River
- Forest

N
W E
S

0 1 2 3 4
Miles

Figure 1: Project Study Area

Montville - Whippany
230 kV Transmission Line
Reinforcement Project

Jersey Central Power & Light
A FirstEnergy Company

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 and 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, engineering, and construction management.

The team worked together during 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 routing 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
Ted Krauss	FirstEnergy	Transmission-Siting Supervisor	Siting
Walt Wlodarczyk	JCP&L	Supervisor, Engineering Services	Engineering
Tim Gaul	Louis Berger	Vice President, Power and Energy	QA/QC
Pete Sparhawk	Louis Berger	Director, Transmission	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
Eric Voigt	Louis Berger	Assistant Director, Cultural Resources	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 Morris and Essex counties, New Jersey, 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 data gathering input at open houses. Updated information, such as the location of new residences and other known constraints not identified on the aerial photographs or in the GIS data, 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**.

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); Environmental Systems Research Institute ("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 U.S. Geological Survey ("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 proactive, ecosystem-level approach for the long-term protection of imperiled species and their important habitats in New Jersey. The New Jersey 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 from 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 organizations ("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 Wildlife Management Areas	Data for State Parks, Forests and Wildlife Management Areas 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 the Institutions layer from ESRI (2012), Redlands, California, and the USGS'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 Morris County GIS office (2013). GIS parcel data is not available for Essex County. Therefore, Louis Berger digitized parcels within 1,000 feet of Potential Routes using tax maps downloaded from the New Jersey Tax Maps website.
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 JCP&L 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).

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

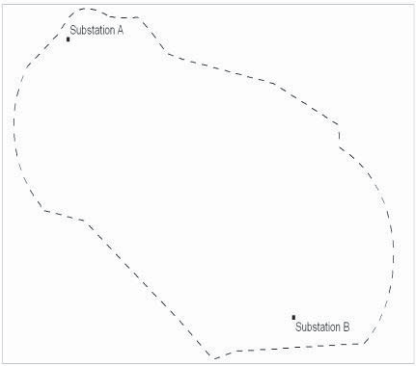
Routing Team members conducted field inspections in July 2012 throughout the Study Area. The team members examined Potential Routes by automobile from points of public access and correlated observed features, including existing transmission line ROW, railroads, large wetland complexes, large recreations 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. Along the Alternative Routes, 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. Additional field reviews were conducted in 2013 and 2014 to review modifications to the Alternatives Routes and to verify information collected in 2012.

2.3 Route Development 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.

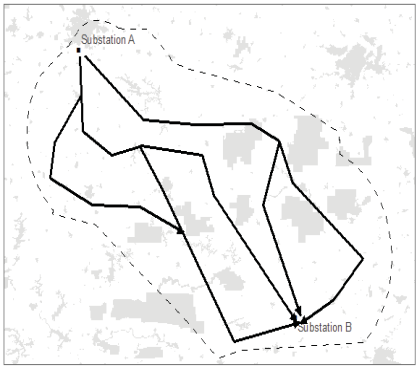
Route development efforts start with the identification of large area constraints and opportunity features within the **Study Area**, which encompasses the endpoints of the project and areas in between. These areas are typically identified using readily available public data sources. The Routing Team uses this information to develop **Potential Corridors** adhering to a series of general routing and technical guidelines (see *section 2.4*). Efforts are made to develop Potential Corridors throughout the Study Area to ensure that a range of reasonable alignments is 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 and further developed into specific alignments. The revised Potential Corridors are considered **Potential Routes.**

Study Area

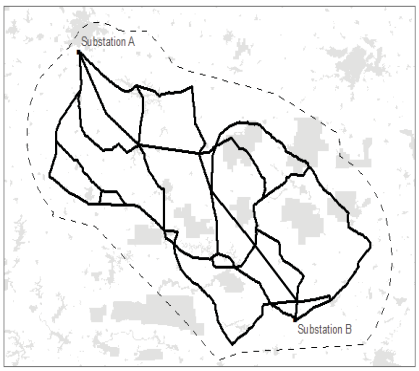


Data Gathering

Potential Corridors



Potential Routes

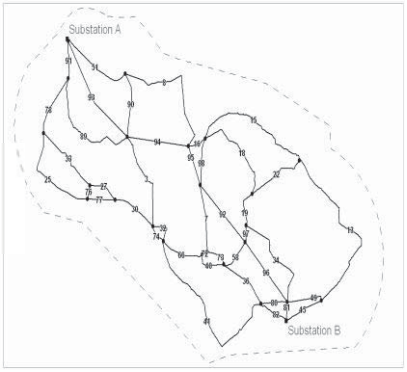


Where two or more Potential Routes intersect, a **node** is created, and between two nodes, a **link** is formed. Together, the Potential Routes and their interconnected links are referred to as the **Potential Route Network**. The links are independently and collectively evaluated for refinements.

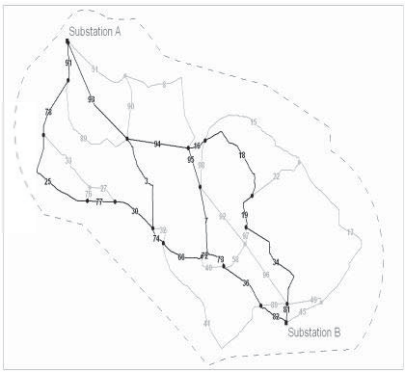
As the Routing Team continues to gather information and review the links of the Potential Route Network, links are modified, removed, or added, resulting in a **Refined Potential Route Network**.

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.

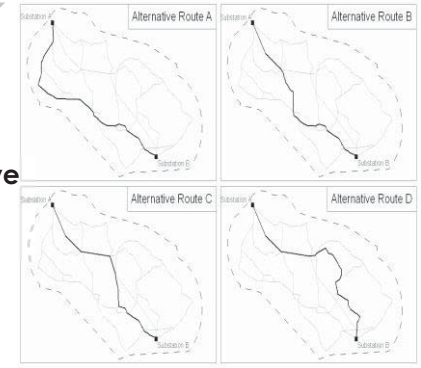
Potential Route Network



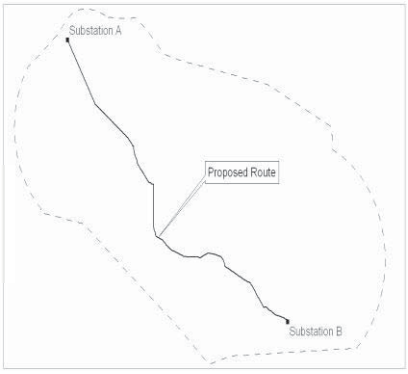
Refined Potential Route Network



Alternative Routes



Preferred Route



2.4 Routing Guidelines

As described in *section 1.3*, the primary objective 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 routing guidelines enable the Routing Team to reach the primary objective 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, and reliability issues related to 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

Once the Study Area was identified, the Routing Team met to develop basic route selection criteria that would be used to select and analyze Potential Corridors and Potential Routes during the Route Selection Study. The following are general guidelines used for the Project, not listed 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.
- Substantial visual impact on residential areas and public resources.

2.4.2 Technical Requirements

The Routing Team also utilized 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);
- Minimize crossing of extra-high voltage ("EHV") transmission circuits;
- Develop the most reasonable, cost-effective solution for customers; and
- Maximize present and future reliability benefits.

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 make use of 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 NJDOT 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.[1]

The NJBPU is the State entity responsible for regulating public utilities, including electric utilities such as JCP&L. JCP&L intends to file a petition with the NJBPU in the first quarter of 2015 requesting a determination that the Project is reasonably necessary for the service, convenience or welfare of the public. The Petition will include information on the Project, including, *inter alia*, the need for the Project, description of the line and ROW, engineering components, safety considerations, 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 of 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.

Large area constraints are those 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 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;

[1] New Jersey Department of Environmental Protection, Large linear infrastructure project guidance document. December 9, 2011

- U.S. Department of Defense sites (Picatinny Arsenal);
- Recreational areas such as parks and large recreational reservoirs, including the Boonton Reservoir;
- Large streams, wetlands, or unique natural resource features; and
- Designated State Forests, State Parks, and other natural and conservation areas, including the Highlands Preservation Area, Troy Meadows, Green Acres Program lands and Wildlife Management Areas.

The Potential Routes were 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; and
- Designated scenic vista points.

The Routing Team attempted to keep the routes and the required ROW from passing over these point-specific constraints. However, in some instances complete avoidance of small area

constraints (e.g., small wetlands) was not possible because of the large numbers or location of these constraints in some areas of the Project.

The Study Area is generally comprised of three major land uses: (i) dense residential and commercial developments; (ii) upland forests under state control for wildlife management and recreational purposes; and (iii) broad areas of lowland/wetland/floodplains conserved under natural heritage easement. The combination of an abundance of lowland/conservation lands and significant residential and commercial development has resulted in a land use pattern that fluctuates between broad conservation areas and densely packed residential areas. The Routing Team considered impacts to both the built and natural environment throughout the routing process.

2.6 Routing Opportunities

The Routing Team defined routing opportunities as locations where the proposed transmission line might be located with minimal 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. Primary opportunities in the Study Area included:

- Existing JCP&L 230 kV transmission corridors: Greystone – Whippany and Stoneybrook – Gilbert 230 kV lines;
- Existing 115 kV and 34.5 kV transmission corridors, including the JCP&L Montville – Whippany 34.5 kV line;
- PSE&G Susquehanna – Roseland 500/230 kV corridor;
- NJ Transit Railway lines: Morristown and Montclair – Boonton lines; and
- Interstate 287, 280 and 80, U.S. Route 46, U.S. Route 202 and various state and local roads.

Along the southern edge of the Study Area, a transmission corridor containing two double-circuit lines and low voltage lines connects to the Roseland, Whippany, Stoneybrook and Greystone Substations. Transmission lines within this corridor include:

- JCP&L transmission lines: Roseland – Whippany 230 kV line, Whippany – Greystone 230 kV line, Stoneybrook – Greystone 230 kV line, Wharton – Greystone 230 kV line; and
- PSE&G transmission lines: Roseland – Center Grove 230 kV line and Kearny – Roseland 230 kV line.

Along the northern edge of the Study Area, PSE&G's Newton – Montville 230 kV line, which exits the substation to the north, was also considered as a potential opportunity.

Existing transmission lines provided the best opportunities for parallel alignments. JCP&L's Whippany – Montville 34.5 kV line essentially traverses a straight line between the two substations. However, portions of this line are bordered by residential development with no room to rebuild or parallel the existing line. PSE&G's Susquehanna – Roseland 500/230 kV line travels northwest out of the Roseland Substation, crosses the Whippany – Montville 34.5 kV line just south of the I-80 and I-280 intersection, and parallels the Whippany – Montville 34.5 kV line into the Montville Substation. Potential opportunities for sharing or paralleling ROW adjacent to the opportunities identified above vary greatly across the Study Area. The corridor west of the Roseland Substation is bounded by high density residential development, greatly limiting the value of this opportunity. Between Roseland and Montville there are sections of the corridor unconstrained by development, yet in several locations residential development is present in proximity to the edge of the ROW.

3.0 ROUTE DEVELOPMENT

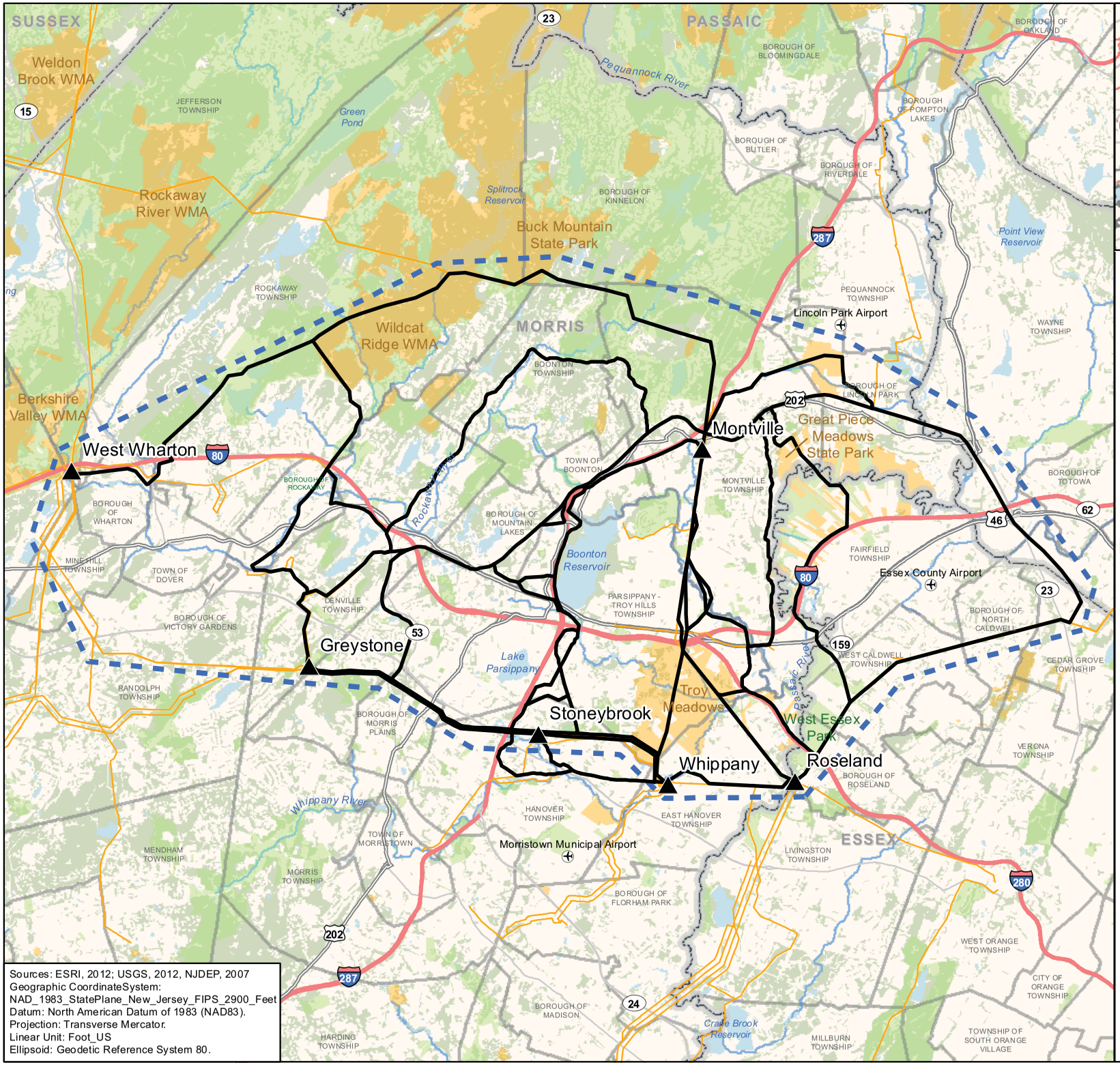
As described in *section 2.3*, the route development effort is an iterative process with a set of Potential Corridors that are further refined to become a network of Potential Routes. The Potential Routes are analyzed, compared, and refined to be assembled into Alternative Routes. Finally, comparative potential impacts are evaluated for each Alternative Route to identify a Preferred Route. At each stage of development, the route alignments become more specific and the data analysis more resolute. The following sections provide discussions of each of the phases of route development and present a summary of routing decisions and analysis that lead to the subsequent refinement stage.

3.1 Potential Corridor Development

The first step of the route development process involved the development of Potential Corridors. Potential Corridors are developed based on broad routing "concepts" that are typically based on avoidance of large area constraints or alignments that incorporate notable opportunity features in the Study Area. The Routing Team developed a series of Potential Corridors that ensured that each of the major substations from west to east along the Wharton – Roseland 230 kV corridor was considered for routing potential. The Potential Corridors are identified in **Figure 2**.

3.1.1 Potential Corridors Considered but Eliminated from Further Study

Potential Corridors were developed in the western portion of the Study Area starting from the West Wharton Substation. These options were relatively limited due to dense development, historic districts, limited paralleling opportunities, and public lands. One routing concept considered exiting the substation to the west and north paralleling lower voltage lines through the Wildcat Ridge wildlife management area ("WMA") before ultimately paralleling PSE&G's Susquehanna – Roseland 500/230 kV line from the Splitrock Reservoir to Montville. The Routing Team ultimately removed this route from further consideration due to likely impacts through the Mount Hope Mine Historic District, the Wildcat Ridge WMA, and limited potential for paralleling the proposed reconfigured Susquehanna – Roseland 500/230 kV line through this



Legend

- Substation
- Conceptual Route
- Project Study Area
- Airport
- Existing Transmission Line
- Interstate
- US Highway
- State Highway
- Railroad
- County Boundary
- Municipal Boundary
- Local/Private Conservation
- State Conservation
- Waterbody
- River
- Forest

N W E S

0 1 2 3 4

Miles

Figure 2: Potential Corridors

Montville - Whippany
230 kV Transmission Line
Reinforcement Project

Jersey Central Power & Light
A FirstEnergy Company

Sources: ESRI, 2012; USGS, 2012, NJDEP, 2007
Geographic CoordinateSystem:
NAD_1983_StatePlane_New_Jersey_FIPS_2900_Feet
Datum: North American Datum of 1983 (NAD83).
Projection: Transverse Mercator.
Linear Unit: Foot_US
Ellipsoid: Geodetic Reference System 80.

area. A similar concept paralleling the Susquehanna – Roseland 500/230 kV line was also considered from the Greystone Substation, as well as along Diamond Spring Road. These Potential Corridors were considered unreasonably circuitous and were dismissed as they would likely impact many communities without providing any notable benefits through corridor sharing to outweigh the overall impacts of the added length.

The Routing Team considered the possibility of exiting the Greystone Substation to the east, rebuilding the existing line to a double-circuit and following the existing transmission line corridor to the intersection of the NJ Transit Morristown railroad line, which is also the Old Main Delaware, Lackawanna and Western Railroad Historic District. This Potential Corridor would continue north to the intersection of the NJ Transit Montclair-Boonton line railroad, then turn east and parallel the railroad as described above. The new circuit would be located within the existing railroad ROW, a NRHP eligible Historic District, and result in a significant impact to residential areas, historic properties and potential archaeological sites as compared to the northern route. Ultimately, the Routing Team removed the eastern exit from the Greystone Substation from further consideration due to likely impacts on these area resources.

Potential Corridors were developed that exit the Stoneybrook Substation to the west following an existing double-circuited 230 kV corridor. The Potential Corridor then turns north, paralleling Interstate 287, Eastmans Road, and Jefferson Road through a heavily developed office complex. The Routing Team considered the option of routing the proposed line east around the office complex. However, this link was eliminated as it did not provide a significant advantage.

In the eastern portion of the Study Area the Routing Team developed several links exiting the Roseland substation to the east, with the consideration of either parallel alignment along PSE&G's existing 230 kV transmission line towards the intersection of the NJ Transit Montclair-Boonton railroad line near the Township of Cedar Grove. However, the corridor is highly congested through this area with little potential for a reasonable parallel alignment and, therefore, was removed from further consideration. The Routing Team also explored exiting the Roseland Substation to the northwest, utilizing the Susquehanna – Roseland 500/230 kV

corridor. However, dense residential development in the vicinity of East Hanover and the lack of potential for ROW expansion led to eliminating this corridor from further consideration.

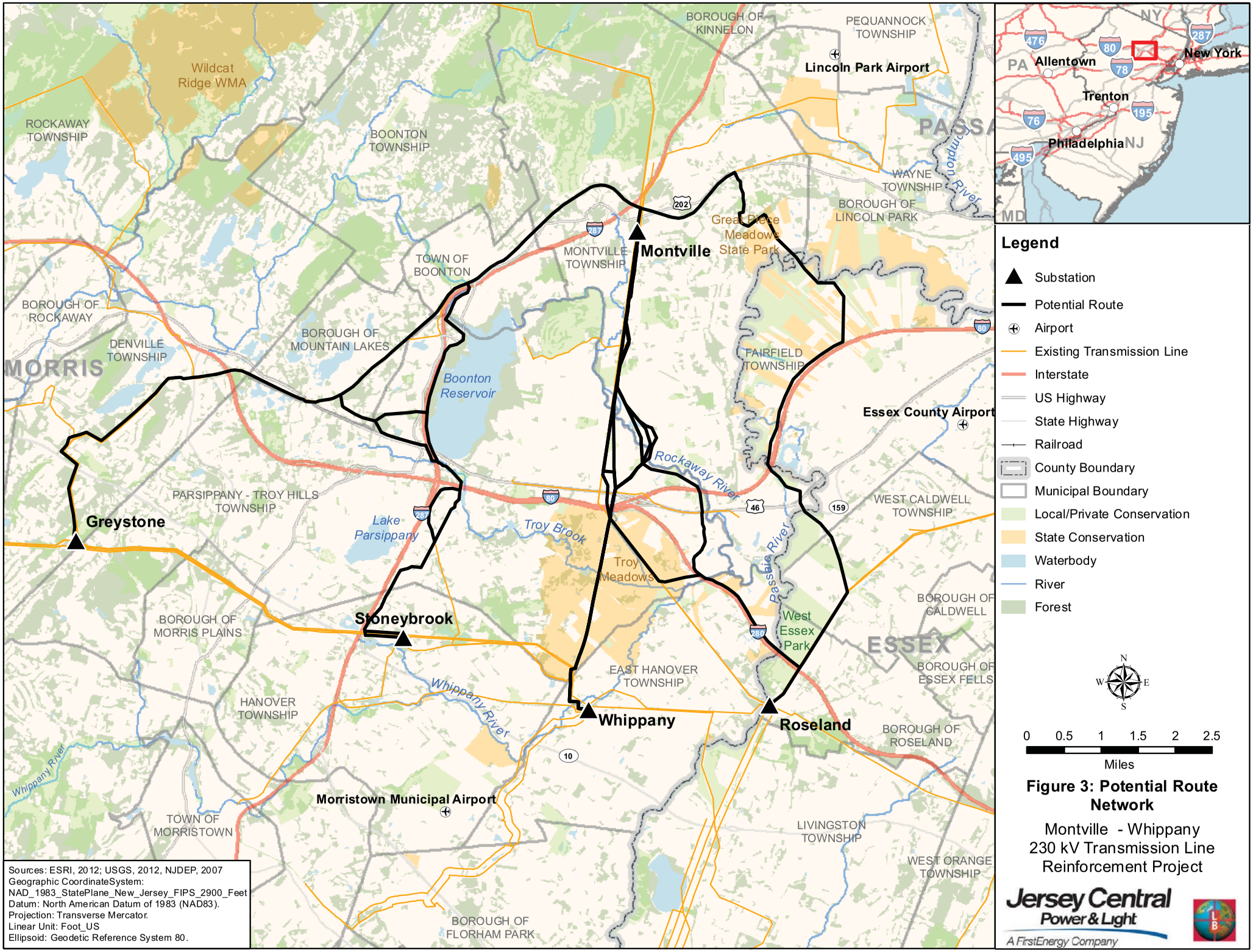
3.1.2 Feasible Potential Corridors

Potential Corridors were developed between the Greystone, Stoneybrook, Whippany, and Roseland Substations. The majority of these concepts were retained for consideration in the Potential Route Network (discussed in *section 3.2*), where more specific alignments were developed, reviewed through aerial photo review and site reconnaissance, and evaluated with respect to their likely feasibility.

The most direct Potential Corridors started at the Whippany Substation and followed existing transmission lines north to the Montville Substation. A few retained Potential Corridors originated at the Roseland Substation and followed existing transmission lines and roads, or took a cross-country route to avoid development and sensitive areas (e.g., conservation easements) to connect to the Montville Substation. Some of these Potential Corridors joined the direct route between the Whippany and Montville Substations. Potential Corridors originating from the Stoneybrook Substation generally followed existing transmission, road, or railway features into the Montville Substation. One Potential Corridor originating from the Greystone Substation was retained that paralleled existing transmission lines and railway into the Montville Substation.

3.2 Potential Route Network Development

The Routing Team eliminated corridors that were not likely feasible and identified specific route alignments for the remaining corridors. These specific alignments are referred to as Potential Routes. The Potential Routes are collectively referred to as the Potential Route Network, which is presented in **Figure 3**. The following sections present a review of the Potential Routes considered, organized by substation source.



Sources: ESRI, 2012; USGS, 2012, NJDEP, 2007
Geographic CoordinateSystem:
NAD_1983_StatePlane_New_Jersey_FIPS_2900_Feet
Datum: North American Datum of 1983 (NAD83).
Projection: Transverse Mercator.
Linear Unit: Foot_US
Ellipsoid: Geodetic Reference System 80.

Figure 3: Potential Route Network

Montville - Whippany
230 kV Transmission Line
Reinforcement Project

Jersey Central Power & Light
A FirstEnergy Company

3.2.1 Greystone – Montville Route Development

The Greystone Substation is a JCP&L 230 kV substation, located near Zeek Road, in the Township of Denville, Morris County. The Greystone Substation has various lines that enter/exit the substation to the north, east, and west. Several Potential Routes were developed paralleling existing transmission lines and railways in an effort to connect the Greystone and Montville Substations.

The Routing Team considered exiting the Greystone Substation to the north, and either paralleling or double-circuiting the existing 230 kV transmission line. The northern route would parallel the western side of the existing transmission line, cross Route 10 and the NJ Transit Morristown railway line in Denville, turn east and parallel the north side of the NJ Transit Montclair-Boonton Line railway. This route would likely involve overbuilding the existing 115 kV transmission line adjacent to the railroad to avoid the requirement for additional ROW within the Mountain Lakes Historic District. The proposed route would parallel the railroad to the intersection of the Susquehanna – Roseland 500/230 kV Transmission Line, turn to the south and enter the Montville Substation from the north.

3.2.2 Stoneybrook – Montville Route Development

The Stoneybrook Substation is a JCP&L 230 kV substation, located adjacent to Woodland Avenue, in Hanover Township, Morris County. Several 115/230 kV lines exit the substation to the east, south, and west. Several Potential Routes were developed paralleling existing transmission lines and railways in an effort to connect the Stoneybrook and Montville Substation.

Potential Routes were developed that exit the Stoneybrook Substation to the west following an existing double-circuited 230 kV corridor. The Potential Route then turns north, paralleling Interstate 287, Eastmans Road, and Jefferson Road through a heavily developed office complex. The Potential Route crosses I-80, angles to the west and continues north adjacent to I-287 and the Boonton Reservoir. The route diverts to the east to avoid residences on Intervale Road, continues north and crosses I-287 near Washington Street in Boonton. From here, the route merges with an existing transmission line corridor and parallels the NJ Transit Montclair-

Boonton railroad line north to the Susquehanna-Roseland 500/230 kV corridor. The Routing Team considered the option of paralleling the south side of I-287 from Boonton to Montville, however, it was determined obtaining shared NJDOT ROW in this section was not feasible (see *section 4.1.1* for specific regulatory references).

To avoid impacts to the Boonton Reservoir, the Routing Team developed a Potential Route that crosses I-287 south of the reservoir and continues west adjacent to Route 46. The route then crosses over the NJ Transit Montclair-Boonton railroad, turns north and parallels the railroad until joining the Susquehanna-Roseland 500/230 kV corridor.

The Routing Team also developed routes exiting the Stoneybrook Substation to the east, following an existing 115 kV transmission corridor before turning north and paralleling a 34.5 kV distribution line through Bee Meadow Park and adjacent residential neighborhoods. Due to potential impacts to residential areas and forested wetlands, this route was eliminated from further consideration.

3.2.3 Whippany – Montville Route Development

The Whippany Substation is a JCP&L 230 kV substation, located near Ridgedale Avenue, in East Hanover Township, Morris County. Several 115/230 kV lines enter/exit the substation to the north, east, south and west. Several Potential Routes were developed paralleling existing transmission lines, including the Susquehanna – Roseland 500/230 kV Transmission Line corridor in an effort to connect the Whippany and Montville Substations.

The most likely exit from the Whippany Substation is to the north following an existing transmission line through Troy Meadows[2], crossing Interstate 80 and continuing north through a developed area. The Routing Team considered routing options to the east of Vail Road/Edwards Road crossing the Rockaway River to avoid potential impacts to dense residential areas. The

[2] Troy Meadows is a large, diverse freshwater marsh located in East Hanover, Hanover and Parsippany-Troy Hills in Morris County. The area is designated as a "National Natural Landmark" by the National Park Service, a "New Jersey Natural Area" and also a "Natural Heritage Priority site" by NJDEP. The majority of Troy Meadows is privately owned by Wildlife Preserves, Inc.: http://wildlifepreserves.org/troymeadows.htm

route would continue north paralleling the Susquehanna – Roseland 500/230 kV corridor and portions of the Montville – Whippany 34.5 kV line, and entering the Montville Substation from the south.

3.2.4 Roseland – Montville Route Development

The Roseland Substation is a PSE&G 230 kV substation, located near Eisenhower Parkway in the Borough of Roseland, Essex County. Several Potential Routes were developed between the Roseland and Montville Substations. The Routing Team considered opportunity features including existing transmission lines, the Susquehanna – Roseland 500/230 kV corridor, the Morristown-Erie railway and Interstate 280 to varying degrees in an effort to connect the Roseland and Montville Substations. The Roseland Substation would need to be expanded beyond the existing fence line to accommodate a new 230 kV exit.

The most likely exit from the Roseland Substation is to the northeast, parallel to or double-circuiting the existing 138 kV transmission line and crossing Interstate 280. Several Potential Routes were considered in this area including paralleling the north side of Interstate 280, crossing the Whippany River and paralleling the Susquehanna – Roseland 500/230 kV corridor through Troy Meadows. This link would continue north through residential areas paralleling the PSE&G corridor and enter the Montville Substation from the south. To avoid impacts to Troy Meadows, the Routing Team also considered routing the proposed transmission line along New Road and traversing the Rockaway River to avoid potential impacts to dense residential areas as described above. Routes to the east of existing transmission line corridors along various state and local roads were previously eliminated from further consideration due to dense development and lack of suitable ROW.

The Routing Team also considered the option of continuing northeast out of the Roseland Substation along an existing transmission corridor, turning north near West Essex Park, crossing Interstate 80 near the Morris/Essex County border and paralleling the north side of Interstate 80. The route/link would turn north and bisect Great Piece Meadows Natural Heritage Priority Site before turning west to parallel the NJ Transit Montclair-Boonton railroad line.

3.3 Potential Route Review and Revisions

Once the Potential Route Network was developed, the Routing Team considered additional information provided by field review and further data analysis. 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, to narrow down the network and focus on refining the more preferable links to establish Alternative Routes. In some cases, these eliminations or adjustments were based on the likelihood of impacts on residential developments, natural resources, or other developed infrastructure.

Based on further analysis, the Routing Team determined that the most feasible routes would connect the Whippany or Roseland Substations to the Montville Substation. Potential Routes between the Whippany and Montville Substations are the most direct routes and parallel existing transmission lines for the majority of the route. Potential Routes originating from the Greystone Substation were found to be circuitous; the shortest route would be 10.6 miles long, which is approximately 3.5 to 3.7 miles longer than routes originating from the Whippany Substation. The only feasible option originating from Greystone would exit the substation to the north. The first portion of the route would involve paralleling or double-circuiting the existing 230 kV transmission line. The northern portion of the route would parallel the NJ Transit Montclair-Boonton Line railway and a 115 kV transmission line through the Mountain Lakes Historic District. Significant residential and commercial development is located adjacent to the railway. Potential Routes exiting Greystone were found to be unnecessarily long and would result in impacts to a greater number of communities, including the Mountain Lakes Historic District. Therefore, Potential Routes originating from Greystone were eliminated from further consideration.

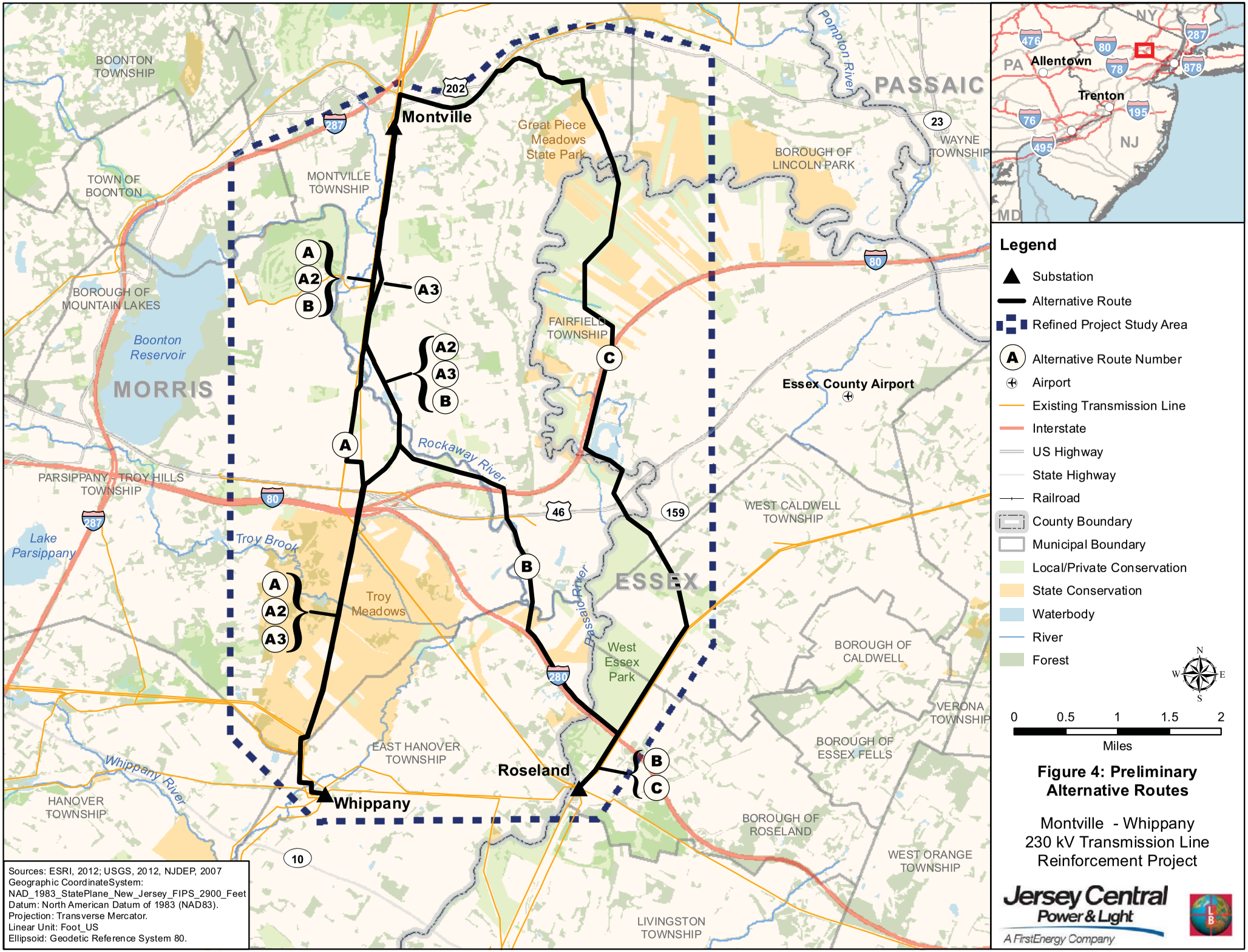
Although Potential Routes between the Stoneybrook and Montville Substations were more reasonable in length than those from Greystone, routes in this area would require significant acquisition of new ROW that would not parallel or rebuild existing transmission lines. In addition, a significant portion of routes exiting Stoneybrook would parallel I-287 and I-80. Parallel of theses interstates is challenging as the NJDOT prohibits overhead transmission lines to longitudinally occupy limited access highways, significant development is located adjacent to

the roadways south of I-80 and the Boonton Reservoir is located adjacent to I-287 north of I-80. Detouring west of the Boonton Reservoir would parallel Route 46 through a developed commercial and residential area, increasing impacts and adding unnecessary length.

Based on the reasons stated above, the Routing Team refined the Study Area by eliminating routes originating from the Greystone and Stoneybrook Substations from further consideration and conducting more detailed field reconnaissance of routes between the Whippany and Roseland Substations. The refined Study Area (see **Figure 4**) is generally bound to the north by the Montville Substation, to the east by the intersection of Route 46 and Horseneck Road in Fairfield Township, to the south by the Whippany and Roseland Substations, and to the west by the Boonton Reservoir and I-287.

The Routing Team conducted detailed field reconnaissance from public access points of the Whippany and Roseland Potential Routes in March 2013 and February 2014. The team utilized 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 along the routes between the Whippany and Montville Substations 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 refined Potential Route Network.

The field investigations along with more detailed engineering analysis resulted in changes to the Potential Route alignments. Additional Potential Route links were added to the Potential Route Network between Whippany and Montville. After crossing I-80 and Route 46, a short new link was added as a connection between a Potential Route link that would rebuild an existing 34.5 kV transmission line and another Potential Route link that would parallel the Susquehanna – Roseland 500/230 kV line. This new link provided a second option to reach the Susquehanna –



Legend

- Substation
- Alternative Route
- Refined Project Study Area
- Alternative Route Number
- Airport
- Existing Transmission Line
- Interstate
- US Highway
- State Highway
- Railroad
- County Boundary
- Municipal Boundary
- Local/Private Conservation
- State Conservation
- Waterbody
- River
- Forest

N W E S

0 0.5 1 1.5 2

Miles

Figure 4: Preliminary Alternative Routes

Montville - Whippany
230 kV Transmission Line
Reinforcement Project

Jersey Central Power & Light
A FirstEnergy Company

Sources: ESRI, 2012; USGS, 2012, NJDEP, 2007
Geographic CoordinateSystem:
NAD_1983_StatePlane_New_Jersey_FIPS_2900_Feet
Datum: North American Datum of 1983 (NAD83).
Projection: Transverse Mercator.
Linear Unit: Foot_US
Ellipsoid: Geodetic Reference System 80.

Roseland 500/230 kV line corridor behind the Arlington Plaza shopping center. One existing Potential Route link would avoid this congested area by using an unoccupied JCP&L easement. Additional options were added to the east and west of the existing JCP&L easement to minimize wetland impacts. Another new Potential Route link was added just north of Van Riper Avenue that would diverge from the main route for a short distance to use an existing JCP&L easement that is partially occupied by an existing double-circuit 115 kV line. In addition, where existing transmission infrastructure exists, JCP&L considered the advantages and disadvantages associated with rebuilding existing 34.5 and 115 kV lines versus paralleling these lines.

The Routing Team made a few adjustments to the Potential Routes between the Roseland and Montville Substations. The westernmost route was adjusted in several locations to minimize impacts to conservation lands. The Potential Route originating from Roseland that would parallel I-280 was adjusted to minimize impacts to developed areas adjacent to New Road.

3.4 Alternative Route Development

Following field reconnaissance and initial analysis, the Routing Team developed three preliminary Alternative Routes (A, B and C) from the remaining Potential Route Network and two Alternative Segments (**Figure 4**). The Alternative Route Segments identified as Alternative Route A2 and Alternative Route A3 were developed for Alternative Route A to avoid a heavily developed area that presently contains one or more overhead transmission lines and underground natural gas pipelines. The Routing Team initially selected Route A as the Preferred Route and retained the two Alternate Segments for consideration.

3.4.1 Public Outreach

The Preliminary Alternative Routes were presented to the public for comment during two public open house meetings held on November 13 and 14, 2013. Prior to conducting public open house meetings JCP&L contacted local, county and State officials to discuss the Project.

On October 30, 2013, JCP&L mailed public notices to all property owners located generally within 200 feet of the ROW for the Preferred Route and Alternate Segments to notify them about the November 13th and 14th open house meetings. During this same time, JCP&L published a

Project website[3] to provide information regarding the Project need, the siting process, and the Preferred Route and Alternate Segments. The website also included an electronic form to facilitate collection of public comments. On November 7, 2013, JCP&L placed an advertisement in the following local newspapers to notify the public of the scheduled open houses:

- Daily Record
- The Progress
- Hanover Eagle
- Morris NewsBee
- Star Ledger (published November 12, 2013).

Two public meetings were held on November 13 and 14, 2013 at the Holiday Inn in Parsippany, New Jersey, to present the original Preferred Route (Route A), Alternate Segments (subsequently referred to as Alternative Routes A2 and A3) and to provide information about the Montville – Whippany 230 kV Transmission Line Reinforcement Project. At the meeting, attendees received a project factsheet, information on the NJBPU Process, comment cards, and 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, Louis Berger, and other utility representatives. The factsheet contained a brief statement on project need, a description of the siting process, and a preliminary project timeline. The public meeting was organized in an open house format and consisted of several stations that identified the Project processes. These stations included the following:

1. Welcome station located at the entrance for attendees to sign-in;
2. Project Need station provided an overall project summary and explaining the planning process;
3. Route Selection station detailed the siting process and included aerial maps showing the Preferred Route and parcel boundaries;
4. The Siting Process station explained how JCP&L uses public input in the routing process;
5. The Right-of-Way station explained the easement process;

[3] Project Website: https://www.firstenergycorp.com/content/fecorp/about/transmission_projects.html

6. The Engineering station detailed the specifications for the new transmission line as well as information on EMF;
7. The Environmental and Permitting station explained the potential environmental studies and permits required for the project; and
8. The Next Steps station explained the project schedule, the BPU process, and how individuals could stay informed regarding the Project.

The November 13th open house meeting was attended by 28 people and eleven comment cards were completed during this meeting. The November 14th open house meeting was attended by 23 people and one comment card was completed during this meeting. Comments were also collected from the public before and after the open house meetings through the Project website, emails, and a toll-free phone number. The maps with the original Preferred Route (Route A) and Alternate Segments (Alternative Routes A2 and A3) presented at the Open Houses were also posted online so stakeholders could review and provide comments even if they were unable to attend the Open Houses.

Comments at the meeting, on the comment cards and submitted online varied, but generally fell into one of the following categories:

1. Real Estate (impacts to property value and property use);
2. Health and Safety (concerns about EMF [Electric and Magnetic Fields];
3. Potential Routes (comments about or opposing specific routes, suggested new alignments, or comments about the routing process); and
4. General requests for additional information.

In addition, JCP&L met with Montville and Parsippany-Hills-Troy townships on several occasions before and after the open house meetings. JCP&L also attended a public Montville Township committee meeting on June 10, 2014 to present information on the Project.

JCP&L reviewed comments and followed up with the commenters, as appropriate, to answer any outstanding questions. In addition, JCP&L provided the commenters with the Project website

and a phone number (888-808-4234) for them to obtain additional information about the Project or provide comments.

As discussed in *section 1.2*, Alternative Route A was originally selected as the Preferred Route. Both Alternative Routes A2 and A3 were also presented as Alternate Segments during the November 2013 public open house meetings. As indicated on the initial Project factsheet and the informational boards presented during the November meetings, "JCP&L [was still] evaluating alternative segments [Routes A2 and A3] that could replace portions of the preferred route in Parsippany and Montville."

The Preferred Route was originally selected because it was the shortest, most direct route into the Montville Substation and paralleled or rebuilt existing transmission lines for its entire route. Alternative Routes A2 and A3 have these same characteristics, except they divert away from congested corridors in one or two locations by using existing, underutilized JCP&L ROW.

Based on further evaluation of the existing transmission ROW through this area, adjacent natural gas line ROW, discussions with PSE&G, a detailed engineering review, and information gathered at the open house meetings and through discussions with members of the public and municipal officials, JCP&L ultimately selected a modified version of Alternative Route A3 as the Preferred Route for the Project. The modified version of Alternative Route A3 provides an additional reliability benefit by making use of the available ROW to separate the 230 kV and 34.5 KV circuits onto individual poles, such that the failure of a single pole will not remove both circuits from service. Further, this would enable fewer, shorter, and therefore less obtrusive, poles to be used in the construction of the proposed transmission line. Underbuilding the 34.5 kV circuits would require structures to be approximately 25 feet taller to maintain separation between the conductors.

JCP&L modified the alignment of Alternative Route A3 based on a more detailed review of JCP&L's existing ROW. Because JCP&L has sufficient ROW in most cases, JCP&L proposes to parallel the majority of the existing 34.5 kV transmission line instead of rebuilding the line. JCP&L proposes paralleling the 34.5 kV lines to the extent possible for the following reasons:

- It would be challenging to schedule an extended outage of the existing double-circuit 34.5 kV transmission line in order to rebuild;
- Rebuilding is significantly more expensive than paralleling;
- Rebuilding would require taller transmission structures and shorter transmission spans (i.e., a greater number of transmission structures);
- Rebuilding has the potential to increase the length of outages should a single pole fail (because both the 230 kV and 34.5 kV structures would be on the same pole);
- In most areas, JCP&L has enough ROW to accommodate a parallel line; and
- The two short segments of the route that will be rebuilt are in areas that pose little risk of pole/car accidents.

Based on public comments received throughout the course of the Project, JCP&L made the following modifications to the final Alternative Routes:

- Adjusted the centerline of Route A3 (located within existing JCP&L ROW) through the Montville Chase residential community approximately 15 feet closer to the existing natural gas line (and farther away from adjacent residences). The final location of the transmission centerline will need to be approved by Spectra Energy Partners, LP, the owner of Algonquin Gas Transmission pipeline.
- Identified a route "Option" through The Meadows at Montville residential community that would involve exchanging JCP&L's existing 170-foot-wide ROW for a new 170-foot-wide ROW, located slightly farther to the west on The Meadows at Montville property, thereby allowing the proposed transmission line to be constructed farther from The Meadows complex.

On November 10, 2014, JCP&L held two additional public open houses to announce that Alternative Route A3 had been selected as the Preferred Route and to solicit additional input. On October 28, 2014, JCP&L mailed public notices to all property owners located generally within 200 feet of the ROW for the Preferred Route and the original Preferred Route (Route A) to notify them about the November 10th open house meetings. Local newspaper ads announcing

the open house were published on November 5th and 6th. Approximately 150 people signed in during the November 2014 open houses and 31 comments were received.

3.4.2 Elimination of Alternative Routes A and A2 from Further Analysis

Alternative Route A (the original Preferred Route) was developed to parallel the PSE&G Susquehanna – Roseland 500/230 kV line from the Arlington Plaza shopping center to the Montville Substation. JCP&L does not have any existing ROW adjacent to the PSE&G Susquehanna – Roseland 500/230 kV line between Alba Place and Lake Shore Drive in Parsippany–Troy Hills Township. In addition, a Texas Eastern gas line is located within the PSE&G ROW. Based on discussions with PSE&G following the November 2013 open house meetings, PSE&G was not willing to permit JCP&L to construct within their existing ROW. Therefore, in order to construct Alternative Route A, JCP&L would need to obtain new ROW adjacent to the PSE&G ROW. NERC standards require that this ROW would need to be a minimum of 100 feet wide. At a minimum, paralleling the Susquehanna – Roseland line through this area is anticipated to require the purchase of 14 residential homes. This assumes that the Montville – Whippany line could be constructed 5 feet east of the PSE&G/Texas Eastern gas pipeline ROW and aerially overlap the gas ROW. Should aerial overlap of the gas pipeline ROW not be permitted, paralleling through this area would result in the purchase of up to 24 residential homes. Therefore, Alternative Route A was eliminated from further analysis.

Alternative Route A2 followed the same path as Alternative Route A3 from the Whippany Substation north to Van Riper Avenue. North of Van Riper Avenue, Alternative Route A2 would continue to parallel/rebuild the existing Montville-Whippany 34.5 kV prior to entering the Montville Substation, while Alternative Route A3 diverts to the east near Changebridge Substation. Just north of Van Riper Avenue, constructing Alternative Route A2 would require the acquisition of new ROW in order to construct the 230 kV line parallel to the existing 34.5 kV line and gas line. Alternative A3 avoids this congested area by using an existing, underutilized JCP&L easement. Furthermore, separating the 230 kV and 34.5 kV circuits onto individual poles instead of rebuilding both circuits on a single set of structures provides additional reliability benefits, as the failure of a single pole will not remove both circuits from service. Separating the circuits here would also enable fewer, shorter, and therefore less obtrusive, poles

to be used in the construction of the proposed transmission line. Therefore, Alternative Route A2 was eliminated from further analysis.

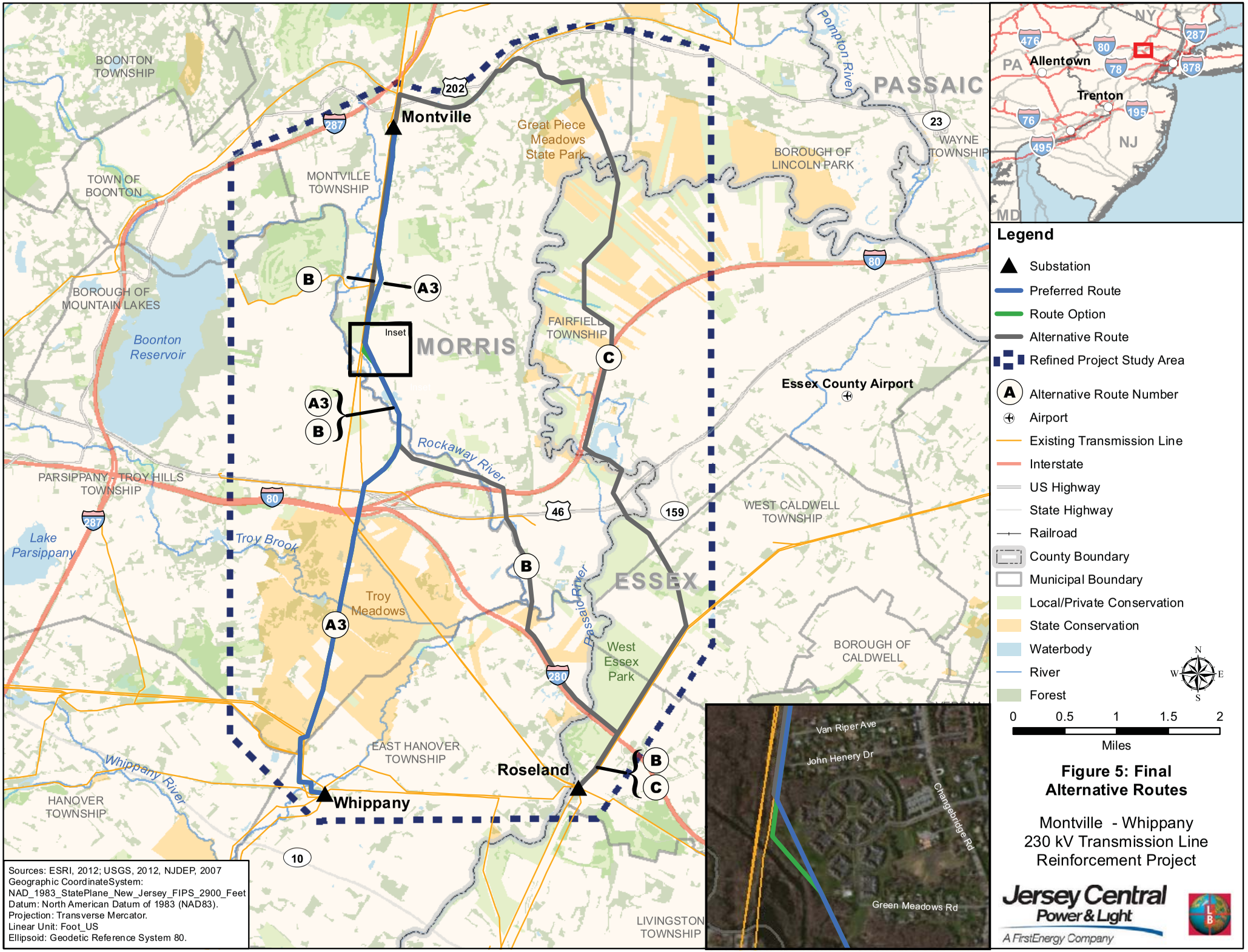
3.4.3 Description of Alternative Routes

The Routing Team developed three Alternative Routes, based on the three Preliminary Alternative Routes and they include, Alternative Route A3, Alternative Route A3 with Option, Alternative Route B, and Alternative Route C. The Alternative Routes are summarized below and shown on **Figure 5**.

Alternative Route A3

Alternative Route A3 is approximately 7 miles long and is the most direct final Alternative Route from an existing JCP&L substation to the Montville Substation. Alternative Route A3 begins at the Whippany Substation and heads north along the existing Montville – Whippany 34.5 kV transmission corridor for approximately 3 miles, including 2.1 miles through the Troy Meadows natural area. The first approximately 0.8 mile of the route is also parallel to the Stoneybrook – Whippany and Greystone – Whippany lines, which both turn west to connect to the Stoneybrook and Greystone Substations. In this area, Alternative Route A3 would rebuild the existing 34.5 kV line within the existing transmission ROW. After the existing 230 kV lines divert to the west, Route A3 would be constructed parallel to the existing 34.5 kV transmission line until crossing I-80 and Route 46.

After crossing Route 46, Alternative Route A3 would diverge to the east of the existing transmission line through a forested/wetland area for approximately 1.6 miles to avoid development adjacent to the existing Susquehanna – Roseland 500/230 kV line. Approximately 1.1 miles of this diversion would use a currently undeveloped JCP&L easement or property JCP&L owns in fee. Just south of John Henry Drive, Alternative Route A3 would continue north, paralleling the existing 34.5 kV line for approximately 1,500 feet. At this point, Alternative Route A3 diverges again east of the existing transmission line to use an underutilized JCP&L easement and avoid a congested corridor containing the PSE&G 500/230 kV line, the JCP&L 34.5 kV line, and the Texas Eastern gas line for approximately 0.6 mile. From here,



Sources: ESRI, 2012; USGS, 2012, NJDEP, 2007
Geographic CoordinateSystem:
NAD_1983_StatePlane_New_Jersey_FIPS_2900_Feet
Datum: North American Datum of 1983 (NAD83).
Projection: Transverse Mercator.
Linear Unit: Foot_US
Ellipsoid: Geodetic Reference System 80.

Figure 5: Final Alternative Routes

Montville - Whippany
230 kV Transmission Line
Reinforcement Project

Jersey Central Power & Light
A FirstEnergy Company

Alternative Route A3 would continue north, paralleling the existing 34.5 kV line into the Montville Substation.

Alternative Route A3 Option

Alternative Route A3 Option is identical to Alternative Route A3 with one exception. Through The Meadows at Montville residential community, JCP&L identified a route "Option" that would involve exchanging JCP&L's existing 170-foot-wide ROW for a new 170-foot-wide ROW located slightly farther to the west on The Meadows at Montville property, allowing the transmission line to be constructed farther away from The Meadows units.

Alternative Route B

Route B is approximately 7.7 miles long. Route B was developed as an option to avoid traversing Troy Meadows, but largely follows a direct route into the Montville Substation. Route B begins at the Roseland Substation and traverses northeast for approximately 0.7 mile parallel to the Roseland – Cedar Grove, Kearny – Roseland and Roseland – West Caldwell 230 kV transmission lines. Route B would overlap a portion of the existing ROW through this area. After crossing I-287, Route B turns northeast and parallels I-287 for approximately 1.3 miles. At this point, Route B turns north for approximately 1.4 miles and crosses I-80. After crossing I-80, Route B turns northwest for approximately 1.1 miles using new ROW before turning north/northwest for approximately 2.2 miles. In this area, the first 1.3 miles would be constructed on new ROW and the last 0.9 mile would use the same undeveloped JCP&L easement that would be used by Route A3. At this point, Route B would follow the same path as Route A (paralleling the existing Montville – Whippany 34.5 kV line) for approximately 2.1 miles into the Montville Substation.

Alternative Route C

Alternative Route C is approximately 10.4 miles long. Route C was developed to avoid traversing through the most heavily developed portions of the Study Area. Route C begins at the Roseland Substation and heads northeast parallel to the Roseland – Cedar Grove, Kearny – Roseland and Roseland – West Caldwell 230 kV transmission lines for approximately 1.9 miles.

Alternative Route C would overlap a portion of the existing ROW through this area. At this point, the route turns in a general northwest direction along new ROW for approximately 2.2 miles until reaching I-80. Alternative Route B turns northeast to parallel I-80 for approximately 1 mile. After crossing I-80, Route B travels 3.9 miles in a generally north direction along new ROW, crossing the Passaic River, until reaching the NJ Transit Montclair – Boonton line railway. Alternative Route C would rebuild an existing lower voltage transmission line located parallel to the NJ Transit Montclair – Boonton line railway corridor for approximately 1.1 miles before turning south to rebuild the existing Montville – Boonton 34.5 kV transmission line into the Montville Substation.

4.0 ALTERNATIVE ROUTE EVALUATION

This section further discusses the Alternative Routes (described in *section 3.3.2*), and provides an analysis of potential impacts to local communities, the environment, and cultural resources. The Alternative Routes were reviewed in detail and compared using a combination of information collected in the field, GIS data sources, supporting documents, and the collective knowledge and experience of the Routing Team. The GIS sources used to evaluate the Alternative Routes are presented in *section 2.2.2*, GIS Data Sources, **Table 2.**

4.1 Right-of-Way, Cost and Constructability Impacts

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, ROW width, high turn angles, proximity to major highways, accessibility, and cost. Additional issues to consider when evaluating constructability are: ease of moving equipment, materials, and workers to the construction sites; relative ease of ensuring public and worker safety; logistical difficulties associated with obtaining the required easements for the transmission line; and the actual amount of time and materials needed for construction, which can correlate to the total length of the corridor. A comparison of the engineering and construction considerations for the three Alternative Routes and Route Option is presented in **Table 3**.

4.1.1 Transmission Right-of-Way

JCP&L attempted to minimize route length and ROW acquisition. JCP&L requires a minimum of a 100-foot-wide ROW for the new 230 kV line. However, the preferred ROW width is 120-feet-wide. JCP&L will attempt to acquire 120 feet of ROW in areas where new ROW is needed.

Table 3. Environmental Inventory: Engineering and Constructability				
Alternate Route	**A3**	**A3 with Option**	**B**	**C**
Length (miles)	7.0	7.1	7.7	10.3
Length entirely within existing ROW (miles)	5.1	5.1	1.3	0.0
Length within partial existing ROW[4] (miles)	1.1	1.1	3.9	3.3
Length within new ROW (miles)	0.8	0.9	2.5	7.0
Length Parallel to Transmission Line (miles)	4.1	4.1	0.6	1.9
Length of Rebuild (miles)	1.0	1.0	2.1	1.4
Length Parallel to Gas Line (miles)	1.1	1.1	2.1	0
Length Parallel to Interstate, State or Local Roads (miles)	0.0	0.0	1.3	1.0
Approximate Number of Angled Structures	15	16	17	30
Road Crossings				
Interstate/US Highway Roads	3	3	3	5
State Roads	0	0	0	1
County/Local Roads	10	10	8	8
Freeway Ramps	2	2	1	3
Railroad Crossing	1	1	0	0
Topography/Slope				
Slopes >20% (miles)	0	0	0	0.1
Slopes 15 – 20% (miles)	0	0	0	0.2

As shown in **Table 3**, the Alternative Routes are generally similar in length, with the exception of Alternative Route C, which is 2.6 to 3.3 miles longer than the other routes. In some cases, the Alternative Routes parallel existing transmission lines, but would require new ROW adjacent to the existing line(s) to accommodate the new 230 kV line. Alternative Route A3 would parallel

[4] Partial ROW refers to portions of the proposed route that would parallel existing infrastructure (transmission, rail, and road). In these cases, the proposed ROW would likely overlap a portion (but not all) of the existing transmission, road or rail ROW.

or rebuild existing transmission lines for the majority of its route. Where Alternative Route A3 is not parallel to or rebuilding existing transmission lines, the route would primarily traverse within existing, unoccupied JCP&L ROW. Alternative Route B originates at the Roseland Substation and would take advantage of existing ROW where it joins Alternative Route A3 just south of the Rockaway River. Alternative Route C also originates from the Roseland Substation and can be constructed within or partially within existing ROW for a portion of its route in the vicinity of the Roseland and Montville Substations.

Alternative Route A3

Several existing transmission lines exit the Whippany Substation to the north and west. Beginning at the Whippany Substation, Alternative Route A3 would parallel two existing 230 kV lines and rebuild approximately 0.8 mile of the existing JCP&L double-circuit Montville – Whippany 34.5 kV wood H-frame transmission line entirely within the existing ROW. After the adjacent 230 kV lines divert to the west, Alternative Route A3 would be constructed parallel to the existing 34.5 kV transmission lines through Troy Meadows until reaching I-80. The existing ROW varies between 30 and 155 feet through this area. In this area, JCP&L proposes to acquire up to 120 feet of new ROW for the transmission structures only. This would allow JCP&L to maximize structure spans, use the existing transmission ROW for access to the existing and new transmission lines, and would allow Troy Meadows to keep the portions of land between the structures under a conservation easement. Alternative Route A3 would continue to parallel the existing 34.5 kV transmission lines, crossing I-80 and U.S. Route 46.

After crossing U.S. Route 46, Alternative Route A3 would divert away from the existing 34.5 kV transmission line and travel northeast for 0.5 mile into the Rockaway River riparian corridor. New ROW would be needed for this section. From here, Alternative Route A3 turns north and continues 1.1 miles through an unoccupied 170-foot-wide JCP&L easement until converging with the existing Montville – Whippany 34.5 kV line.

Alternative Route A3 would parallel the existing 34.5 kV line within a JCP&L easement for approximately 0.3 mile before taking a second, 0.6-mile-long diversion from the existing Montville-Whippany 34.5 kV ROW to the east. This diversion would be located within a

partially occupied 100-foot-wide JCP&L easement. The JCP&L easement is unoccupied until reaching River Road, where the Changebridge Substation is located. An existing double-circuit 34.5 kV line (Changebridge Tap) exits the substation to the south before turning east to follow River Road and exits the substation to the north within the JCP&L easement. In addition, a natural gas line parallels the portion of the JCP&L easement located north of River Road. JCP&L can construct the new 230 kV line within the existing easement by rebuilding the existing 34.5 kV lines. Approximately 700 feet after crossing Old Changebridge Road, Alternative Route A3 would continue north parallel to the existing Montville – Whippany 34.5 kV line for approximately 0.4 mile. Here an existing Algonquin gas easement is adjacent to the 34.5 kV Montville – Whippany lines. Therefore, Alternative Route A3 would divert slightly east and occupy an existing, unoccupied, 70-foot wide JCP&L easement. Construction within this easement would occur as close to the western side of the easement as possible to maintain separation from an adjacent office complex. About 0.3 miles south of the Montville Substation, the Algonquin gas line turns to the east. At this point, Alternative Route A3 would return to paralleling the Montville – Whippany 34.5 kV lines for the remaining 0.3 mile to the Montville Substation within the existing JCP&L easement.

Alternative Route B

Alternative Route B begins at the Roseland Substation and traverses northeast for approximately 0.7 mile parallel to the Roseland – Cedar Grove, Kearny – Roseland and Roseland – West Caldwell 230 kV transmission lines. New ROW would be required through this area, but some overlap with the existing ROW is anticipated. After crossing I-287, Alternative Route B turns northeast and parallels I-287, a limited access highway, for approximately 1.3 miles. Utilities within the State of New Jersey have the right to occupy highway ROW. However, the NJDOT has identified specific requirements for utility crossings or occupation of highway ROW within the Utility Accommodation Code (N.J.A.C. 16:25). In accordance with this Code, any usage of limited access highway ROW is subject to the discretion of NJDOT. Further, NJDOT has excluded utilities from use and longitudinal occupancy of limited access highway ROW except in extreme cases of need when it can be demonstrated to be in the best public interest. Specifically, the utility must satisfy the following criteria:

1. That alternate locations are not available or cannot be implemented at reasonable cost, as determined by the Department, in consultation with the Federal Highway Administration ("FHWA"), from the standpoint of providing efficient public utility services in a manner conducive to safety, durability, and economy of maintenance and operations;
2. That the accommodation will not adversely affect the design, construction, operation, maintenance, or stability of the limited access highways;
3. That it will not interfere with or impair the present use or future expansion of the limited access highways; and
4. That disapproval of the use of the right-of-way would result in the loss of productive agricultural land, or loss of productivity of agricultural land, if any.

Lastly, any permitted longitudinal occupancy of a limited access highway must be constructed underground. Construction of a 230 kV transmission line of this length underground would not only be prohibitively expensive, but would result in significant environmental and operational impacts as a result of:

- The need for multiple underground lines to equal the capacity of a single overhead line.
- The increased time necessary to repair damaged underground lines, resulting in increased outage time for customers.
- The requirement to completely clear the ROW and significant excavation to bury the line.

Based on the aforementioned NJDOT restrictions, the Alternative Route B centerline (i.e., the transmission structures) must be located outside of the limited access highway ROW. Though some overlap with the existing NJDOT ROW may be possible, Alternative Route B would require acquisition of new ROW through this area. From here, Alternative Route B would require new ROW for approximately 2.4 miles, until the route intersects with Alternative Route A3 north of Edwards Road. At this point, Alternative Route B would follow the same path as Alternative Route A3 into the Montville Substation.

Alternative Route C

Alternative Route C would also begin at the Roseland Substation. Alternative Route C would parallel the Roseland – Cedar Grove, Kearny – Roseland and Roseland – West Caldwell 230 kV transmission lines for approximately 1.9 miles. New ROW would be required through this area, but some overlap with the existing ROW is anticipated. At this point, Alternative Route C would require new ROW for approximately 2.2 miles until reaching I-80, a limited access highway. Based on the aforementioned NJDOT restrictions, the Alternative Route C centerline must be located outside of the I-80 ROW. Though some overlap with the existing NJDOT ROW may be possible, Alternative Route C would require acquisition of new ROW through this area. After crossing I-80, Alternative Route C would require new ROW for approximately 3.9 miles until reaching the NJ Transit Montclair – Boonton line railway. At this point, Alternative Route C would rebuild an existing lower voltage transmission line and parallel the NJ Transit Montclair – Boonton line railway corridor for approximately 1.1 miles. Through this area, Alternative Route C would involve replacing the existing single-circuit wooden monopole structures with one set of new steel monopole structures that would carry the two circuits and acquisition of additional ROW. Alternative Route C would require an easement or license agreement with NJ Transit. At this point Alternative Route C would turn south and involve rebuilding the existing Montville – Boonton 34.5 kV transmission line for approximately 0.3 mile into the Montville Substation.

4.1.2 Engineering Considerations

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 or social impacts and operational limitations and cost. JCP&L attempted to consider and minimize engineering challenges during conceptual design, as described in the following sections.

Substation Engineering

Alternative Route A3 would originate from the Montville Substation while Alternative Routes B and C would originate from the Roseland Substation. The Montville Substation would only require minimal modifications within the existing fence line to accommodate the new 230 kV

line. The Roseland Substation, however, would need to be expanded in order to accommodate the new 230 kV line.

Transmission Line Engineering

For Alternative Route A3, the Routing Team considered rebuilding the existing double-circuit Montville – Whippany 34.5 kV line through Troy Meadows, which is crossed by the route for 1.8 miles south of I-80. However, the rebuilt line would require taller structures and shorter spans (i.e., additional transmission structures) in order to accommodate all three lines. In addition, rebuilding the line would likely require JCP&L to schedule a double-circuit outage of this line segment during construction. JCP&L determined that paralleling the existing 34.5 kV line provided greater reliability. The new 230 kV line will be constructed on steel monopole structures primarily adjacent to the existing 34.5 kV line. The crossing of I-80 and U.S. Route 46 is challenging. JCP&L has sufficient ROW to continue to parallel the existing 34.5 kV line across I-80 and Route 46. The area north of U.S. Route 46 where the 34.5 kV line continues is densely populated and limited space is available for new ROW. Therefore, Alternative Route A3 would divert from paralleling the existing Montville-Whippany 34.5 kV ROW to the east through the Rockaway River riparian corridor, which is partially located within an existing, undeveloped JCP&L ROW. Additional ROW clearing would be required through this area. South of John Henry Drive, Alternative Route A3 would parallel the existing Montville-Whippany 34.5 kV ROW. Alternative Route A3 would involve a second diversion from the existing Montville-Whippany 34.5 kV ROW to the east through a JCP&L ROW that is partially occupied by an existing double-circuit 34.5 kV line and crossed by an adjacent natural gas transmission line. The existing 34.5 kV line would be rebuilt within the existing easement to accommodate all three lines.

Exiting the Roseland Substation, Alternative Route B would parallel the existing double-circuit Kearney – Roseland double circuit 230/345 kV line, and Roseland – West Caldwell double-circuit 138 kV transmission line on an adjacent set of steel monopole structures for the first 0.7 mile. Additional ROW and clearing would be required to accommodate the new 230 kV line. At this point, Alternative Route B turns northwest to parallel I-287. While Alternative Route B transmission structures cannot be located within the limited access highway ROW, about 50 feet

of the 100- to 120-foot-wide ROW may overlap the NJDOT ROW to avoid impacts to existing development adjacent to the highways. 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. Alternative Route B would involve approximately 3.6 miles of new ROW that is not parallel to existing infrastructure. These areas are predominantly forested with wetlands and streams and would need to be cleared. Alternative Route B would connect with the existing, undeveloped JCP&L easement used by Alternative Route A3 and would follow the same path as Alternative Route A3 into the Montville Substation.

Alternative Route C would involve paralleling the existing double-circuit Kearney – Roseland double-circuit 230/345 kV line, and Roseland – West Caldwell double-circuit 138 kV transmission lines for a longer distance (approximately 1.9 miles). Additional ROW and clearing would be needed through this area. From here, Alternative Route C would require new ROW and clearing through a forested area for approximately 2.2 miles. Alternative Route C then turns northeast to parallel I-80 for approximately 1.0 mile. Through this area, design and construction of Alternative Route C would need to be coordinated with NJDOT to meet their design and safety requirements. After crossing I-80, Alternative Route C would require new ROW and clearing through a forested area for approximately 3.9 miles. From here, Alternative Route C parallels the NJ Transit Montclair – Boonton line railway corridor and an existing 34.5 kV transmission line for approximately 1.1 miles. This option would require overbuilding the existing 34.5 kV transmission line to accommodate both the 230 and 34.5 kV lines. Transmission lines that traverse over railways require taller structures to meet the minimum National Electrical Safety Code ("NESC") vertical ground clearance standards. Constructing within an active railway ROW would require coordination with and approval from NJ Transit. The remaining portion of Alternative Route C would involve rebuilding the existing Montville – Boonton 34.5 kV transmission line into the Montville Substation.

Based on high-level engineering, Alternative Route A3 would be expected to require the least number of angled structures. The Alternative Route A3 Option would require one additional angle in order to divert farther away from residential homes through The Meadows at Montville

community. Alternative Route B would require a similar number of angled structures. Alternative Route C would be expected to require the most angled structures in order to minimize impacts to conservation areas and existing development, and to parallel I-80 and the NJ Transit railway. As shown in **Table 3**, few areas of steep slope are crossed by the Alternative Routes. Alternative Route C would traverse a short distance of slopes greater than fifteen percent (15%) and the remaining routes would not traverse any areas identified as steep slopes. The areas of steep slope crossed by Alternative Route C are primarily associated with stream banks.

Accessibility is a crucial factor to consider when planning a transmission line. A route has to be accessible not only during the time of construction, but also for routine maintenance operations. Suitable access to the corridor is indicative of the number of available and usable public roads in the immediate vicinity of the corridor. Large controlled access roadways provide little opportunity for construction access, since traffic moves quickly and cross streets are limited. Local neighborhood roads provide greater opportunity for construction access, but temporary access roads often need to be constructed from these roads to allow for large machinery to make turns without significantly slowing the movement of traffic or creating safety hazards.

Because Alternative Route A3 and the Alternative Route A3 Option would be constructed adjacent to existing transmission lines, existing access roads can likely be used in some areas, limiting the need for construction of new temporary access roads for this alternative. Depending on the condition of the existing access roads, improvements may be required. However, the Susquehanna – Roseland 230 kV Transmission Line between the Montville and Whippany Substations was recently constructed; therefore, access roads along this corridor may require less improvement. In addition, opportunities to utilize existing access roads associated with the 34.5 kV line may exist.

Existing access roads can be utilized for portions of Alternative Routes B and C that parallel existing transmission lines. Access for construction from I-280 and I-80 will likely be limited, thereby requiring the development of access routes through the adjacent forested areas. Opportunities may exist for Alternative Route B to use existing access roads associated with the

active NJ Transit Montclair-Boonton transit line. More than half of Alternative Route C would require acquisition of new ROW that is not parallel to existing infrastructure. New access roads would be required in these areas.

Transmission line road crossings often require special design and include setback and access requirements, especially crossings of interstates or limited access highways. All of the Alternative Routes would require one crossing of I-80 and U.S. Route 46. Alternative Routes B and C would require one crossing of I-280. As shown in Table 3, all three routes would also require additional state or local road crossings.

4.1.3 Project Cost

JCP&L did not prepare a detailed cost estimate for the Alternative Routes. Project cost is expected to increase with route length, the number of individual property owners involved, the number of angled structures required, and amount of grading, vegetation clearing, and environmental mitigation required. A quantitative comparison of the ROW acquisition costs and a qualitative comparison of engineering and construction and permitting costs are presented in the following sections.

ROW Acquisition

ROW acquisition includes the cost of the property and the cost to acquire each property. To estimate cost of ROW acquisition necessary for each of the Alternatives, a base price of $220,000 per acre was utilized. ROW acquisition costs for Alternative Route A3, the shortest and most direct route, were estimate to be $4.3 million. Alternative Route B is expected to have higher real estate acquisition costs (approximately $11.6 million) because a greater amount of new and partial ROW will be required. Costs associated with Alternative Route C were estimate to be $27.7 million as it would require the most new and partial ROW. Alternative Route A3 is expected to have the lowest ROW acquisition costs because it requires the least amount of new ROW acquisition.

Alternative Routes B and C would also require license agreements with NJ Transit and/or NJDOT. The majority of Alternative Route A3 is located adjacent to existing transmission lines for its entire route. Therefore, costs to develop temporary access roads are anticipated to be minimal. Alternative Routes B and C would both require development of new temporary access roads for construction where they are not parallel to existing transmission lines.

Engineering, Construction and Permitting

Engineering costs include the cost to design, permit and construct the new transmission line. Alternative Route C would result in increased engineering and construction costs due to its longer length and the significant number of angled structures required. Estimated engineering costs for Alternative Route C are approximately $50.6 million. Alternative Route B would result in lower engineering and construction costs, approximately $38.8 million compared to Alternative Route C, but higher costs compared to Alternative Route A3 due to its longer length. Engineering costs for Alternative Route A3 were estimate to be approximately $34.4 million.

Based on a review of aerial imagery and as shown in Table 4, Route A3 would require approximately 41.6 acres of tree clearing. Alternative Routes B and C would require considerably more tree clearing, 80 acres and 113 acres, respectively. As shown in *section 4.2*, Table 4, all Alternative Routes would traverse a significant distance of wetlands—between 5.0 and 5.8 miles of NJDEP mapped wetlands. Alternative Route A3 would traverse the fewest areas of mapped wetlands and Alternative Routes B and C would traverse the greatest distance through wetland areas. Alternative Routes A3 and the Alternative Route A3 Option would traverse approximately 2.1 miles through Troy Meadows. However, an existing transmission corridor presently traverses Troy Meadows in this area. For these reasons, clearing, grading and potentially wetland and stream mitigation costs would be significantly greater for Alternative Routes B or C compared to Alternative Routes A3 and the Alternative Route A3 Option. Overall, engineering, construction and permitting costs are estimated to be lower for Alternative Routes A3 and the Alternative Route A3 Option compared to Alternative Routes B and C.

4.1.4 ROW, Cost and Constructability Summary

From an engineering and constructability perspective, Alternative Route A3 is preferred to the remaining Potential Routes because it is the shortest route, parallels or rebuilds existing transmission for the majority of its route and minimizes the amount of new ROW acquisition. Total estimated cost[5] for Alternative Route A3 is approximately $35.5 million, significantly less than total estimated cost for Alternative Routes B and C ($50.4 million and $78.3 million, respectively). Alternative Route A3 also has good access as it is primarily located adjacent to existing transmission lines. Using an existing ROW and access roads to the extent possible will result in less ROW acquisition and vegetation clearing and earth disturbance, thereby reducing the overall Project cost and environmental impact.

4.2 Built Environment Impacts

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. A comparison of the built environment considerations for the Alternative Routes is presented in **Table 4**.

4.2.1 Land Use

JCP&L considered compatibility with existing land use during the Routing Study. Alternative Routes connecting the Whippany and Montville Substations are located entirely within Morris County; the tenth most populated county in the state. Alternative Routes connecting the Roseland and Montville Substations are located within Morris and Essex Counties; Essex County is the third most populated county in the state.

[5] The estimated total cost for the proposed Alternative Routes is an order-of-magnitude estimate developed using averages of recent costs for similar projects and without an in-depth analysis of field investigation. The estimated cost is subject to change as the constructability of the Project, sequence of construction, and other factors that may affect cost are identified and analyzed as the Project progresses.

Table 4. Environmental Inventory: Built Environment				
Alternative Route	**A3**	**A3 with Option**	**B**	**C**
Human Environment				
Length	7.0	7.1	7.7	10.3
Acres of ROW Required (100' – 120'ROW)[6]	100.1	100.4	112.2	150.4
Residences within the 120' ROW[7]	0	0	0	3
Residences within 75 feet of centerline	2	2	1	8
Residences within 100 feet of centerline	11	11	1	17
Residences within 250 feet of centerline	64	42	70	82
Residences within 500 feet of centerline	278	261	247	241
Schools within 1,000 feet of centerline	2	2	1	1
Churches within 1,000 feet of centerline	1	1	2	1
Cemeteries within 1,000 feet of centerline	1	1	1	0
Parcels within ROW	88	88	91	138
Forest Clearing				
Forest clearing based on aerial imagery (Acres in ROW)	41.6	43.4	80.0	113.0
Land Use (%) with 2,000' of the ROW[8]				
Agriculture	1.1%	1.1%	1.0%	0.0%
Barren Land	0.0%	0.0%	1.9%	1.8%
Forest Cover	4.8%	4.8%	6.6%	12.8%
Urban	26.8%	26.5%	30.1%	24.0%
Water	3.1%	3.2%	5.0%	6.0%
Wetlands	64.2%	64.4%	55.5%	55.5%

[6] Area calculations were generally based on a 120-foot-wide ROW. However, in a few locations along Alternative Route A3, a 100-foot-wide ROW was used where JCP&L presently has only 100 feet of ROW or to avoid impacts to residential properties where JCP&L will seek new ROW.

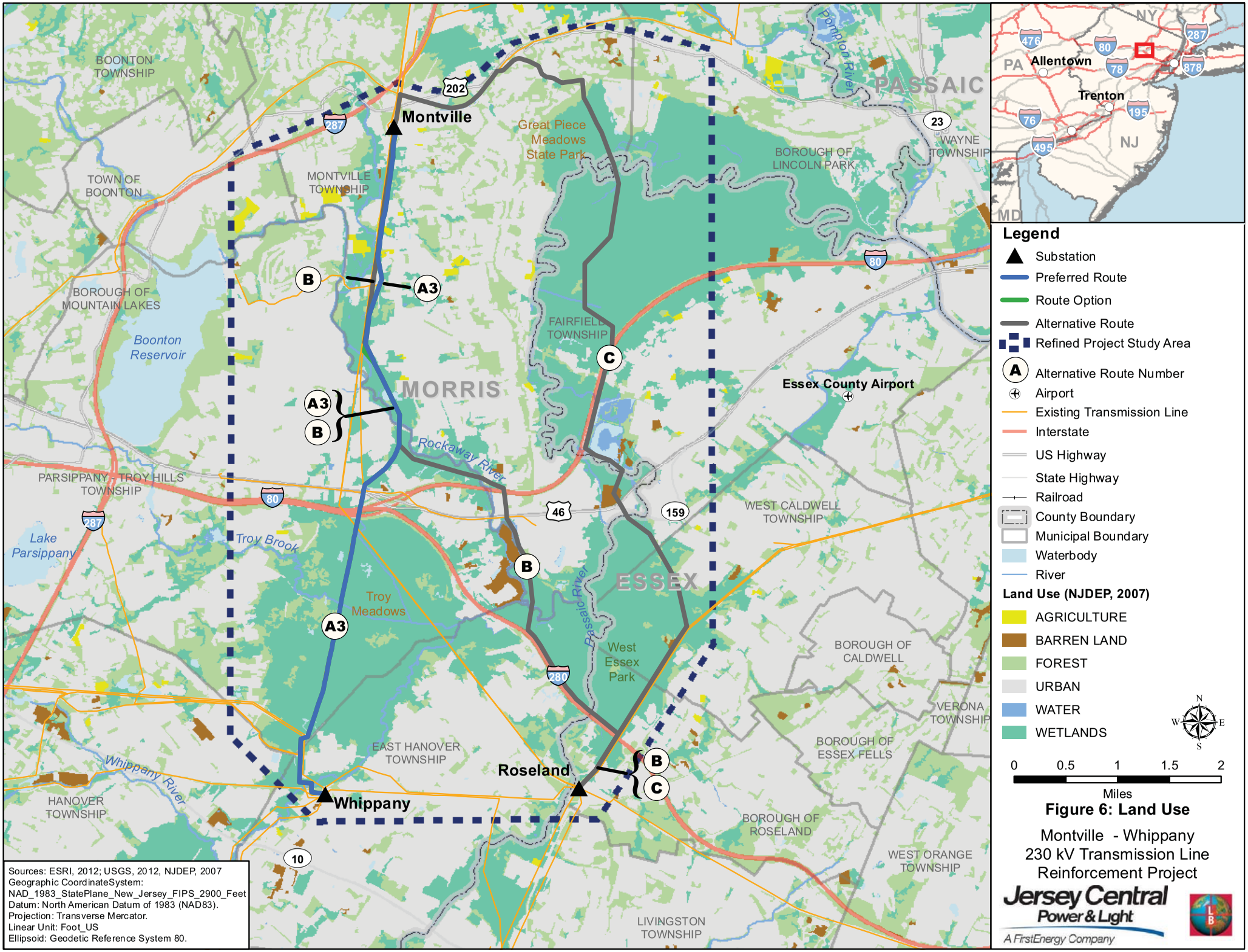
[7] In cases where houses are located within the 120-foot-wide ROW, JCP&L would acquire 100-foot-wide ROW to avoid the need to purchase a residential home.

[8] Percentage averaged from a 2,000-foot corridor on the centerline based on land use data from the 2007 New Jersey NJDEP Landscape Project. The NJ Landscape Project is an ecosystem level approach for long-term protection of imperiled species and their important habitats derived from NJDEP's aerial photo-based land-use/land-cover that depicts the state of land use and natural cover statewide. Due to its large resolution, the Landscape Project data should be used as a rough approximation of land use. Numbers are rounded to the nearest percent and may not total 100% for each alternative.

Table 4. Environmental Inventory: Built Environment				
Alternative Route	**A3**	**A3 with Option**	**B**	**C**
Land Use (Length of Line)[5]				
Agriculture (miles)	0.1	0.1	0.1	0.0
Barren Land (miles)	0.0	0.0	0.0	0.3
Forest Cover (miles)	0.2	0.2	0.3	2.2
Urban (miles)	1.5	1.5	1.5	1.7
Water (miles)	0.2	0.2	0.2	0.4
Wetlands (miles)	5.0	5.0	5.6	5.8
Conservation Areas				
NJDEP Green Acres Easements (miles)	2.1*	2.1*	0.3	0.1
Municipal Parks (miles)	0.4	0.4	1.2	3.4

* The NJDEP property crossed by Routes A3 and the Alternative Route A3 Option is Troy Meadows.

The refined Study Area is generally comprised of three major land uses, including: (i) significant suburban developments; (ii) upland forests under state control for wildlife management and recreation purposes; (iii) and broad areas of lowland wetland/floodplains conserved under natural heritage easement. General land use within the vicinity of the Alternative Routes is shown on **Figure 6.** Land use was calculated from the National Land Cover Dataset ("NLCD"). The combination of an abundance of lowland/conservation lands and significant residential and commercial development demand has resulted in a land use pattern that fluctuates between broad conservation area and densely packed residential housing. This pattern of development unavoidably pits impacts on natural resources against impacts on landowner homes and businesses. The Routing Team considered this close juxtaposition of major constraint types to be one of the greater challenges for developing potential transmission line routes in this Study Area.



Sources: ESRI, 2012; USGS, 2012, NJDEP, 2007
Geographic CoordinateSystem:
NAD_1983_StatePlane_New_Jersey_FIPS_2900_Feet
Datum: North American Datum of 1983 (NAD83).
Projection: Transverse Mercator.
Linear Unit: Foot_US
Ellipsoid: Geodetic Reference System 80.

Figure 6: Land Use

Montville - Whippany
230 kV Transmission Line
Reinforcement Project

Jersey Central Power & Light
A FirstEnergy Company

Development generally follows the I-80 and I-287 corridors, which intersect at the center of the refined Study Area. Major urban areas in the Study Area include: Boonton, Montville, Troy Hills, Lake Hiawatha, Pine Brook, Roseland, and Parsippany. In general, intervening residential development patterns connect these areas, making identification of suitable routes between them often challenging. Major natural land use features within the refined Study Area include: Troy Meadows, Great Piece Meadows State Park, Morris Canal, and West Essex Park.

Alternative Route A3 and the Alternative Route A3 Option traverse entirely within Montville, East Hanover and Parsippany-Troy Hills Townships in Morris County. Route B traverses Montville, East Hanover, Parsippany-Troy Hills and the Borough of Roseland within Morris County. Alternative Route C traverses Montville Township, West Caldwell Township and the Borough of Roseland in Morris County and a short distance through Fairfield Township within Essex County.

Wetland areas represent the largest type of land use within 2,000 feet of the Alternative Routes followed by urban areas. Many of these wetlands areas are forested. Based on a review of aerial imagery, Route A3 would require approximately 41.6 acres of tree clearing. Alternative Routes B and C would require significantly more tree clearing (80 acres and 113 acres, respectively) compared to Route A3. In addition, many of the wetland areas crossed by Alternative Route A3 are located within an existing cleared transmission ROW. New impacts to wetlands within the Rockaway River riparian corridor will occur as a result of Alternative Route A3 and the Alternative Route A3 Option.

There is significant development throughout the Study Area. Alternative Route A3 is the shortest route at 7 miles, but crosses the largest amount of urban areas as a result of the concentrated residential development located between the northern side of I-80 and the Montville Substation. As a result of congestion in this area, Alternative Route A3 would traverse existing JCP&L ROW to the east for short distances through undeveloped areas dominated by wetlands and forest. Using the existing JCP&L ROW reduces the number of residences within 500 feet of the transmission centerline, but would increase environmental impacts. Alternative Route B would traverse adjacent to some commercial development located along Route 280. North of

Lake Hiawatha, Alternative Route B would traverse the same developed areas crossed by Alternative Route A3. Alternative Route C would traverse commercial and residential areas primarily located adjacent to I-80 and the CSX railway.

As shown in **Table 4**, no residences are located within the ROW for Alternative Route A3, the Alternative Route A3 Option or Alternative Route B. Two residences are located within the ROW for Alternative Route C adjacent to the CSX railway, assuming a standard 120-foot ROW width. The ROW for Alternative Routes A3 and the Alternative Route A3 Option would traverse 88 parcels. The ROW for Alternative Route B would traverse 91 parcels and the ROW for Alternative Route C would traverse the greatest number of parcels, 138. In addition, the majority of the parcels crossed by Alternative Route C are not currently crossed by a transmission ROW while many of the parcels crossed by Alternative Route A3 and about half of Alternative Route B are presently encumbered by an existing transmission line ROW.

As shown in **Table 4**, Alternative Route C would traverse within 250, 100 and 75 feet of the highest number of residences. Alternative Route A3, the Alternative Route A3 Option and Alternative Route B would traverse within 75 feet of a similar number of residences. The Alternative Route A3 Option would result in crossing within 250 feet of 22 fewer residences and within 500 feet of 27 fewer residences compared to Alternative Route A3.

No airports are located within the refined Study Area. The Essex County Airport is located just east of the refined Study Area within Fairfield Township. The Morristown Municipal Airport is located southwest of the Whippany Substation. The Alternative Routes are located outside of the 7,500-foot generalized Federal Aviation Administration ("FAA") notification zone for both airports; therefore, neither airport is expected to be impacted by the Project.

4.2.2 Recreation/Aesthetics

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. The line will be constructed with galvanized steel structures that range in height from approximately 110 to 185 feet tall. Taller structures are

needed in some areas such as where the existing 34.5 kV line will be rebuilt, in areas of distribution/transmission wire crossings, and in areas where increased span length is required to avoid placing a structure in a sensitive/restricted area. Portions of each route would involve rebuilding an existing 34.5 kV transmission line. Structures in these areas would be constructed to carry the new 230 kV transmission line and the existing 34.5 kV transmission lines.

As described in *section 5.2.1*, land use is dominated by large wetland areas with several dense residential and commercial developed areas interspersed. Aesthetics are defined as a mix of landscape visual character, the context in which the landscape is being viewed (view/user groups), and the scenic integrity of the landscape. Visual character encompasses the patterns of landform (topography), vegetation, land use, and aquatic resources (i.e., lakes, streams, and wetlands). The visual character is influenced both by natural systems, human interactions, and use of land. Scenic integrity is the degree by which the landscape character deviates from a natural, or natural-appearing, landscape in line, form, color, and texture of the landscape. In general, natural and natural-appearing landscapes have the greatest scenic integrity. As man-made incongruities are added to the landscape, the scenic integrity diminishes. Additionally, some landscapes have a greater ability to absorb alterations with limited reduction in scenic integrity. The character and complexity, as well as environmental factors, influence the ability of a landscape to absorb changes. A new transmission line next to an existing transmission line provides less contrast and, therefore, can generally be better absorbed into that landscape than introducing a transmission line as a new feature in a previously undeveloped area.

The largest recreational facility within the Study Area is the 1,361-acre West Essex Park[9], which offers a variety of recreational activities, including an environmental center, golf and mini golf, boating and canoe landings, fishing areas, and an interpretive trail. Both Alternative Routes B and C would traverse a portion of West Essex Park (approximately 0.9 mile and 2.5 miles, respectively) parallel to the existing Montville – Roseland 230 kV Transmission Line and/or I-280. At this location, the existing transmission ROW serves as the eastern boundary of the park. Some ROW overlap is anticipated, which would minimize new impacts to the park. The main

[9] West Essex Park: http://www.essex-countynj.org/p/index.php?section=parks/sites/westp

recreational facilities within the park are located to the west of the existing ROW, along the Passaic River. The new 230 kV structures would be similar in height as the existing structures in the ROW; therefore, it is unlikely that the new structures would create a significant impact on the viewshed within the park or the main recreational facilities. Alternative Route B would result in a slightly greater visual impact compared to Alternative Route C because a portion of Alternative Route B would parallel I-280 through the park, creating a new linear feature.

The 1,170-acre Great Piece Meadows Wildlife Preserve[10] is another large recreational/conservation area located within the Study Area. Great Piece Meadows is a large forested wetland complex with areas of scrub-shrub and emergent wetlands and upland forest located along the Passaic River in the Borough of Lincoln Park, Montville Township and Fairfield Township. The area is owned by state or municipal entities which manage the area for flood protection, wildlife habitat and recreation. Recreational activities are limited within the wildlife preserve; the region of Great Piece Meadows adjacent to I-80 is a designated wildlife sanctuary zone as such only passive outdoor recreation use and nature study are permitted. Alternative Route C would traverse approximately 2.8 miles of the wildlife management zone of the preserve on new ROW. The Deer Run Golf and Tennis Club are located in the northern part of the park, approximately 500 feet from Alternative Route C. Alternative Route C would result in the clearing of a new 120-foot-wide ROW through the wildlife management area. Alternative Route C's aesthetics impacts would be minimized due to the buffer created by the surrounding forest.

Alternative Route A3 and the Alternative Route A3 Option traverse approximately 2.1 miles of Troy Meadows by paralleling the existing Montville – Whippany 34.5 kV line. JCP&L will seek up to 120 feet of additional ROW adjacent to the existing 34.5 kV line through Troy Meadows for the structure footprints only. By paralleling (instead of rebuilding) the existing 34.5 kV line, JCP&L can construct the new 230 kV line with shorter structures and longer spans. In addition, because vegetation through the area primarily consists of shrub-scrub and emergent wetlands, forest clearing would be minimal. The structure footprints would be permanently impacted, but

[10] Great Piece Meadows: http://wildlifepreserves.org/gpmeadows.htm

the remaining portion of the ROW could continue to be used as a natural area. Best management practices would be used during construction to minimize impacts to this wetland area, such as installation via helicopter. Visual impacts outside of the ROW would be limited by the surrounding vegetation and lack of nearby development or recreational activities.

Alternative Route B was developed as an option to generally follow the same path as Alternative Route A into the Montville Substation, but to avoid Troy Meadows. Alternative Route C diverts to avoid Troy Meadows by heading north, crossing Morris Canal and paralleling the NJ Transit railroad and canal for approximately 0.9 mile. To avoid impacts to these parks and wetland areas, Alternative Route A3, the Alternative Route A3 Option and the northern section of Alternative Route B cross through urban and developed areas located north of I-80 and Route 46. All three options would involve paralleling the existing Montville – Whippany 34.5 kV line across I-80 and Route 46. At this point, Alternative Route A3 and the Alternative Route A3 Option would take a 1.6-mile-long jug handle to the east using a combination of existing, unoccupied JCP&L ROW, JCP&L-fee owned property, and new ROW. Structures through this area would be 110 to 130 feet in height. This jug handle would consist of a new 100- to 120-foot-wide ROW through a forested wetland area, which would result in new visual impacts to residential properties located in close proximity to the ROW. Alternative Route A3 and the Alternative Route A3 Option would also include another 0.6-mile-long jug handle to the east within a JCP&L easement. An underground natural gas line is located within the JCP&L easement. Additional clearing would be required to accommodate the new 230 kV line. The 230 kV line structures would be 110 to 130 feet through this area.

General visual and aesthetic impacts of the Alternative Routes can be evaluated based on the types of parallel opportunities utilized and current scenic integrity. As mentioned previously, routes that use or parallel existing transmission line would generally result in fewer land use or aesthetic impacts than those that parallel roads, railroads, or require virgin ROW. Therefore, Alternative Route A 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.

4.2.3 Cultural Resources

Background research consisted of a review of the files maintained by the New Jersey Historic Preservation Office ("NJHPO") to identify all previously recorded architectural resources and with the New Jersey State Museum ("NJSM") to identify all previously recorded archaeological sites that are within 0.5 mile of the centerline of the three Alternative Routes. In addition, Louis Berger has identified all historic properties 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") and archaeological sites. All three Alternative Routes are within 0.5 mile of previously identified cultural resources including historic properties. **Table 5** provides a detailed description of each cultural resource category and data sources for previously identified cultural resources that were consulted during the background research.

A total of 16 architectural historic properties are located within a 0.5-mile radius of at least one of the Alternative Routes. **Table 6** provides the available information regarding all of the recorded architectural historic properties listed in or previously determined eligible (SHPO Opinion; Determination of Eligibility [DOE]) for listing in the NRHP/NJRHP and which are mapped on **Figure 7**. There are 76 archaeological sites within a 0.5-mile radius of the three Alternative Routes. Of these 76 sites, only two are listed on or previously determined eligible (SHPO Opinion; DOE) for listing on the NRHP/NJRHP (**Table 7**). **Table 8** provides a summary of data regarding the types and counts of historic properties within 0.5 mile of the Alternative Routes, as well as the counts of previously identified archaeological sites and assumed potential for impacts to cultural resources of each Alternative Route.

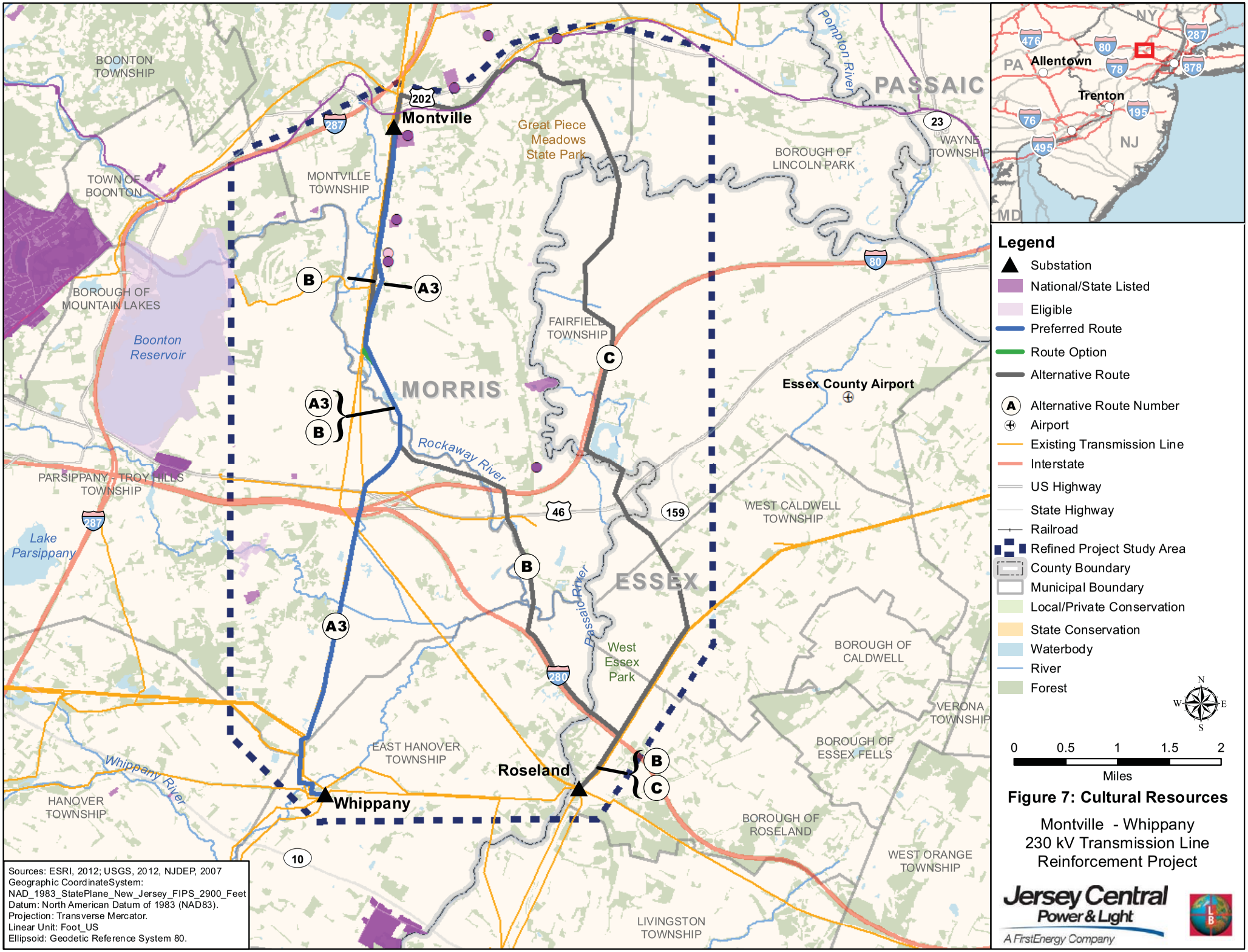
Table 5. Definitions of Cultural Resource Categories and Data Sources		
Category	**Definition**	**Data Source(s)**
NR/SR: National and New Jersey Registers Listed Historic Properties	Historic Properties Listed on the National Register of Historic Places (NRHP) and the New Jersey (State) Register of Historic Places (NJRHP) within 0.5 mile of the centerline of the Alternative	NRHP and NJRHP boundaries (polygons and point locations) were obtained from the files of the New Jersey Historic Preservation Office.
COE: Certificate of Eligibility	Historic Properties not already listed on the New Jersey Register of Historic Places (NJRHP) which have received a certification of eligibility from the New Jersey State Historic Preservation Officer within 0.5 mile of the centerline of the Alternative	Boundaries (polygons and point locations) of Historic Properties with a COE were obtained from the files of the New Jersey Historic Preservation Office.
DOE: Determination of Eligibility	Historic Properties which have received a determination of eligibility from the keeper of the National Register of Historic Places (NRHP) within 0.5 miles of the centerline of the Alternative	Boundaries (polygons and point locations) of Historic Properties with a DOE were obtained from the files of the New Jersey Historic Preservation Office.
SHPO Opinion: Historic Properties with a SHPO Opinion	Historic Properties within 0.5 mile of the centerline of an Alternative for which an opinion of eligibility has been issued by the State Historic Preservation Office. It is in response to a federally or state funded or permitted activity that will have an effect on historic properties not listed on the National Register.	Boundaries (polygons and point locations) of Historic Properties with a NJ SHPO Opinion were obtained from the files of the New Jersey Historic Preservation Office.
Archaeological Site	Previously recorded archaeological sites within 0.5 mile of the centerline of the Alternative	Boundaries (polygons and point locations) of archaeological sites registered with the New Jersey State Museum.

Table 6. Historic Architectural Properties within 0.5 Mile of Each Alternative Route		
Resource Name	**Eligibility Status**	**Alternative Route**
Morris Canal	NR/SR/ SHPO Opinion	A3, A3 with Option, B, C
Martin van Duyne House	NR/SR/ SHPO Opinion/DOE	A3, A3 with Option, B, C
Van Duyne – Jacobus House	NR/SR	A3, A3 with Option, B, C
Parsonage of the Montville Reformed Dutch Church (Cornelius Doremus House)	NR/SR	A3, A3 with Option, B
Davenport – Demarest House	NR/SR	A3, A3 with Option, B
Beach House	DOE	A3, A3 with Option, B
Stephen Condit House	NR/SR	A3, A3 with Option
Adoniram Pruden House	SHPO Opinion	B
Simon Van Duyne House	NR/SR	B, C

Table 6. Historic Architectural Properties within 0.5 Mile of Each Alternative Route		
Resource Name	**Eligibility Status**	**Alternative Route**
Roseland Switching Station	SHPO Opinion	B, C
Henry Doremus House	NR/SR	C
Morris Canal Bridge 98-A Site	NR/SR	C
Van Duyne Cider Mill	COE	C
Former Canal House	SHPO Opinion /DOE	C
James Van Duyne Farmhouse	NR/SR	C
Crane's Mill Complex (Demolished)	SHPO Opinion	C

Table 7. Prehistoric Properties within 0.5 Mile of Each Alternative Route		
Resource Name	**Eligibility Status**	**Alternative Route**
Steppel Site (28-Mr-1 and 28-Mr-53)	SR/ SHPO Opinion	B
Definis Archaeological Site (28-Mr-161)	SHPO Opinion/DOE	B

Table 8. Summary of Previously Identified Historic Properties and Archaeological Sites within 0.5 Mile of Each Alternative Route							
Alternative Route	**NR/SR (count)**	**SHPO Opinion (count)**	**DOE (count)**	**COE (count)**	**Total # Historic Properties (count)**	**Total # Previously Identified Archaeological Sites**	**Overall Potential Impacts to Cultural Resources**
A3	5	0	1	0	**6**	**20**	Moderate
A3 Option	5	0	1	0	**6**	**20**	Moderate
B	6	2	1	0	**9**	**39**	High
C	7	2	1	1	**11**	**37**	High



Sources: ESRI, 2012; USGS, 2012, NJDEP, 2007
Geographic CoordinateSystem:
NAD_1983_StatePlane_New_Jersey_FIPS_2900_Feet
Datum: North American Datum of 1983 (NAD83).
Projection: Transverse Mercator.
Linear Unit: Foot_US
Ellipsoid: Geodetic Reference System 80.

Figure 7: Cultural Resources

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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 impacted by the existing line, in addition to other development in the site vicinity.

As the second longest Alternative Route (7.7 miles), Alternative Route B has a high potential to impact cultural resources. A total of 5.2 miles would be built in either existing ROW or within partial existing ROW; 2.5 miles would be located within new ROW. As indicated in **Table 8**, there are 9 historic properties and 39 previously recorded archaeological sites within a 0.5 mile radius of this alternative. Alternative Route B does not cross any historic properties; however it originates at the Roseland Switching Station historic property. In addition, the majority of the archaeological sites are in the vicinity of proposed new ROW; including site 28-Mr-132 which the Alternative Route B crosses. As such, it is likely that Alternative Route B has a high potential to impact cultural resources.

Alternative Route C also has a high potential to impact cultural resources. Eleven historic properties, including an historic district, are within 0.5 mile of Alternative Route C, but it only directly crosses over the historic district, Morris Canal. In this area, Alternative Route C would involve rebuilding an existing 34.5 kV line. The change in structure height and removal of vegetation has the potential to increase indirect impacts to the NRHP listed Morris Canal Historic District and other architectural historic properties. There also are 37 archaeological sites within a 0.5-mile radius of Alternative Route C and Alternative Route C directly crosses previously identified archaeological sites 28-Mr-221 and 28-Ex-37 in areas where Alternative Route C would involve the construction of new ROW. Therefore, Alternative Route C is anticipated to result in the greatest potential impacts to historic properties and archaeological sites because the route would involve the most construction within new ROW.

Alternative Route A3 and the Alternative Route A3 Option have a moderate potential to impact cultural resources (see **Table 8**). Alternative Route A3 would require 0.8 mile of new ROW and the Alternative Route A3 Option would require 0.9 mile of new ROW. Portions of Alternative Route A3 and the Alternative Route A3 Option would involve additional construction of a new

transmission line in unoccupied corridors. However, both options are in close proximity to the existing lines and would not be expected to significantly increase potential impacts to cultural resources. Alternative Route A3 and the Alternative Route A3 Option are adjacent to an approximately 15-acre historic property, the Van Duyne – Jacobus House. This route and route option will use existing ROW in the area around the Van Duyne – Jacobus House; therefore, this historic property would not be impacted directly by the project. Within a 0.5-mile radius, there are a total of 20 sites near Alternative Route A3 and the Alternative Route A3 Option. Alternative Route A3 and the Alternative Route A3 Option cross archaeological site 28-Mr-132 in an area of new construction and archaeological site 28-Mr-263 within existing ROW.

All reasonable efforts will be made to avoid affecting archaeological resources. Where practical, archaeological resources identified in the transmission line corridor, in the direct path of any needed access roads, or at the locations of proposed work areas will be avoided by spanning any such resources or, if necessary, shifting tower positions, rerouting access roads, and reconfiguring or relocating work areas as deemed necessary.

JCP&L will continue to consult with the NJHPO throughout the planning, design, and construction process and conduct field work and surveys as necessary during the project permitting process to minimize potential impacts to cultural resources.

4.2.4 Built Environment Summary

In conclusion, after analyzing and comparing the three Alternate Routes against potential impacts on the built environment, Alternative Route A3 is preferred over other alternatives. Alternative Route A3 minimizes potential direct and indirect impacts to residential, commercial and industrial development, institutional uses, cultural resources, and land use. Alternative Route A3 would rebuild and/or parallel existing transmission line for the majority of its route. Therefore, Alternative Route A3 would result in minimal cumulative land use and aesthetic impacts. Alternative Route A3 deviates from paralleling the existing transmission corridor through the most developed portion of the Study Area. In this area, Alternative Route A3 would use a combination of new ROW and an undeveloped JCP&L easement. Although this detour

would result in land use changes by clearing a new ROW, doing so significantly reduces the number of residences within 500 feet of the new transmission line. As mentioned previously, Alternative Route A3 is the shortest route and would require the least amount of new ROW.

4.3 Natural Environment Impacts

Natural environment impacts include potential impacts to vegetation and habitat, surface waters, and conservation and recreation lands. Potential impacts discussed in this section are based on publically available maps and data as well as consultation with federal and state agencies. A comparison of the natural environment considerations for the three Alternative Routes and Alternative Route Option is presented in **Table 9**.

Table 9. Environmental Inventory: Natural Environment

Alternative Route	A3	A3 with Option	B	C
Wetlands/Streams				
Stream Crossings (#)	29	29	34	42
Crooked Brook	1	1	4	0
Crooked Brook tributary	2	2	3	0
Foulertons Brook	0	0	1	1
Foulertons Brook North	0	0	1	1
Foulertons Brook North tributary	0	0	1	1
Morris Canal	0	0	0	2
Passaic River	0	0	1	3
Passaic River tributary	0	0	5	25
Passaic Valley Brook	1	1	1	0
Pine Brook tributary	0	0	0	8
Rockaway River	1	1	3	0
Rockaway River tributary	8	8	13	0
Scow Ditch	2	2	0	0
Scow Ditch tributary	1	1	0	0
Smith Ditch	1	1	0	0
Smith Ditch tributary	6	6	0	0
South Brook tributary	0	0	0	1
Troy Brook	1	1	0	0
Un-coded tributary	1	1	1	0
Whippany River	1	1	0	0

Table 9. Environmental Inventory: Natural Environment				
Alternative Route	**A3**	**A3 with Option**	**B**	**C**
Whippany River tributary	3	3	0	0
Waterbody Crossings	1	1	1	0
NJDEP Wetland (miles)	5.0	5.0	5.6	5.8
FEMA Floodplain				
100 Year Floodplain (acres of ROW)	68.8	69.4	77	108.7
Forest Clearing				
Forest clearing based on imagery (acres)	41.6	43.4	80.0	113.0
Open Space/Conservation				
Protected Lands (miles)	2.5	2.5	1.5	3.5
NJDEP Green Acres (miles)	2.1	2.1	0.3	0.1
Municipal Park (miles)	0.4	0.4	1.2	3.4
Species of Special Concern Habitat (acres)	79.4	81.4	83.8	117.9
State Threatened Habitat (acres)	0.0	0.0	2.2	3.1
State Endangered Habitat (acres)	74.4	76.2	81.6	114.8
Federally-listed Species Habitat (acres)	0.0	0.0	0.0	0.0
Soils				
Prime Farmland (percent)	14.5%	14.5%	23.1%	19.7%
Farmland of Statewide Importance (percent)	1.4%	1.4%	1.4%	1.4%
Soil Types[1]				
Hydric Soils (percent)	55.7%	56.3%	35.6%	49.6%
Partially Hydric Soils (percent)	7.4%	7.4%	24.4%	21.7%
Non-Hydric Soils (percent)	32.9%	32.3%	36.0%	24.1%
Unknown Soils (percent)	4.0%	4.0%	4.0%	4.7%

[1]May not add to 100% due to rounding.

4.3.1 Soil and Water Resources

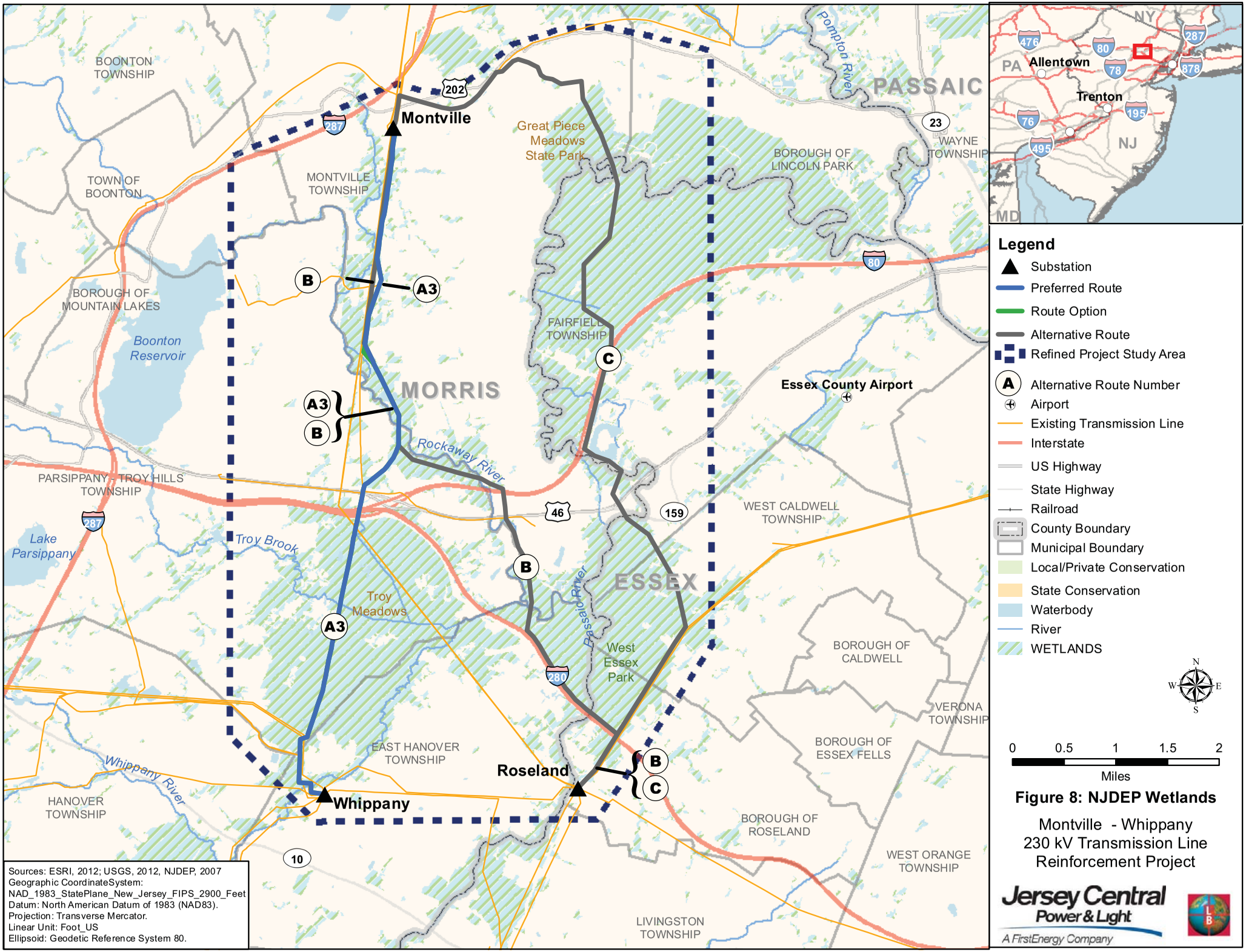
Transmission line construction activities such as vegetation clearing, access road construction, grading, and foundation construction can impact soil and water resources by disturbing the native structure of the soil and thereby creating areas of higher erosion potential, compaction, and lower soil permeability/fertility, and by delivering eroded soil to nearby streams through sedimentation. Direct impacts to hydrologic features are minimized or avoided by spanning wetlands, rivers or drainages when feasible. JCP&L will obtain all necessary permits and employ specified best management practices ("BMPs") to minimize potential impacts on jurisdictional wetlands as well as soil erosion and sedimentation during construction activities. Areas cleared within the

ROW will be re-vegetated with compatible species and maintained in accordance with JCP&L's Vegetation Management Plan and N.J.A.C. 14:5-9.6.

Prime farmland and farmland of statewide importance are special categories of highly productive cropland that is recognized and described by the National Resources Conservation Service ("NRCS"). Although there are both prime farmland and farmland of statewide importance soils located within the Study Area, agricultural use is not a significant land use in the Study Area, so current or future impacts on this resource as it pertains to agricultural production is not likely.

NRCS soil surveys and digital soils data were used to locate areas with soils typically found in wetlands. NRCS soil surveys group areas into soil map units, which consist of one or more soil types. For this analysis, soils were grouped into three categories based on soil survey information: hydric soils, hydric inclusion soils (partially hydric soils), and non-hydric soils. Soil map units that consist of over 50 percent hydric soil types were classified as hydric soils, soil map units that consist of up to 50 percent hydric soil types were classified as hydric inclusion soils, and soil map units that consist only of non-hydric soil types were classified as non-hydric soils. Areas with hydric and hydric inclusion soils have a greater probability of supporting wetlands than areas with non-hydric soils. As shown in **Table 9**, Alternative Route A3 and the Alternative Route A3 Option traverse the largest percentage of soils characterized as hydric. When the percentages of partially hydric soils are factored in to each Alternative Route, all three routes contain similar percentages (ranging from 60% to 72%) of hydric soils.

According to the NJDEP Freshwater Wetland mapping (**Figure 8**) and as shown on **Table 9**, Alternative Routes B and C would traverse the greatest distance of mapped wetlands (approximately 5.6 and 5.8 miles, respectively), while Alternative Route A3 and the Alternative Route A3 Option would traverse 5.0 miles each. In addition to crossing the fewer mapped wetlands, Alternative Route A3 would result in fewer impacts to wetlands, as it is the shortest route and would require the least amount of new ROW compared to the other Alternative Routes, which will disturb new areas over a longer distance. Alternative Route A3 and the Alternative Route A3 Option also minimize the amount of new wetland impacts by underbuilding existing transmission lines in a few locations.



Sources: ESRI, 2012; USGS, 2012, NJDEP, 2007
Geographic CoordinateSystem:
NAD_1983_StatePlane_New_Jersey_FIPS_2900_Feet
Datum: North American Datum of 1983 (NAD83).
Projection: Transverse Mercator.
Linear Unit: Foot_US
Ellipsoid: Geodetic Reference System 80.

Legend

- Substation
- Preferred Route
- Route Option
- Alternative Route
- Refined Project Study Area
- Alternative Route Number
- Airport
- Existing Transmission Line
- Interstate
- US Highway
- State Highway
- Railroad
- County Boundary
- Municipal Boundary
- Local/Private Conservation
- State Conservation
- Waterbody
- River
- WETLANDS

N W E S

0 0.5 1 1.5 2
Miles

Figure 8: NJDEP Wetlands

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The Study Area is located entirely within the Hackensack-Passaic watershed (USGS Cataloging Unit 02030103). The NJDEP Division of Watershed Management has divided watersheds in New Jersey into several Watershed Management Areas. The refined Study Area is located within the Upper Passaic, Whippany and Rockaway Watershed Management Area (WMA 6). WMA 6 includes watersheds draining from the headwaters in Morris County into the Pompton River drainage of New Jersey. The area lies mostly in Morris County and includes a small area of Essex County as well as the following sub-watersheds: Upper Passaic River, Mid Passaic River, Whippany River, and Rockaway River.

As shown in **Table 9**, Alternative Route C would traverse the greatest number of streams (42), compared to the remaining routes. Moreover, the majority of streams crossed by Alternative Route A3 and the Alternative Route A3 Option and some of the streams crossed by Alternative Route B are presently crossed by one or more existing transmission lines. Alternative Route A3 and the Alternative Route A3 Option would result in additional impacts to the Rockaway River riparian corridor. Certain streams within the Study Area are designated as Category One (C1) waters. C1 streams are protected from any measurable change in water quality because of their exceptional ecological, recreational, water supply, or fishery resource significance. As part of this protection, the State of New Jersey designates lands along C1 streams as a riparian buffer conservation zone (riparian zone). This zone extends 300 feet from each stream bank. C1 streams within the Study Area include unnamed tributaries to the Passaic River through the Great Piece Meadows Wildlife Preserve and the Boonton Reservoir. In addition, tributaries to designated C1 streams are also classified as C1 waters by the NJDEP. Depending on the extent of the riparian zone, placement of structures and associated impacts can be minimized based on an average structure spacing of approximately 800 feet. All stream channels would be crossed with aerial spans and no structures would be placed in streams.

Each of the Alternative Routes would involve similar environmental permitting requirements including the following:

- Freshwater Individual Permit for impacts greater than 1/2 acre;
- Flood Hazard Area Individual Permit for clearing of trees within the riparian zone;

- Soil Erosion and Sediment Control Certification;
- Green Acres Major Diversion;
- Wetland/Riparian/Flood Hazard Mitigation for permanent impacts to regulated areas; and
- NJDEP/USFWS coordination for Threatened and Endangered Species.

In addition, any of the routes selected are anticipated to have over 5 acres of wetland impacts, which would require U.S. Environmental Protection Agency review of NJDEP permits submitted for the Project. JCP&L will obtain all required permits prior to construction of the Project.

4.3.2 Vegetation

JCP&L attempted to minimize impacts to vegetation by considering routes that would use existing, cleared ROW. Clearing the ROW of vegetation, constructing transmission line structures, and moving vehicles along the ROW can affect soils in various ways, including altering physical properties, altering soil engineering properties, and increasing the potential for erosion. As shown in **Table 9**, Alternative Route A3, which uses the most existing ROW, would require the least amount of forest clearing (approximately 41.6 acres) while Alternative Route C, which uses the least existing ROW, would require the largest amount of forest clearing (approximately 113 acres). The Alternative Route A3 Option would slightly increase the amount of required tree clearing. Alternative Route B, which parallels or rebuilds existing transmission for about 36 percent of its route, would require approximately 67.4 acres of forest clearing. In areas that require new ROW, a 100- to 120-foot-wide ROW will be cleared and maintained in accordance with JCP&L's Vegetation Management Program. In cases where the route would parallel existing transmission lines, rail or roadways, the actual amount of forest clearing is expected to be less based on the amount of overlap with existing ROW.

Each Alternative Route traverses one Natural Heritage Priority Site identified by NJDEP. Alternative Route A3 and the Alternative Route A3 Option traverse Troy Meadows, Alternative Route B traverses West Essex Park and Alternative Route C traverses Great Piece Meadows Wildlife Preserve, which was identified as a Priority Wetland by the US Environmental Protection Agency. Troy Meadows is designated as a "National Natural Landmark" by the

National Park Service, a "New Jersey Natural Area" and also a "Natural Heritage Priority Site" by the NJDEP. Troy Meadows is classified as a "Priority Wetland" by the US Environmental Protection Agency and most of the meadows are classified as "Exceptional Resource Value Wetlands" by the NJDEP. Natural Heritage Priority Sites are critically important areas needed to conserve New Jersey's biological diversity, with particular emphasis on rare plant species and ecological communities. Natural Heritage Priority Sites are based on analysis of information in the New Jersey Natural Heritage Database. Troy Meadows and Great Piece Meadows contain a few global and state rare plant species; there are no critically imperiled plant species found within 1 mile of the project area in either wildlife preserve. Alternative Route A3 and the Alternative Route A3 Option would be constructed adjacent to existing transmission lines within new ROW through Troy Meadows. Therefore, permanent impacts would be limited to the transmission structure footprint and limited vegetation clearing, as the area is generally an open meadow and not forested. Conversely, Alternative Routes B and C would traverse through West Essex Park or Great Piece Meadows in a new, 120-foot-wide ROW. Significant tree clearing would be required for Alternative Route C through Great Piece Meadows.

According to the Natural Heritage Grid Map (NJDEP-ONLM), Alternative Route A3 and the Alternative Route A3 Option are within 1 mile of identified habitat for three rare plant species: humped bladderwort (*Utricularia gibba*), star duckweed (*Lemna trisulca*) and low spearwort (*Ranunculus pusillus var. pusillus*). Through its Natural Heritage Database, the NJDEP-ONLM documents rare plant species and rare ecological community habitat to inform decision-makers who need to address the conservation of natural resources. The Natural Heritage Grid Map is a GIS file that provides a general portrayal of the geographic locations of rare plant species and rare ecological communities for the entire state without providing sensitive detailed information.

Alternative Route B is within 1 mile of four rare plant species: swamp cottonwood (*Populus heterophylla*), cat-tail sedge (*Carex typhina*), star duckweed, and low spearwort. Alternative Route C is within 1 mile of four rare plant species: winged monkey-flower (*Mimulus alatus*), tufted loosestrife (*Lysimachia thyrsiflora*), swamp cottonwood, and cat-tail sedge. If during field inspections, potential habitat for listed rare plant species is identified within the Preferred Route, efforts will be made to minimize impacts to potential habitat and mitigate for impacts, if

required. Species specific surveys will be conducted for listed rare plant species if required by the NJDEP.

4.3.3 Wildlife

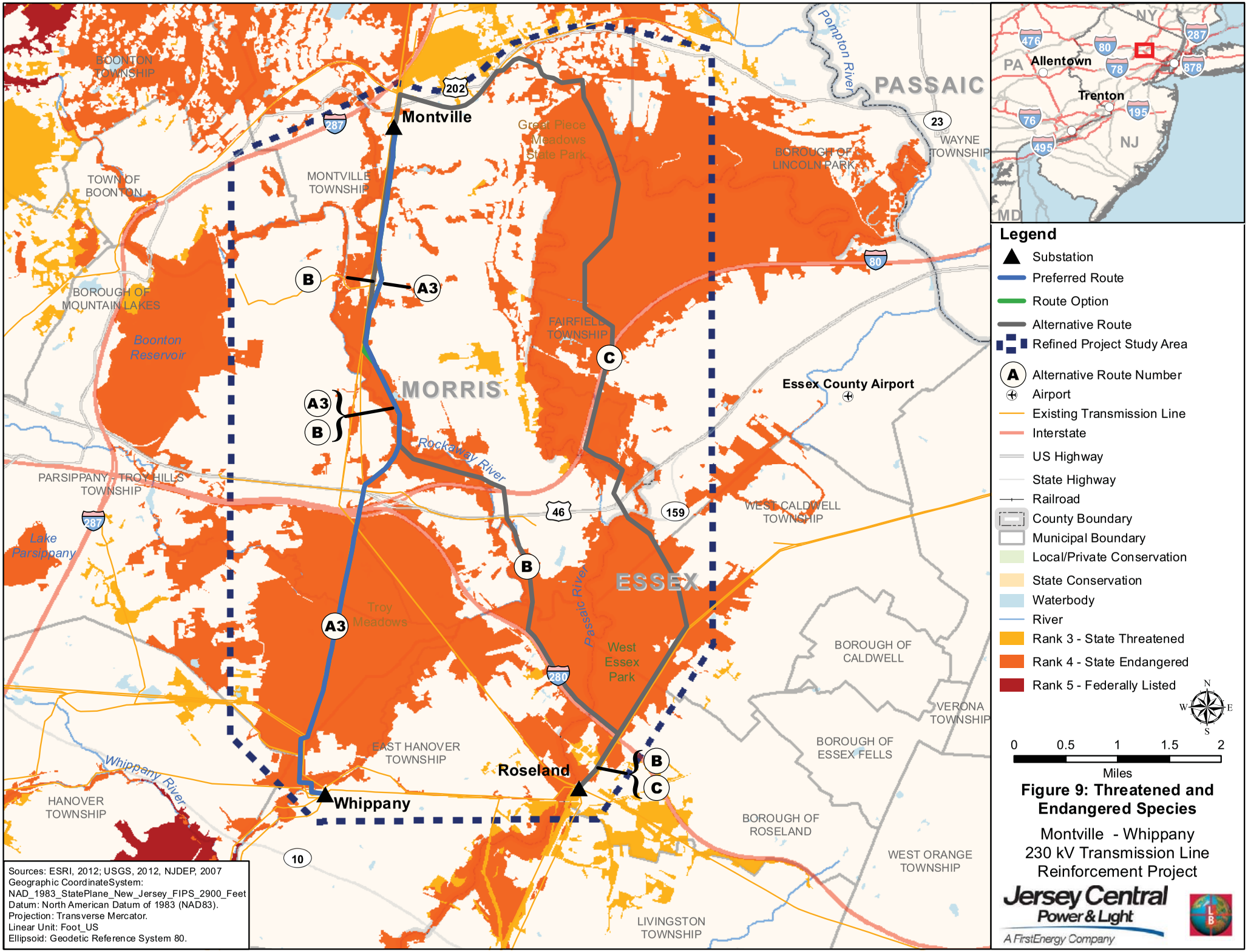
Wildlife habitat crossed by the Alternative Routes varies from developed areas, to forested areas, to wetland areas. Wildlife habitat in proximity to all three Alternative Routes can be expected to host a wide diversity of wildlife. By locating routes within or partially within existing ROW, JCP&L limits the amount of new forest clearing required to construct and maintain the new transmission line, which minimizes impacts to wildlife.

Threatened and Endangered Species within the Study Area

Information regarding the historic or current presence of Federal and/or State-listed endangered, threatened, special concern, proposed, or candidate species, or habitat to support those species located in the vicinity of the project area was obtained from the U.S. Fish and Wildlife Service ("USFWS") website and NJDEP Landscape Project Mapping (Version 3.1). This information is shown in **Figure 9**.

The New Jersey Field Office of the USFWS now requires the use of the Information, Planning, and Conservation ("IPaC") planning tool to obtain an official species list in a determined project area. According to the USFWS IPaC[11], the following species have been documented within the refined Study Area (municipalities of Boonton (Town), Denville, Morris Plains, Hanover, Montville, Parsippany – Troy Hills, East Hanover, Fairfield, West Caldwell, and Roseland): Indiana bat (*Myotis sodalis*) (federal endangered), bog turtle (*Glyptemys muhlenbergii*) (federal threatened), and northern long-eared Bat (*Myotis septentrionalis*) (proposed federal endangered).

[11] http://ecos.fws.gov/ipac/



Sources: ESRI, 2012; USGS, 2012, NJDEP, 2007
Geographic CoordinateSystem:
NAD_1983_StatePlane_New_Jersey_FIPS_2900_Feet
Datum: North American Datum of 1983 (NAD83).
Projection: Transverse Mercator.
Linear Unit: Foot_US
Ellipsoid: Geodetic Reference System 80.

Figure 9: Threatened and Endangered Species

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The NJDEP Landscape Project is a landscape-level approach to the conservation of imperiled wildlife species in New Jersey. The Landscape Project geographic information system depicts critical wildlife habitat through the integration of species location data, land-use/land-cover, and species life history information. Based on Landscape Project Mapping, the following threatened or endangered species were identified within the vicinity of each of the Alternative Routes: barred owl (*Strix varia*), long-eared owl (*Asio otus*), bald eagle (*Haliaeetus leucocephalus*), red-shouldered hawk (*Buteo lineatus*) and bobcat (*Lynx rufus*). In addition, the Landscape Project Mapping has identified wood turtle (*Glyptemys insculpta*), blue-spotted salamander (*Ambystoma laterale*), and northern harrier (*Circus cyaneus*) within the vicinity of Alternative Route A3 and Alternative Route A3 Option. Wood turtle and blue-spotted salamander were identified within the vicinity of Alternative Route C.

A habitat assessment for listed species will be conducted during detailed field investigations on the Preferred Route. If required by the USFWS and/or NJDEP, JCP&L will complete species specific field surveys and submit a survey report to the USFWS and/or NJDEP for concurrence with the survey findings. To minimize potential construction related impacts to state-listed plant and wildlife species, JCP&L would adhere to permit conditions imposing seasonal work restrictions based on sensitive life stages. Construction activities likely to cause adverse effects will not be performed during certain restricted time periods.

Impacts on Wildlife and Preservation Lands

All Alternative Routes parallel existing linear ROWs (i.e., transmission line, railroad and/or roadway ROWs) for a portion of the proposed routes. In these locations, no new edge habitat will be created and forest fragmentation will be minimized. In areas where the Alternative Routes parallel existing ROWs, construction will not create new edge habitat. Construction parallel to existing ROWs will clear edge forest, where present, so existing edge wildlife species will continue to have suitable habitat following construction. Interior habitat area will decrease, but not as much as it would if the ROW were constructed in otherwise undisturbed areas.

In areas where the ROW will go through relatively undisturbed tracts of forest, ROW clearing will result in forest fragmentation and the creation of edge habitat. Although edge habitat

provides habitat for a wide diversity and abundance of species, such as deer, songbirds, red-tailed hawks, and red fox, species that require forest interior habitat will lose habitat and be forced to disperse to interior forest areas.

Once the line is built, there will be limited vegetation cutting during scheduled ROW maintenance that will cause short-term disturbance of wildlife in the immediate vicinity of such activities. Animals that inhabit shrubs and small trees that have grown within the ROW will be displaced to adjacent habitats. Vegetation clearing will be conducted in compliance with the NJDEP-approved "JCP&L Multi-Permit Application Supplemental Information Describing Practices for Maintenance Work in Water Resources Areas," dated June 3, 2010. During ROW maintenance, herbicide application will comply with all applicable federal, state, and local laws and regulations, including the U.S. Department of Agriculture, New Jersey Department of Agriculture, and USEPA and will not pose a threat to wildlife. The relatively low frequency of this activity (every 3 to 6 years) will reduce most impacts to wildlife.

The Project is expected to have minimal impacts on birds. The Project will follow all Avian Power Line Interaction Committee ("APLIC") methods identified in Avian Protection Plan Guidelines (USFWS, 2005[12]) and Reducing Avian Collisions with Power Lines: State of the Art in 2012 (APLIC, 2012[13]). The conductors on the proposed line are spaced at a minimum of 24 feet apart (horizontally) and 12.5 feet (vertically). This is farther apart than the wing-span of the largest raptor that may be found in the project area (bald eagle); therefore, electrocution is not likely to occur. However, bird collision with the conductors, shield wires, and towers is possible. Shield wires are of particular concern because birds fly over the larger, more visible conductors and are less able to see the less-visible shield wires above. Waterfowl are particularly susceptible to collision because they are less adept while flying. Raptors are less susceptible to collisions because of their keen eyesight and high maneuverability in flight.

[12] http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/APP/AVIAN%20PROTECTION%20PLAN%20FINAL%204%2019%2005.pdf

[13] http://www.eei.org/products/Pages/ReducingAvianCollisions.aspx

Potential impacts on habitat can be evaluated by comparing each route with regard to forest cover, wetlands, length and percent parallel (**Table 4**). As previously stated, Alternative Route A3 requires the least amount of forest clearing and crosses the lowest acreage of wetlands. In contrast, Alternative Route C has the largest amount of forest clearing and has the greatest acreage of wetlands. Alternative Route A3 is likely to have the least impact on wildlife, because it requires the least amount of forest clearing, has the highest percentage of its length within existing transmission line ROW and is the shortest. In addition, since a significant portion of Alternative Route A3 consists of existing cleared transmission ROW, permanent impacts to wetlands, including the conversion of forested wetlands to scrub-shrub or emergent wetland, would primarily occur from the placement of structure foundations. For these reasons, Alternative Route A3 is likely to have the lowest impact on wildlife.

4.3.4 Natural Environment Summary

In conclusion, after analyzing and comparing the potential impacts to the natural environment for the three Alternative Routes, Alternative Route A3 is preferred over other Alternative Routes. The majority of Alternative Route A3 would be constructed within existing transmission ROW and, therefore, would result in minimal changes to the existing plant communities and wildlife habitat (i.e., conversion of a forested wetland to an emergent wetland). Alternative Route A3 would require tree clearing through Troy Meadows and ROW that is currently undeveloped; however, it would require significantly less tree clearing than Alternative Routes B and C. Forest clearing can result in numerous impacts including forest fragmentation and creation of new edge habitat, wetland function modification, soil erosion and increased stormwater runoff. Therefore, Alternative Route A3 would be the preferred alternative from a natural environment perspective, due to the use of existing transmission line ROWs and eliminating the need to clear additional forest cover and impact wildlife habitat.

4.4 Selection of the Preferred Route

Based on a qualitative and quantitative review of information obtained from GIS data, existing easements, field reconnaissance, and extensive public outreach as well as engineering and financial estimates for this Project, the Routing Team selected **Alternative Route A3** as the Preferred Route.

The Routing Team believes that the cumulative social, environmental, and financial impacts associated with constructing Alternative Route A3 will be less than any other Alternative Route. Specifically:

- Alternative Route A3 is the shortest route into the Montville Substation.
- Approximately 73 percent of Alternative Route A3 parallels or rebuilds existing transmission lines, compared to 35 percent of Alternative Route B and 32 percent for Alternative Route C.
- Approximately 89 percent (6.2 miles) of Alternative Route A3 can be constructed entirely within or partially within existing transmission ROW.
- Alternative Route A3 avoids traversing a densely populated portion of the Study Area that would require purchasing residential homes in order to construct adjacent to existing electric transmission and natural gas lines.
- No residences are located within the 100- to 120-foot-wide ROW that would need to be purchased, and only two residences are located within 75 feet of the transmission centerline.
- Alternative Route A3 and the Alternative Route A3 Option have a moderate potential to impact cultural resources, while Alternative Route B and C have a high potential.
- From an environmental perspective, Alternative Route A3 significantly minimizes new impacts to forested and natural areas compared to Alternative Routes B and C.
- Alternative Route A3 and the Alternative Route A3 Option cross the least amount of streams and 100-year floodplain.
- Alternative Route A3 and the Alternative Route A3 Option would require approximately half the amount of tree clearing required for Alternative Routes B and C.
- Alternative Route A3 is estimated to cost $11.7 million to $39.6 million less than Alternative Routes B and C, respectively.

As stated in this report, the Study Area is largely split between dense residential and commercial development and sensitive wetland and other natural areas. New Jersey routing guidelines emphasize the use of existing utility and infrastructure corridors over new ROW where feasible, practical and safe.

JCP&L is willing to propose the Alternative Route A3 Option should The Meadows at Montville residential community desire to exchange ROW through this property. The Alternative Route A3 Option would involve exchanging the existing 170-foot-wide ROW through the Meadows of Montville with a new 170-foot-wide ROW located slightly farther to the west on The Meadows at Montville property, allowing the transmission line to be constructed farther away from The Meadows at Montville units.

5.0 AGENCY COORDINATION

At present, the USFWS will not respond to individual requests for project review if the project can be categorically excluded from review. As such, in accordance with USFWS direction, initial identification of federally listed threatened and endangered species is conducted utilizing the USFWS's interactive IPaC web-map[14].

If IPaC returns a result of "There are no listed species found within the vicinity of the project," no further action is required. The New Jersey Field Office ("NJFO") provides an online letter stating this policy of not providing concurrence with a "no effect" determination. (Note that under the Endangered Species Act ("ESA"), a species list is valid for only 90 days. New occurrences of listed and candidate species and potentially suitable habitat are discovered periodically. The NJFO, therefore, recommends visiting its website at regular intervals during project planning and implementation for updates to species lists and information.)

If IPaC identifies the potential for Indiana bat and/or Northern long-eared bat within the proposed project, and the project involves certain activities including clearing of tree, initial coordination with the USFWS is required. If IPaC identifies one or more federally listed, proposed, or candidate species as potentially present in the action area of the proposed project, other than bats, initial coordination with the USFWS is required.

The New Jersey Natural Heritage Program ("NHP") maintains a computer database of reported sightings of rare plants, animals, and natural communities in the state. The NHP also maintains records of species listed as endangered or threatened by the USFWS. The NJDEP uses the Landscape Project mapping to identify critical wildlife habitat in accordance with land use regulations, including the Freshwater Wetlands Protection Act Rules (N.J.A.C. 7:7A) and Flood Hazard Area Control Act Rules (N.J.A.C. 7:13). The NJDEP Landscape Project is a landscape-level approach to the conservation of imperiled wildlife species in New Jersey. Request for

[14] http://ecos.fws.gov/ipac/

information regarding the presence of threatened and endangered species within the vicinity of the Alternative Routes will be submitted to the NJDEP and the NHP.

During the design process, FirstEnergy will coordinate with the NJDEP Division of Land Use Regulation to arrange a pre-application meeting at the NJDEP Office in Trenton, New Jersey to discuss the appropriate environmental permit required for the project. The pre-application process will identify specific program policies and the extent of any special studies and/or required application materials that are necessary.

As part of the cultural resource assessment, consultation letters will also be submitted to the New Jersey Historic Preservation Office ("NJHPO") and the New Jersey State Museum ("NJSM"). Additionally, as required by N.J.A.C. 7:4, letters will be sent out to interested parties (such as historical societies and historic preservation groups) to solicit information once the permitting process begins.