

EXHIBIT C – SITING ANALYSIS

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EXHIBIT C – SITING ANALYSIS

1.0 Introduction

PPL Electric and its routing consultant team The Louis Berger Group, Inc. and Commonwealth Associates, Inc. (Berger/CAI), along with public outreach and other specialty consultants, undertook a 6-month program of identifying potential routes from the Susquehanna Substation to the Delaware River. This program involved intensive analysis through reviewing maps, Geographic Information Systems (GIS) data sets, and aerial photography; conducting field analysis; and subsequently identifying three Alternative Routes for further evaluation.

2.0 Alternative Route Descriptions

After carefully analyzing and evaluating the potential route link network developed through the mapping and field work described previously, PPL Electric identified three Alternative Routes that could be used for the Pennsylvania portion of the Susquehanna-Roseland 500 kV Transmission Line project. The three routes, identified as Routes A, B, and C, were announced publicly on June 5, 2008 via newspaper articles, the project website (www.pplreliablepower.com), and other media announcements. The three routes selected represent the routing team's best efforts at identifying viable route alternatives that (1) meet the stated project purpose, goals, and objectives in the most environmental, socially, and economically responsible manner; and (2) complement the efforts of the PSE&G routing team through New Jersey so that each utility's routes meet at a common point at the Delaware River crossing. Where practical, the routes follow paths of existing power lines or where the company already owns property or has property rights through easements or other similar agreements. However, all three routes require the company to purchase some amount of new right-of-way. The paths that the Alternative Routes would take are discussed in more detail below.

Alternative Route A

Route A begins at the PPL Electric Susquehanna Substation near Berwick and travels northeast through Luzerne and Lackawanna Counties on the path of an existing 230 kV power line. The line then travels east through Lackawanna and Wayne Counties primarily on the path of existing power lines, then heads east-southeast through Pike County and crosses the Delaware River at a point north of Milford.

Specifically, Route A leaves the Susquehanna Substation and travels 29.7 miles through Luzerne County, including the townships of Salem, Union, Hunlock, Plymouth, and Jackson; Larksville and Courtdale Boroughs; Kingston Township; West Wyoming Borough; and Exeter Township, to a point near PPL Electric's Stanton Substation north of the community of Harding near the Susquehanna River. PPL Electric plans to use the existing transmission structures and lines in this segment of Route A, which were constructed in the 1980s to accommodate a 500 kV line but currently operate at 230 kV. In addition, a 0.9-mile section of new 500 kV single circuit

transmission line would be constructed from the Susquehanna Substation north to a connection point with the existing 500/230 kV line.

Route A then crosses the Susquehanna River, continuing northeast for approximately 13.4 miles through Lackawanna County and the municipalities of Ransom Township, Newton Township, South Abington Township, Scranton City, Scott Township, Dickson City Borough, and Blakely Borough, to PPL Electric's Lackawanna Substation. In this segment, a new 500 kV line would be constructed adjacent to and northwest of an existing 230 kV line on existing PPL Electric right-of-way.

From the Lackawanna Substation, Route A travels north and east for approximately 8.4 miles through Lackawanna County and the municipalities of Archbald Borough and Jefferson Township, to a point near and east of PPL Electric's Peckville Substation where it meets PPL Electric's existing Peckville-Blooming Grove 230 kV Line. Approximately 65 percent of this segment is located in an easement where PPL Electric previously secured rights-of-way for future use; use of the remaining 35 percent of this segment is being negotiated with the current property owners.

East of Peckville, Route A travels east for approximately 2.2 miles through Lackawanna County (Jefferson Township), 14.6 miles through Wayne County (South Canaan, Lake, Paupack, and Palmyra Townships), and 2.7 miles through Pike County (Palmyra Township) to a point east of Lake Wallenpaupack and Hawley. This 19.5-mile segment would be located within the existing right-of-way of PPL Electric's Peckville-Blooming Grove 230 kV Line. In this segment, the existing 230 kV structures would be removed and replaced with new structures that would carry both the existing 230 kV as well as the new Susquehanna-Roseland 500 kV Transmission Line.

East of Hawley, Route A leaves the existing Peckville Blooming Grove 230 kV line right-of-way and travels east-southeast for approximately 24.5 miles through predominantly forested lands in Pike County, including the townships of Palmyra, Shohola, and Westfall, at which point it crosses the Delaware River approximately 2.5 miles northeast of Milford near Routes 6 and 209 and Interstate I-84. PPL Electric has no existing facilities or easements in this 24.5-mile segment of Pike County, and would need to secure rights-of-way from property owners throughout the segment. Route A in this area was routed to avoid, to the extent feasible, the large and small area constraints identified in Exhibit B and cross the Delaware River near the northernmost part of the Delaware Water Gap National Recreation Area (DEWA). The route does parallel an existing underground pipeline right-of-way for approximately 5 to 6 miles to take advantage of previously disturbed land areas to the extent possible. New 500 kV structures, operating as a single circuit, but built for future double circuit operation, would be constructed in this segment.

Alternative Route B (Preferred Route)

Alternative Route B begins at the PPL Electric Susquehanna Substation near Berwick and travels northeast through Luzerne and Lackawanna Counties on the path of an existing 230 kV power line. The line then travels east through Lackawanna, Wayne, and Pike Counties primarily on the path of existing power lines, then heads south through Pike County, crossing the Delaware River near the community of Shoemakers in Monroe County.

Alternative Route B, which PPL Electric has identified as its Preferred Route for the Susquehanna-Roseland 500 kV Transmission Line, is broken into the following five segments:

- Segment 1 – Susquehanna Substation to Stanton Substation
- Segment 2 – Stanton Substation to Lackawanna Substation
- Segment 3 – Lackawanna Substation to Jefferson Township
- Segment 4 - Jefferson Township to Lake Wallenpaupack
- Segment 5 – Lake Wallenpaupack to Delaware River

These segments are referenced where appropriate throughout subsequent discussions of Route B to more easily identify the general location of geographical places or specific elements of the project.

Specifically, the Preferred Route leaves the PPL Electric Susquehanna Substation and travels 29.7 miles through Luzerne County, including the townships of Salem, Union, Hunlock, Plymouth, and Jackson; Larksville and Courtdale Boroughs; Kingston Township; West Wyoming Borough; and Exeter Township, to a point near PPL Electric's Stanton Substation north of the community of Harding near the Susquehanna River (Segment 1). PPL Electric plans to use the existing transmission structures and lines in this segment of Route B, which were constructed in the 1980s to accommodate a 500 kV line but currently operate at 230 kV. In addition, a 0.9-mile section of new 500 kV single circuit transmission line will be constructed from the Susquehanna Substation north to a connection point with the existing 500/230 kV line.

The Preferred Route then crosses the Susquehanna River, continuing northeast for approximately 13.4 miles through Lackawanna County, and the municipalities of Ransom Township, Newton Township, South Abington Township, Scranton City, Scott Township, Dickson City Borough, and Blakely Borough to PPL Electric's Lackawanna Substation (Segment 2). In this segment, a new 500 kV line would be constructed adjacent to and northwest of an existing 230 kV line on existing PPL Electric right-of-way.

From the Lackawanna Substation, the Preferred Route travels north and east for approximately 8.4 miles through Lackawanna County, including the municipalities of Archbald Borough and Jefferson Township, to a point near and east of PPL Electric's Peckville Substation where it meets PPL Electric's existing Peckville-Blooming Grove 230 kV Line (Segment 3). Approximately 65 percent of this segment is located in an easement where PPL Electric previously secured rights-of-way for future use; use of the remaining 35 percent of this segment is being negotiated with the current property owners.

East of Peckville, the Preferred Route travels east for approximately 2.2 miles through Lackawanna County (Jefferson Township), 14.6 miles through Wayne County (South Canaan, Lake, Paupack, and Palmyra Townships), and 2.7 miles through Pike County (Palmyra Township) to a point east of Lake Wallenpaupack and Hawley (Segment 4). This 19.5-mile segment would be located within the existing right-of-way of PPL Electric's Peckville-Blooming Grove 230 kV line. In this segment, the existing 230 kV structures would be removed and replaced with new structures that would carry both the existing 230 kV as well as the new Susquehanna-Roseland 500 kV Transmission Line.

East of Hawley, the Route B turns sharply to the south and continues along the Peckville-Blooming Grove 230 kV line to PPL Electric's Blooming Grove Substation, where it then follows the existing Bushkill-Blooming Grove 230 kV line south-southeast toward Bushkill and the community of Shoemakers on the edge of the DEWA (Segment 5). This 29.2-mile segment includes approximately 27.6 miles through Pike County (including Palmyra, Blooming Grove, Greene, Porter, and Lehman Townships) and 1.5 miles through Monroe County (Middle Smithfield Township) and traverses largely forested area, including approximately 15.4 miles of the Delaware State Forest, on existing PPL Electric right-of-way. South of the State Forest, the route passes through the Saw Creek Estates residential development on existing PPL Electric right-of-way. At Shoemakers, the line turns east-southeast to follow the existing 230 kV line for approximately 1.5 miles across the northernmost part of the Fernwood Resort golf course and through the DEWA to the Delaware River. Throughout this entire segment—including the crossing of the Delaware River—the existing 230 kV transmission line and structures would be removed and replaced with new structures that would carry both the existing 230 kV line and the new Susquehanna-Roseland 500 kV Transmission Line.

Alternative Route C

Route C also begins at the PPL Electric Susquehanna Substation near Berwick and travels south primarily on an existing future-use right-of-way through Luzerne and Schuylkill Counties. The route then travels east primarily on future-use or existing transmission power line rights-of-way in Schuylkill and Lehigh counties. The route continues east primarily on future-use or existing transmission line routes in Lehigh and Northampton Counties and crosses the Delaware River near PPL Electric's Martins Creek and Lower Mount Bethel power plants at Martins Creek.

Specifically, Route C leaves the Susquehanna Substation in Salem Township and travels south and southeast across U.S. Route 11 and the Susquehanna River into Nescopeck Township for approximately 1.75 miles and then turns west for approximately 1.6 miles. The new 500 kV line would be installed on the vacant side of the existing Sunbury-Susquehanna 500 kV Line for the above-mentioned line segments. The existing Sunbury-Susquehanna 500 kV Line was designed to accommodate two 500 kV circuits, although initially only one circuit was installed.

The route then leaves the existing 500 kV line and heads generally south on existing, vacant PPL Electric future use right-of-way for approximately 8.3 miles through Luzerne County (Nescopeck and Black Creek Townships) and 14.5 miles through Schuylkill County (North Union, East Union, Union, Mahanoy, West Mahanoy, Ryan, Blythe, and New Castle Townships, as well as Shenandoah and Gilberton Boroughs) to a point southeast of Frackville within State Game Land 326. There are some "gaps" (approximately 25 percent of the line route) in the future use right-of-way in this area where PPL Electric would need to negotiate the required easements. Throughout this section, the line would be constructed for double circuit operation, although initially only one circuit would be installed.

At this point, Route C heads eastward for 15.5 miles through Schuylkill County, including 8 miles on vacant future use right-of-way through New Castle, Blythe, and Schuylkill Townships; and 7.5 miles paralleling the existing Siegfried-Frackville #1 230 kV transmission line on the south side of the existing right-of-way through Schuylkill, Walker, and West Penn Townships. The route diverts from the existing 230 kV line for approximately 1.5 miles at one point in Walker Township before rejoining the line. Similar to the future use right-of-way situation in the north-south part of Route C between Susquehanna and Frackville, there are also some gaps in the future use right-of-way and additional easements would need to be negotiated to fill in these gaps. Throughout this section, new 500 kV line would be built for double circuit but operated at single circuit initially.

Beginning in West Penn Township, Route C merges with the existing Siegfried-Frackville #1 230 kV Line and travels for 16.1 miles, 7.3 miles through Schuylkill County (West Penn Township), across the Kittatinny Ridge and Appalachian Trail, and another 8.8 miles through Lehigh County (Lynn, Heidelberg, and Washington Townships) to a point just east of the Pennsylvania Turnpike (I-476) south of the community of Newhard. The existing 230 kV line would be removed and replaced with new structures that would hold the proposed 500 kV line and reestablish the removed 230 kV circuit.

Route C then leaves the existing 230 kV line and heads northeast on PPL Electric vacant, future use right-of-way for approximately 2.2 miles through Lehigh County (Washington Township) and 4.5 miles through Northampton County (Lehigh Township), where it would need to tie in to a new 500 kV switching station to be located on PPL Electric-owned property near the community of Bossards Corner. From the new 500 kV switching station, the route continues north and east for 10.2 miles through Northampton County (Lehigh, Moore, and Bushkill Townships) on vacant, future use right-of-way to a point near the community of Katellen. Approximately 6 miles of this section through Moore Township parallels (i.e., within $\frac{1}{4}$ to $\frac{1}{2}$ mile at its nearest points) the south side of Blue Mountain. A new 500 kV line, built for double circuit 500 kV, but operating initially as a single circuit 500 kV line, would be constructed throughout the entire 16.9 miles of this future use right-of-way.

At this point, the route joins the existing Martins Creek-Siegfried 230 kV Line, where it parallels this line on its south side in existing right-of-way for 15.9 miles through Northampton County (Bushkill, Plainfield, Washington, and Lower Mt. Bethel Townships) until it crosses the Delaware River immediately north of PPL Electric's Mt. Bethel power plant near Martins Creek. A new 500 kV line, built for double circuit 500 kV, but operating initially as a single circuit 500 kV line, would be constructed throughout this entire section.

Once the Alternative Routes were identified, PPL Electric and the routing team held public workshops throughout the project study area; consulted with various federal, state, and local regulatory and resource agencies and other stakeholders; and conducted additional analysis of the three routes comparing land use, zoning, rights-of-way, environmental impacts, cost, and public input to identify a preferred route for the Susquehanna-Roseland 500 kV Transmission Line through Pennsylvania. The result of this process was documented in an Alternative Route Identification Report, which is the basis for much of the information contained in Exhibits B and C of the Application.

3.0 Right-of-Way and Structure Considerations

The selection of the Preferred Route considered the right-of-way and structure configurations that were likely to be used. These considerations varied for each of the three Alternative Routes identified. Table C-1 identifies the expected line configuration for each Alternative Route based on PPL Electric’s current understanding of right-of-way, electrical system, and engineering considerations.

Table C-1. Structure and Right-of-Way Considerations by Alternative Route				
Route	Segment	Length (miles)	ROW Width and Clearance	Proposed Structures, System, and ROW Configuration
A and B	Susquehanna Substation to Stanton Substation (Segment 1)	29.7	200 ft	Use existing 500 kV structures currently operating at 230 kV; replace older overhead ground wire with fiber optic cable; inspect clearances to ensure adequacy for higher voltage; little or no clearing expected; would require 0.9 mile of new line from the Susquehanna Substation on PPL property to connect to PPL Electric 500 kV substation instead of the 230 kV substation; line would be taken out of the Stanton 230 kV Substation, bypassing Stanton without connecting there.
A and B	Stanton Substation to Lackawanna Substation (Segment 2)	13.4	325 ft, generally cleared to 100 ft with some areas cleared to 150 ft	Construct new 500 kV line parallel to existing 230 kV line on northwest side; clear up to an additional 200 ft for the full 325 ft; Lackawanna substation would be expanded for new 500 kV yard on PPL Electric-owned property.
A and B	Lackawanna Substation to Jefferson Township (Segment 3)	8.4	350 feet, uncleared, vacant future use, with some gaps	Secure ROW gaps (approximately 3.2 miles); clear ROW to 200 ft; construct new 500 kV line for future double circuit.
A and B	Jefferson Township to Lake Wallenpaupack (Segment 4)	19.5	200 feet, cleared to 150 ft in wooded areas, with some 100 ft ROW in open areas	Replace existing 230 kV line and structures with new structures to double circuit new 500 kV on one side and existing 230 kV on the other; line would twice parallel an existing 69 kV line, once for 5.1 miles and again for 6.6 miles; some additional ROW will be needed in the 100 ft open areas; clear to 200 ft, additional clearing of approximately 50 ft needed in some wooded areas.
A	Lake Wallenpaupack to Delaware River crossing north of Milford	24.5	No existing ROW	Secure new ROW for entire length; clear new ROW (primarily forested) to 200 ft; construct new 500 kV transmission line built for double circuit but operated at single circuit initially.
B	Lake Wallenpaupack to Delaware River crossing at Bushkill/ DEWA (Segment 5)	29.2	200 ft, generally cleared to 150 ft; through DEWA, width mostly undefined, with 50-ft building restriction on each side of centerline; some widths 100 ft, with 325 ft closest to the Delaware River	Replace existing antiquated 230 kV line and structures with new line built for double circuit proposed 500 kV on one side and original 230 kV on the other; line would parallel an existing 69 kV line for 10.8 miles; clear to 200 ft; minimize additional clearing in residential areas.

Table C-1. Structure and Right-of-Way Considerations by Alternative Route				
Route	Segment	Length (miles)	ROW Width and Clearance	Proposed Structures, System, and ROW Configuration
C	Susquehanna Substation across Susquehanna River to Nescopeck Township	3.4	200 ft, cleared to 200 ft	Use existing single circuit 500 kV line across river, built for double circuit, string second set of conductors on opposite side of structures. No additional clearing expected.
C	Nescopeck Township to Frackville area	22.8	200 ft, uncleared vacant future use, with some gaps	Secure ROW gaps (approximately 25%); clear ROW to 200 ft; construct new 500 kV line built for double circuit but operated at single circuit initially.
C	Frackville area to Schuylkill Township	8.0	200 ft, uncleared vacant future use, with some gaps	Secure ROW gaps (approximately 25%); clear ROW to 200 ft; construct new 500 kV line built for double circuit but operated at single circuit initially.
C	Schuylkill Township to West Penn Township	7.5	200 ft, cleared to various widths depending on landscape	Construct new 500 kV line built for double circuit but operated at single circuit initially parallel to existing 230 kV line on south side; clear up to 175 ft depending on landscape.
C	West Penn Township to Washington Township, east of Pennsylvania Turnpike	16.1	200 ft, cleared to various widths depending on landscape	Replace existing 230 kV line with new line designed to carry new 500 kV line on one side and existing 230 kV line on the other. Includes crossing of Appalachian Trail
C	Washington Township, east of Pennsylvania Turnpike to Bossards Switchyard	6.7	200 ft, vacant future use	Construct new 500 kV line built for double circuit but operated at single circuit initially; wooded areas cleared to 200 feet. A new 500 kV switchyard would be constructed on PPL Electric-owned property near Bossards Corner.
C	Bossards Switchyard to Moore/Bushkill Township Border	10.2	200 ft, vacant future use	Construct new 500 kV line built for double circuit but operated at single circuit initially; wooded areas cleared to 200 feet.
C	Moore/Bushkill Township Border to Delaware River crossing at Martins Creek	15.9	200 ft, cleared to various widths depending on landscape	Construct new 500 kV line built for double circuit but operated at single circuit initially parallel to existing 230 kV line on south side; clear up to 175 ft depending on landscape.

ROW = Right-of-Way.

4.0 Environmental Inventory Mapping

The Alternative Routes were evaluated using the GIS data sources presented in Table B-1 (see Exhibit B) and a variety of other data sources and methods. A detailed list of sources used to identify and locate various data and resources during the routing process, and subsequently prepare the environmental and land use inventory of the three Alternative Routes identified in this study, is presented in Table C-2.

In addition to the comparative GIS layers obtained and other data layers as discussed in Section 6.0 of Exhibit B and shown in Table B-1, other quantitative and qualitative information on the three Alternative Routes was collected through readily available documents, field reconnaissance, information gained during the public outreach meetings in June and July 2008, and in consultation with various resource agencies, organizations, and County planning departments. Based on this information, a comparative analysis of several environmental, cultural, and land use resources along the Alternative Routes, as well as potential impacts on and possible mitigation of impacts on those resources, is presented below. Resources evaluated include geology and soils, surface water resources and aquatic species and habitat, wetlands, vegetation, wildlife, land use, recreation lands, cultural resources, and aesthetics.

Table C-2. Environmental and Land Use Inventory Data Sources		
Category	Definition	Units
NATURAL RESOURCES		
Slopes Crossed		
Less than 10% 10-15% 15-20% Greater than 20%	Characterization of lands crossed by percentage of slope. Slopes (in percent) derived from a digital elevation model (DEM) consisting of terrain elevations for ground positions at regularly spaced horizontal intervals (10 meters). The data used for this analysis was derived from the National Elevation Dataset (NED) prepared by the USGS.	Feet crossed
Hydrology		
Total Stream Crossings	All streams and creeks. The National Hydrography Dataset (NHD) is the source of these data. The NHD is a comprehensive set of digital spatial data prepared by the USGS and US EPA that contains information about surface water features such as lakes, ponds, streams, rivers, springs and wells. In addition, the NHD data were verified and adjusted as necessary by aerial photography.	Counts
Wetlands		
Freshwater Emergent Wetland Freshwater Forested/Shrub Wetland Freshwater Pond Riverine	Wetlands crossed by general wetland type. Wetland types are grouped based on the classification system developed by Cowardin et al., 1979. Data Source: The National Wetlands Inventory (NWI) of the U.S. Fish & Wildlife Service - The NWI produces information on the characteristics, extent, and status of the Nation's wetlands and deepwater habitats. The National Wetlands Inventory information is used by Federal, State, and local agencies, academic institutions, U.S. Congress, and the private sector for reviewing general wetland distribution for planning purposes.	Feet crossed
Designated Natural Lands		
State Forest State Park PA Game Land	Boundaries were downloaded from the Pennsylvania Spatial Data Access page. State Forest and State Park boundaries were created by Pennsylvania DCNR in 2006. Pennsylvania State Game Land data layer was prepared by the Pennsylvania Game Commission in 2003.	Feet Crossed
National Park Service	Property tract data with ownership was provided by the National Park Service, Delaware Water Gap National Recreation Area, Division of Research and Resource Planning, in May 2008.	Feet Crossed
LAND USE		
Land Use and Land Cover Types		
Land Use/Land Cover	Data Source: The National Land Cover Database 2001 (NLCD 2001) compiled by the Multi-Resolution Land Characteristics (MRLC) Consortium (including the U.S. Geological Survey, Environmental Protection Agency, U.S. Forest Service, National Oceanographic and Atmospheric Association, National Aeronautics and Space Administration, Bureau of Land Management, National Park Service, Natural Resource Conservation Service, and the U.S. Fish and Wildlife Service). NLCD 2001 products include 21 classes of land cover from Landsat satellite imagery.	Percentage of land use type within 1,000 feet of each side of the route centerline
Barren Land (Rock/Sand/Clay)	Unvegetated rocky or sandy land	
Cultivated Crops	Areas producing agricultural crops such as corn, soybeans, etc.	
Pasture/Hay	Land used for grazing and hay production	
Grassland/Herbaceous	Open grasslands	
Developed, Low, Medium and High Intensity	Land developed for residential, commercial, or industrial uses	
Developed, Open Space	Open space lands in developed areas	
Forest	Forest covered lands	
Wetlands	Areas of open water, such as lakes and large rivers, and forested and emergent wetland areas.	
Rights-of-Way		
Double Circuit 500 kV; Double Circuit 230 kV; Energize Existing 230 kV to 500 kV; Future Use ROW; Parallel To Existing 230 kV on Future Use ROW; Virgin ROW	Use of existing rights-of-way and construction presumed necessary by alternative (see Table C-1). Data acquired from PPL Electric and interpretation of PAMAP imagery.	Length in feet

Table C-2. Environmental and Land Use Inventory Data Sources		
Category	Definition	Units
Sensitive Public Resources		
Residences Within 75 ft Other Structures Within 75 ft Residences Within 100 ft Other Structures Within 100 ft Residences Within 250 ft Other Structures within 250 ft Churches Within 1,000 ft Schools Within 1,000 ft Cemeteries Within 1,000 ft	Residences, commercial buildings, outbuildings, and uncharacterized “buildings” were identified through aerial photo interpretation, field reconnaissance efforts, and GIS data sources. The first augmentation was conducted by incorporation of the routing team’s mapped notes derived from field reconnaissance efforts from points of public access. Through this process, buildings were identified by the type of building present (residence, outbuilding, commercial use building, etc.). Once the Alternative Routes were identified, a more focused aerial photo review was conducted within 500 feet of the Alternative Routes to allow for a reasonable tabulation of the number of residences, outbuildings, and commercial structures in close proximity to the Alternative Routes. This aerial photo review focused on the classification of buildings within 500 feet along the route that were not field-verified or identified previously. This final data layer version was used as a tool for general comparisons between the Alternative Routes. The locations of churches, schools, and cemeteries were derived from the USGS’ Geographic Names Information System (GNIS) and augmented through field reconnaissance efforts. This database serves as the Federal Government’s repository of information regarding feature name spellings and applications for features in United States and its Territories. The names listed in the inventory are often published on Federal maps, charts, and in other documents and have been used in emergency preparedness planning, site-selection and analysis, genealogical and historical research, and transportation routing. Whenever encountered in the field, the routing team recorded local schools, churches, and cemeteries to augment and verify this data layer.	Counts
New Forest Clearing		
Acres of clearing based on imagery and ROW estimates	Forested land and non-forested land were inventoried by manually digitizing “on-screen” using ArcMap (ESRI, Redlands, CA) geographic information system (GIS) software. All analysis was completed using photo interpretation of PAMAP imagery at a scale of 1:2000. Land was determined to be forested if tree canopy closure was visually estimated to be equal to or greater than 10 percent. Using the right-of-way assumption described in Table C-1, a GIS intersect was done to determine where new clearing on each Alternative Route would require clearing of forested land.	Area in acres

The maps for the project Study Area were developed by digitally compiling the most recent United States Geologic Survey (USGS) 1:24,000 scale maps of the area in conjunction with Geographic Information System (GIS) data provided by various federal, state and local sources, (Section 6.0 of Exhibit B). All of the data collected were included in a GIS program to provide the necessary graphic and informational results for this study. The maps were checked and confirmed by field investigations and meetings with local officials.

In addition, this Exhibit includes a series of 32 topographical maps at a scale of 1 inch equals 3,000 feet (1:36,000 scale) identifying the known natural and cultural environment elements within established distances of the three Alternative Routes as specified in the PUC Application regulations. A key map showing the locations of each of the 32 maps is also provided.

5.0 Environmental and Land Use Analysis

The routing team developed an environmental and land use inventory using the data identified in Table C-2, methodologies and GIS data described in Exhibit B, Section 6.0, and additional data collected during the field reconnaissance. This inventory is shown in Table C-3. The calculations presented in Table C-3 were made using available information and data. Unforeseen changes in land uses since the data were created may alter the calculations somewhat. However, this inventory does represent a useful method of quantifying and comparing the three Alternative Routes.

Table C-3. Environmental and Land Use Inventory of the Alternative Routes			
Parameter	Route		
	A	B	C
Total Route Length¹			
in Miles	96.7	101.1	90.6
in Feet	510,400	533,950	478,500
Slopes Crossed (linear feet crossed)			
Less than 10%	185,350	193,450	239,800
10-15%	109,300	112,500	86,150
15-20%	75,800	81,100	51,350
Greater than 20%	139,950	146,950	101,150
Hydrology (total number)			
Total Stream Crossings	76	78	67
NWI Wetlands (linear feet crossed)			
Freshwater Emergent Wetland	1,750	5,150	900
Freshwater Forested/Shrub Wetland	4,300	4,550	2,000
Freshwater Pond	750	950	950
Riverine	1,300	900	1,900
Wetland Total	8,100	11,550	5,750
NLCD Land Use Classifications (% crossed within 1,000 feet of line)			
Barren Land (Rock/Sand/Clay)	0.4	0.4	1.2
Cultivated Crops	1.9	1.6	18.1
Pasture/Hay	3.4	3.2	13.2
Grassland/Herbaceous	0.5	0.5	0.0
Shrub/Scrub	3.8	5.1	0.2
Developed, Low, Medium, and High Intensity	1.0	1.0	1.6
Developed, Open Space	2.2	3.6	6.2
Forest	85.4	82.7	58.0
Wetlands	1.5	1.9	1.6

Table C-3. Environmental and Land Use Inventory of the Alternative Routes			
Parameter	Route		
	A	B	C
Designated Natural Lands (linear feet crossed)			
State Forest	15,100	81,300	0
State Park	3,100	3,100	0
NPS	300	8,150	0
PA Game Lands	35,550	29,400	39,650
Buildings (total number)			
Residences within 75 feet of centerline	2	2	39
Other structures within 75 feet of centerline	8	10	17
Residences within 100 feet of centerline	5	8	63
Other structures within 100 feet of centerline	11	18	28
Residences within 250 feet of centerline	58	216	259
Other structures within 250 feet of centerline	35	47	121
Sensitive Public Resources (total number)			
Churches within 1,000 feet	0	0	0
Schools within 1,000 feet	0	0	0
Cemeteries within 1,000 feet	2	2	2
Rights-of-Way (linear feet crossed)			
Double circuit existing 230 kV with new 500 kV	102,950	257,050	85,200
	20%	48%	18%
Add new 500 kV to existing structures	0	0	18,050
	0%	0%	4%
Re-energize existing 230 kV to 500 kV	161,800	161,800	0
	32%	30%	0%
Future Use ROW ²	44,400	44,400	250,800
	9%	8%	52%
Parallel existing double circuit 230 kV with new 500 kV	70,750	70,750	124,500
	14%	13%	26%
Virgin ROW ³	130,550	0	0
	26%	0%	0%
New Forest Clearing (acres)⁴			
Acres of clearing	1,078	610	1,117

¹ Total length of line from Susquehanna Substation to Delaware River. The first 29.7 miles of both Routes A and B, plus 0.9 mile of connector 500 kV line at the substation, would require no additional structures, making the actual length of new construction 65.4 and 70.0 miles, respectively.

² Includes unsecured "gaps" in right-of-way corridor. Majority of right-of-way has been secured: approximately 3.2 miles of additional right-of-way would be needed on Routes A and B; approximately 14.3 miles would be needed on Route C.

³ No right-of-way currently exists. Requires acquisition of new easements.

⁴ Forested land and non-forested land were inventoried by manually digitizing "on-screen" using ArcMap (ESRI, Redlands, CA) GIS software. All analysis was completed using photo interpretation of PAMAP imagery at a scale of 1:2000. Land was determined to be forested if tree canopy closure was visually estimated to be equal to or greater than 10 percent. Using the right-of-way assumption described in Table C-1, a GIS intersect was done to determine where new clearing on each Alternative Route would require clearing of forested land.

In addition to the comparative GIS layers obtained and other data layers as discussed in Exhibit B and shown in Table B-1, other quantitative and qualitative information on the three Alternative Routes was collected through readily available documents, field reconnaissance, information gained during the public outreach meetings in June and July 2008, and in consultation with various resource agencies, organizations, and County planning departments. Based on this information, a comparative analysis of several environmental, cultural, and land use resources along the Alternative Routes, as well as potential impacts on and possible mitigation of impacts on those resources, is presented below. Resources evaluated include geology and soils, surface water resources and aquatic species and habitat, wetlands, vegetation, wildlife, land use, recreation lands, cultural resources, and aesthetics. Each of these resources is discussed in the following sections.

5.1 Geology and Soils

5.1.1 Geology and Terrain

The project study area is located in the northeastern portion of the Commonwealth in the Appalachian Plateau and Ridge and Valley Provinces. (A Province is a region having a pattern of relief features or landforms that differs significantly from that of adjacent regions.) The topography ranges from the rounded hills and valleys of the Glaciated Low Plateau Section to low to moderately high linear ridges of the Susquehanna Lowland Section (Sevon, 2000).

Routes A and B

Route A/B crosses two physiographic Provinces: the Appalachian Plateau Province and the Ridge and Valley Province. Within each Province, the route crosses a number of Sections. Each Section (i.e., a succession of rock units) is then composed of a number of individual geologic units or formations.

Route A/B begins in the Ridge and Valley Physiographic Province (Luzerne County), specifically the Susquehanna Lowland Section and heads northeast toward PPL Electric's Stanton Substation (Segment 1). This Section is described as having low to moderately high linear ridges with linear valleys, including the Susquehanna River Valley. The geology of the Section is predominately sandstone, siltstone, shale, conglomerate, limestone and dolomite. Elevations range from approximately 260 feet above mean sea level (amsl) to 1,715 feet amsl.

Route A/B continues northeast and crosses into the Appalachian Plateau Physiographic Province and the Glaciated Low Plateau Section (Segment 2). The route runs generally parallel to the Anthracite Valley Section of the Ridge and Valley Province. The Glaciated Low Plateau Section is characterized by rounded hills and valleys with low to moderate topographic relief. The underlying rock types of this section are sandstones, siltstones and shale. Elevations range from approximately 440 to 2,690 feet amsl in this Section.

Route A/B then turns east (Lackawanna County) and briefly crosses the Anthracite Valley Section of the Ridge and Valley Province (Segment 3). The Anthracite Valley Section is described as narrow to wide, canoe-shaped valleys having irregular to linear hills enclosed by steep-sloped mountains.

In Segment 4, Route A/B continues east entering the Glaciated Low Plateau Section in Wayne County and continues on into Pike County at which point Routes A and B split. Route A continues southeast through Pike County and through the Glaciated Low Plateau Section to the New Jersey border. Route B turns south in Pike County and continues through the Glaciated Low Plateau Section into Monroe County and the Blue Mountain Section of the Ridge and Valley Province (Segment 5). The Blue Mountain Section is comprised of an eastward widening valley with low linear ridges and shallow valleys. The geology is sandstone, siltstone and shale with some limestone and conglomerate. Topographic relief ranges from moderate to high (300 to 1,680 feet amsl) across the Section.

Route C

Route C begins in the Ridge and Valley Physiographic Province (Luzerne County), specifically the Susquehanna Lowland Section. This Section is described as having low to moderately high linear ridges with linear valleys, including the Susquehanna River Valley. The geology of the Section is predominately sandstone, siltstone, shale, conglomerate, limestone and dolomite. Elevations range from approximately 260 feet amsl to 1,715 feet amsl.

As Route C heads south it crosses into the Anthracite Upland Section. This Section is described as having low linear to rounded hills as well as coal strip mines and pits. Elevation varies in this Section from 320 to 2,094 feet amsl. Geology is comprised of sandstone, shale, conglomerate, and anthracite.

Route C continues south into Schuylkill County across the Anthracite Upland Section before turning east and entering the Blue Mountain Section of the Ridge and Valley Physiographic Province. As described previously, the Blue Mountain Section is comprised of an eastward widening valley with low linear ridges and shallow valleys. The geology is sandstone, siltstone and shale with some limestone and conglomerate. Topographic relief ranges from moderate to high (300 to 1,680 feet amsl) across the Section.

Moving eastward, Route C exits the Blue Mountain Section in Lehigh County and enters the Great Valley Section of the Ridge and Valley Physiographic Province. The Great Valley Section is described as a very broad valley with low karst terrain (i.e., areas of irregular limestone in which erosion has produced fissures, sinkholes, underground streams, and caverns). Limestone and dolomite are the predominant rock types. Elevations range in this Section from 140 to 1,100 feet amsl.

5.1.2 Soils

Soil groups in the vicinity of the Alternative Routes were determined using the STATSGO soil survey. STATSGO is a general soil association map developed by the National Cooperative Soil Survey and distributed by the Natural Resources Conservation Service (NRCS) of the U.S. Department of Agriculture. It consists of a broad based inventory of soils and nonsoil areas that occur in a repeatable pattern on the landscape and that can be cartographically shown at the scale mapped. The soil maps for STATSGO are compiled by generalizing more detailed soil survey maps. Tables C-4 and C-5 indicate the name, brief description, and length of each soil group

crossed (rounded to nearest 50 feet) by route and by percentage of route. Soil descriptions are taken from the NRCS (2008).

Routes A and B

Within Route A/B, there are ten different soil groups encountered. The Wellsboro-Oquaga-Morris-Lackawanna soil groups accounts for the largest single soil group encountered along Route A/B (19 and 24 percent, respectively). The next largest soil group is the Wurtsboro-Oquaga-Morris-Mardin-Lackawanna-Arnot group. These soil types account collectively for 16 and 15 percent of the soil types along Routes A/B respectively. Soil types crossed by Routes A and B are shown in Table C-4.

Route C

Within Route C, there are eight different soil groups encountered. The Weikert-Berks and Laidig-Hazleton-Dekalb-Buchanan soil groups comprise 63 percent of the soil types encountered along Route C. The Meckesville-Leck Kill-Calvin and the Udorthents-Hazleton-Dekalb groups comprise an additional 29 percent of the route. These four groups together account for over 90 percent of the soil types encountered along Route C. Soil types crossed by Route C are shown in Table C-4.

The amount of cleared vegetation has a direct correlation on the impacts to soil along each of the possible Routes. Route B, which has substantially less cleared vegetation than either Route A or C would be preferred due to a decreased possibility for soil erosion/degradation due to vegetative clearing. This is especially important in areas of steep slopes where vegetative cover is important to soil development and stability.

5.1.3 Impacts on Geology, Terrain and Soils and Proposed Mitigation Measures

Activities associated with the construction of transmission line structures, clearing of right-of-way, and movement of vehicles along right-of-way may require the modification of topography and associated geology and soils. Due to the presence of steep slopes along all routes (see Table C-4), engineering of soils and/or bedrock may be required to place transmissions structures. The presence of steep slopes also affects the clearing of right-of way, construction of access roads, and impact to soils and vegetation.

As required, forested portions of the right-of way would be cleared for construction and operation of the transmission line. Non-compatible trees and shrubs would be cut flush to ground surface and in most areas, the logs and slash piled on the right-of-way unless requested to do otherwise by the landowner or the municipality. Temporary access roads would need to be installed to access transmission lines and structures where equipment cannot reach the site by driving on existing soil surfaces. Access roads would be required primarily on hillsides and other areas where special access needs are required. In locations where existing transmission lines will be rebuilt, existing access roads can be utilized resulting in minimal construction of new access roads.

Table C-4. Soil Types Crossed by the Alternative Routes

Soil Unit	Description	Feet of Soil Type Crossed	
		Route A	Route B
Routes A and B			
Laidig-Hazleton-Dekalb-Buchanan (s6558)	Very to moderately deep, somewhat poorly to excessively drained soils. Slopes range from 0 to 80 percent.	62,550 (12%)	32,650 (6%)
Oquaga-Dystrochrepts-Arnot (s6574)	Shallow to moderately deep, moderately to somewhat excessively drained soils. Slopes range from 0 to 70 percent.	46,500 (9%)	46,500 (9%)
Pope-Monongahela-Holly-Chenango (s6563)	Very deep, very poorly to somewhat excessively drained soil. Slopes range from 0 to 60 percent.	64,900 (13%)	81,750 (15%)
Urban land-Udorthents (s6564)	Well drained soils on uplands. Fill material.	27,350 (5%)	27,350 (5%)
Urban land-Udorthents (s6575)	Well drained soils on uplands. Fill material.	6,900 (1%)	6,900 (1%)
Volusia-Mardin-Histosols (s6567)	Very deep, somewhat poorly to moderately well drained soils. Slopes range from 0 to 50 percent.	6,600 (1%)	9,100 (2%)
Volusia-Mardin-Lordstown (s6561)	Very to moderately deep, somewhat poorly to well drained soils. Slopes range from 0 to 90 percent.	62,550 (12%)	62,550 (12%)
Wellsboro-Oquaga-Morris-Lackawanna (s6560)	Very to moderately deep, somewhat poorly to somewhat excessively drained soils. Slopes range from 0 to 70 percent.	99,100 (19%)	128,950 (24%)
Wurtsboro-Oquaga-Morris-Mardin-Lackawanna-Arnot (s6562)	Very deep to shallow, somewhat poorly to somewhat excessively drained soils. Slopes range from 0 to 70 percent.	80,750 (16%)	80,750 (15%)
Wurtsboro-Worth-Volusia-Swartswood-Mardin (s6566)	Very deep to deep, somewhat poorly to well drained. Slopes range from 0 to 60 percent.	51,850 (10%)	57,250 (11%)
Route C		Route C	
Laidig-Hazleton-Dekalb-Buchanan (s6558)	Very to moderately deep, somewhat poorly to excessively drained soils. Slopes range from 0 to 80 percent.	139,200 (29%)	
Meckesville-Leck Kill-Calvin (s6565)	Very to moderately deep, well drained soils. Slopes range from 0 to 80 percent.	74,600 (16%)	
Pope-Monongahela-Holly-Chenango (s6563)	Very deep, very poorly to somewhat excessively drained soil. Slopes range from 0 to 60 percent.	15,200 (3%)	
Udorthents-Hazleton-Dekalb (s6570)	Very to moderately deep, well to excessively well drained soils. Slopes range from 0 to 80 percent. Fill material.	60,100 (13%)	
Urban land-Conotton (s6604)	Very deep, well-drained soils. Slope ranges from 0 to 50 percent.	12,800 (3%)	
Water	N/A	650 (0%)	
Weikert-Berks (s6569)	Shallow to moderately deep, well drained soils. Slopes range from 0 to 100 percent.	164,600 (34%)	
Wellsboro-Oquaga-Morris-Lackawanna (s6560)	Very to moderately deep, somewhat poorly to somewhat excessively drained soils. Slopes range from 0 to 70 percent.	7,300 (2%)	
Wurtsboro-Volusia-Swartswood-Chippewa (s6603)	Very deep to moderately deep, very poorly to well drained. Slopes range from 0 to 35 percent.	3,150 (1%)	

The severity of these effects on soils would depend on a number of variables, including present vegetative cover, soil slope, and soil geotechnical characteristics such as texture, depth, moisture and susceptibility to water and wind erosion. Vegetated surfaces are less prone to erosion, which is especially important on steep slopes where vegetation is the primary erosion control agent. Medium-textured soils with high silt content are the most susceptible to erosion while soils with high clay content and coarse texture (e.g. sands) are the least susceptible to erosion and produce the least amount of surface water runoff.

Heavy vehicle movement during project construction can result in soil compaction impacts on right-of-way and temporary roads. Soil compaction decreases soil productivity in terms of vegetation production and increases surface water runoff, thereby increasing erosion of soils. Associated with the movement of heavy vehicles is the possibility of rutting the ground surface during construction activities. Rutting of soil on sloping ground surfaces increases the potential for surface water runoff to channel in these ruts, increasing the potential for soil erosion. When not properly designed and constructed, there also exists the potential for slope creeps, slides, and falls due to construction activities. The locating of access roads on unstable or unsuitable soils, poor drainage or inappropriately placed fill material may also cause these soil concerns.

In order to reduce or mitigate the potential impacts discussed above, PPL Electric employs a range of soil erosion and sediment control measures during construction, operation, and maintenance of transmission lines. These control measures include the following:

- Environmentally sensitive areas such as wetlands, floodplains, streams, and watersheds are identified within the study area. This information is utilized to minimize the environmental impact to soils and other natural resources.
- Where possible, road grades and alignments would follow the contour of the land with smooth, gradual curves within the limits of the right-of-way.
- During clearing operations, soil disturbance would be kept to a minimum with rock outcrops and tree stumps remaining in place.
- Steep slopes (15% or greater) are avoided where possible or feasible to minimize the potential for soil erosion and slower revegetation.
- Access through large rock outcrop areas should be avoided by routing access roads around or by terminating access on one side of the rock outcrop area.
- Where streams are not crossed by access roads, vehicular traffic would be restricted to a minimum of 50 feet from the stream bank to avoid disturbing these sensitive environmental areas.
- Access through a wetland would be avoided by routing access roads to higher ground around the wetland or by terminating the access road on either side of the wetland.

- Access through floodplains would be avoided by routing access roads to higher elevations around the floodplain or by terminating the access road on either side of the floodplain.
- Access through watershed areas would be avoided by routing access roads around or by terminating the access road on either side of the watershed area.
- Access roads would be located to avoid existing compatible tree species remaining on the right-of-way. When it is necessary to locate an access road through a cluster of trees, the route shall be selected that minimizes tree removal and damage.
- Prior to the initial vegetation clearing, filter fabric fences would be installed below all areas to be disturbed.
- In “selective clearing,” low-growing trees and shrubs that are compatible with the operation of the line will be preserved wherever possible. In most cases, these species do not grow to heights that present a hazard to the line. The preservation of compatible species inhibits the growth of tall-growing (non-compatible) species, helps to prevent erosion, minimizes visual impact of the cleared right-of-way, and provides a useful wildlife habitat.
- In “restricted clearing,” an attempt will be made to preserve additional vegetation of even non-compatible species in areas of high environmental sensitivity (i.e., steep slopes, stream banks). The preserved vegetation helps to minimize habitat disruption and short-term environmental impacts of line construction, such as erosion, siltation, and loss of shading, which might result from selective clearing practices.
- Typically, restricted clearing is used:
 - At designated stream crossings, where the creation of a "buffer" is advisable to preserve existing water quality.
 - On designated steep slope areas, where erosion may be lessened by limiting cutting on the downhill side of the line.
 - In designated natural or unique areas not subject to high public visibility.
 - In ravines, where limited clearing may be done on upper slopes and little or no clearing is required at the bottom.
 - At selected road crossings or along scenic highways/roads and city streets. The size, use, and the scenic or visual characteristics of the road are considered in designating road screens.
 - In areas containing cultivated trees or shrubs that have been designated for trimming or topping only.
 - In protected watersheds and high quality (HQ) or exceptional value (EV) watersheds.

- Soil disturbance would be kept to a minimum and permanent restoration would be made immediately following grading. All seeded areas will be mulched. Slopes in all cuts and fills and scarred areas shall be hydroseeded as soon as practical with mix B (coarse lawn mix) for slopes less than 3 to 1 or crown vetch for slopes exceeding 3 to 1, to reduce erosion and restore vegetational cover. The installation of an erosion control blanket may be required at critical locations where high erosion potential exists and when time of year is not suitable for seeding.
- Potential erosion areas will be inspected weekly and immediately after storm events during construction. Ruts will be smoothed out and gravel spread to stabilize the roadway and prevent erosion.

In addition, soil and erosion control plans, incorporating applicable elements discussed above, will be required as conditions of federal and state permits that will be required to construct the line and associated transmission facilities. County Conservation Districts (CCDs) will also review and approve any such soil and erosion control plans prior to permit issuance. It is likely that this review will be coordinated through the Pennsylvania Department of Environmental Protection (DEP).

5.1.4 Conclusion

The amount of cleared vegetation has a direct effect on the impacts to soil along each of the Alternative Routes. Route B, which would require substantially less clearing of vegetation than either Route A or C, would be preferred due to a decreased possibility for soil erosion/degradation. This is especially important on areas of steep slopes where vegetative cover promotes soil development and stability.

5.2 Surface Water Resources and Aquatic Species/Habitats

5.2.1 Surface Water

The number of surface water crossings for each Alternative Route was determined by utilizing the National Hydrography Dataset (USGS and EPA, 2005). These data were verified by reviewing aerial photography of the project area.

Route A

The hydrology of the study area is dominated by the Delaware Basin watershed, with a smaller area in the northwestern-most portion of the study area located in the Susquehanna/Chesapeake Basin watershed. Portions of the northwestern study area include tributaries of the Susquehanna River. The Susquehanna River flows predominantly southward into Chesapeake Bay. Route A would cross the Susquehanna River southwest of Scranton near the PPL Electric Stanton substation, on existing right-of-way and paralleling an existing PPL Electric 230 kV transmission line. Route A would not cross any major lakes; however, the line would cross directly north of Lake Wallenpaupack.

Portions of the study area in the Delaware Basin watershed include tributaries west of the Delaware River. The Delaware River forms the state boundary between Pennsylvania and New Jersey and flows in a southerly direction into Delaware Bay. Route A would cross the Delaware River north of Milford at the northernmost part of the Delaware Water Gap National Recreation Area in a location where there are currently no overhead transmission lines. General hydrology in the project study area is shown in Figure C-1.

Based on the National Hydrography Dataset (USGS and EPA, 2005) and a review of aerial photography, Route A crosses approximately 76 drainages (i.e., water courses) in Pennsylvania. Six of these drainages are considered major streams (i.e., those with drainage areas of approximately 200 square miles or greater), as derived from the Pennsylvania Department of Transportation streams database, and include the Delaware River, Shohola Creek, Lackawanna River, Wallenpaupack Creek, Middle Creek (crossed twice), and the Susquehanna River. Table C-5 lists the drainages crossed by Route A and identifies if the drainage has been assigned any special use designations.

Route B

The general hydrology of the Route B study area is generally the same as that described above for Route A. Route B would cross the Susquehanna River in the same location as Route A. Route B would cross the Delaware River just north of the Delaware Water Gap area, through the Delaware Water Gap National Recreation Area on the path of an existing 230 kV transmission line (Segment 5). The Delaware River in this area, known as the Middle Delaware, has been designated as *scenic* under the Wild and Scenic Rivers Act.

Based on the National Hydrography Dataset (USGS and EPA, 2005) and a review of aerial photography, Route B crosses 78 drainages in Pennsylvania. Seven of these drainages are considered major streams, as derived from the Pennsylvania Department of Transportation streams database, and include the Bush Kill (crossed twice), the Delaware River, Shohola Creek, Lackawanna River, Wallenpaupack Creek, Middle Creek (crossed twice), and the Susquehanna River. Table C-5 lists the drainages crossed by Route B and identifies if the drainage has been assigned any special use designations.

Route C

The hydrology of the Route C study area is dominated by the Delaware Basin watershed, with a smaller area in the southwestern-most portion of the study composed of the Susquehanna/Chesapeake Basin watershed. Portions of the study area in the Delaware Basin watershed include tributaries west of the Delaware River, including the Lehigh River. The Lehigh River flows in a southerly direction and ultimately empties into the Delaware River at Easton, Pennsylvania. Portions of the study area in the Susquehanna/Chesapeake Basin include tributaries of the Susquehanna River. The Susquehanna River flows predominantly southward into the Chesapeake Bay.

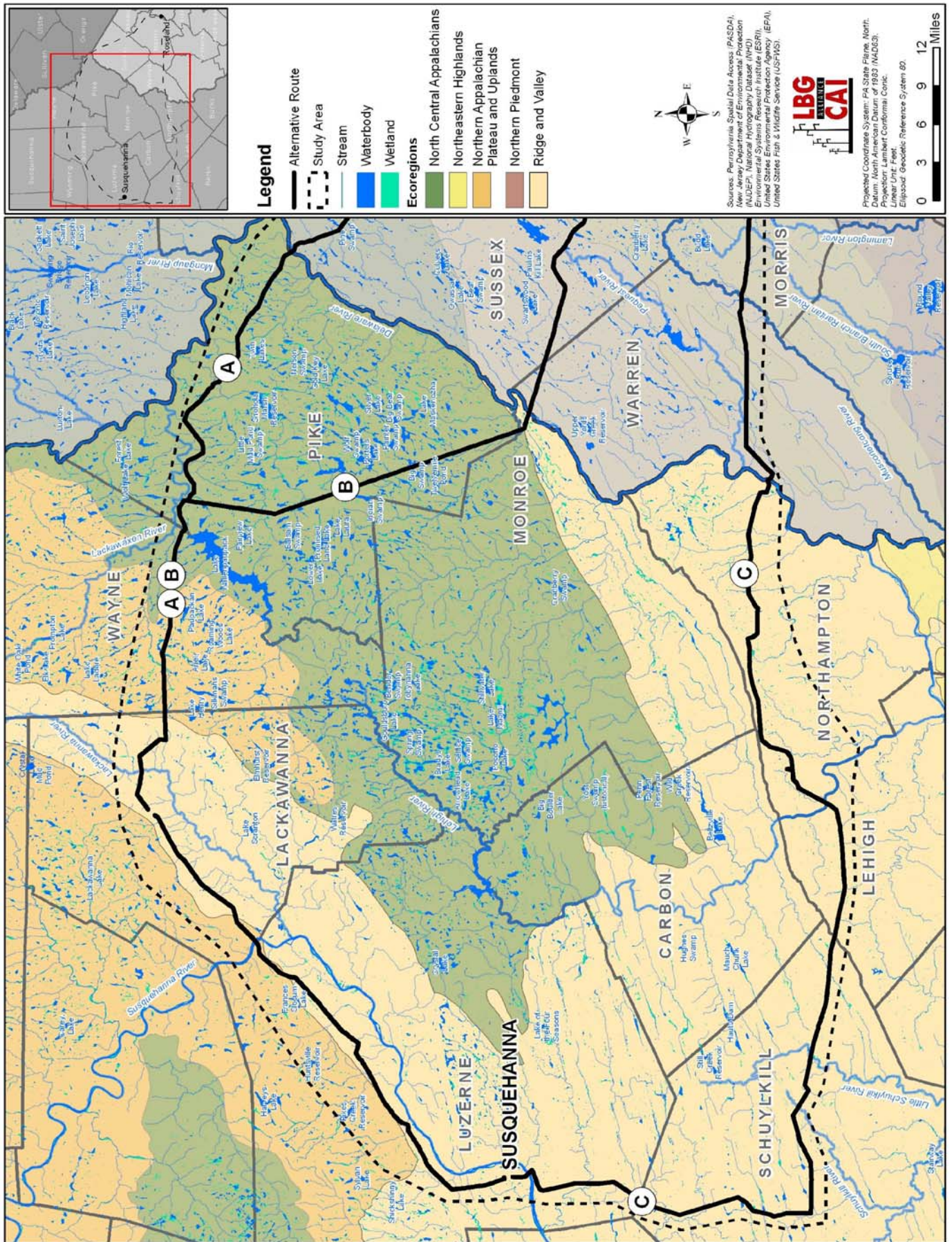


Figure C-1: Ecoregions and Hydrology.

Table C-5. Number of Drainage Crossings and Designated Uses					
Name of Surface Water Body	Route			Major Stream	PADEP Designated Water Use
	A	B	C		
Abrahams Creek	1	1			CWF
Barnes Run			1		CWF
Beaver Creek			1		HQ-CWF
Beaver Run		1			HQ-CWF
Bertsch Creek			1		CWF
Big Creek			1	Yes	CWF
Black Creek			1		CWF
Blooming Grove Creek	1	1			HQ-CWF
Brown Creek	1	1			CWF
Brushy Run			1		CWF
Bush Kill		2		Yes	HQ-CWF/ HQ-TSF
Catawissa Creek			1	Yes	CWF
Crawford Branch	1				HQ-CWF
Cummins Creek	1				HQ-CWF
Decker Creek	1	1			HQ-CWF
Deep Brook	1				EV
Delaware River	1	1	1	Yes	WWF
Dimmick Meadow Brook	1				EV
East Spring Run		1			HQ-CWF
Gates Run		1			HQ-CWF
Grassy Island Creek	1				HQ-CWF
Greenwalk Creek			3		HQ-CWF
Harveys Creek	1	1			CWF
Hull Creek	1	1			CWF
Hunlock Creek	1	1			CWF
Indian Cave Creek	2	2			CWF
Jordan Creek			1	Yes	TSF, MF
Keyser Creek	1	1			CWF
Kirkham Creek	1				HQ-CWF
Lackawanna River	2	2		Yes	HQ-CWF
Leggetts Creek	1	1			TSF
Lehigh Canal			1		
Lehigh River			1	Yes	TSF
Lindy Creek	1	1			CWF
Little Bushkill Creek			1		HQ-CWF
Little Martins Creek			1		CWF
Little Schuylkill River			1	Yes	CWF
Little Shickshinny Creek	1	1			HQ-CWF
Lizard Creek			1		CWF, TSF
Lords Creek	1				HQ-CWF

Table C-5. Number of Drainage Crossings and Designated Uses					
Name of Surface Water Body	Route			Major Stream	PADEP Designated Water Use
	A	B	C		
Lucky Run	1	1			CWF
Mahanoy Creek			1	Yes	WWF
Martins Creek			1		TSF
Middle Creek	2	2		Yes	HQ-CWF
Mill Creek	1		1		HQ-CWF
Nescopeck Creek			1	Yes	TSF
Notch Brook		1			HQ-CWF
Obendoffers Creek	1	1			CWF
Ontelaunee Creek			1		CWF/EV (existing use)
Oughoughton Creek			1		CWF
Pinchot Brook	1				EV
Rattling Run			1		HQ-CWF
Red Rock Run		1			HQ-CWF
Red Shale Brook	1	1			HQ-CWF
Rocky Run	1	1			CWF
Saint Johns Creek	1	1			CWF
Sand Hill Creek		1			HQ-CWF
Sap Brook	1				HQ-CWF
Saw Creek		2			HQ-CWF
Schuylkill River			1	Yes	CWF
Shickshinny Creek	1	1			CWF
Shohola Creek	1	1		Yes	HQ-CWF
Silver Creek			1		CWF
Sober's Run			1		EV (existing use)
Stump Run			1		CWF
Susquehanna River	1	1	1	Yes	WWF
Toby Creek	1	1			TSF
Tomhicken Creek			1		CWF
Twin Lakes Creek	1				HQ-CWF
Vandermark Creek	1				HQ-CWF
Wallenpaupack Creek	1	1		Yes	HQ-WWF
Wangum Creek	2	2			HQ-CWF
West Branch Tinklepaugh Creek	1	1			CWF
White Oak Run	2	2			CWF
Wolf Creek			1		CWF
Unnamed tributaries ¹	31	35	35		
Grand Total	76	78	67		

EV = Exceptional value; HQ = High quality; CWF = Cold water fishery; WWF = Warm water fishery; TSF = Trout stocking fish; MF = Migratory fishes.

¹ 21 of the unnamed tributaries in Route A are designated as HQ, 22 of the unnamed tributaries in Route B are designated as HQ, and 7 of the unnamed tributaries in Route C are designated as HQ.

Based on the National Hydrography Dataset (USGS and EPA, 2005) and a review of aerial photography, Route C crosses 67 drainages in Pennsylvania. Ten of these drainages are considered major streams, as derived from the Pennsylvania Department of Transportation streams database, and include Big Creek, Delaware River, Susquehanna River, Nescopeck Creek, Catawissa Creek, Mahanoy Creek, Schuylkill River, Little Schuylkill River, Jordan Creek, and the Lehigh River. Table C-5 lists all of the drainages crossed by Route C and identifies if the drainage has been assigned any special use designations.

5.2.2 Aquatic Species/Habitats

Pennsylvania Water Quality Standards (Title 25 Pa. Code § 93.3) designate protected water uses which provide the basis for the development of water quality criteria. Special quality waters consist of exceptional value and high quality waters. Those pertaining to biological uses include the maintenance and propagation of aquatic life, including coldwater and warmwater fisheries, and anadromous fish (i.e., those that live their lives in the sea and migrate to freshwater to spawn) and catadromous fish (i.e., those that live their lives in freshwater and travel to the sea to spawn), which ascend into flowing waters to complete their life cycle. The Pennsylvania DEP routinely re-evaluates its water quality designations. Water bodies that have been granted a new designated use status that has not yet been incorporated into the Pennsylvania Code are still classified according to its existing use with regard to permitting. According to this code, the majority of the drainages crossed in the study area are designated as coldwater fisheries.

The Pennsylvania Department of Environmental Protection (PADEP) protects four stream water uses: aquatic life, fish consumption, potable water supply, and recreation. If a stream segment is not attaining any of these four uses, it is considered impaired (Pennsylvania Office of Water Management, 2006).

Route A

As shown in Table C-5, Route A crosses three exceptional value (EV) water bodies, Deep Brook, Dimmick Meadow Brook, and Pinchot Creek. Route A crosses 21 high quality (HQ) water bodies, 21 HQ unnamed tributaries, 37 cold water fisheries (CWF), and 2 warm water fisheries (WWF).

In a letter dated July 23, 2008, DCNR expressed several concerns regarding the potential impact of the Alternative Routes to surface water quality. Specifically, DCNR expressed concern that Route A would impact a stream crossing at Harvey's Creek by widening the right-of-way and that Route A would traverse a currently undisturbed portion of the Delaware State Forest on the Buckhorn Tract, which would include numerous stream crossings.

Route B

As shown in Table C-5, Route B does not cross any EV designated or existing water bodies. Route B crosses 22 HQ named waterbodies, 22 HQ unnamed tributaries, 37 CWF, and 2 WWF.

Similar to Route A, DCNR expressed concern that Route B would impact a stream crossing at Harvey's Creek by widening the right-of-way.

Route C

As shown in Table C-5, Route C crosses one EV water body, Ontelaunee Creek. Route C crosses 7 HQ water bodies, 7 HQ unnamed tributaries, 23 CWF, and 3 WWF.

DCNR expressed concern that Route C could impact the headwaters of Sober's Run, which is designated as an existing use EV water body.

5.2.3 Impacts on Surface Waters and Aquatic Species/Habitats and Proposed Mitigation Measures

Aquatic species are sensitive to factors such as water clarity, temperature, and flow characteristics. Transmission line construction and operation can alter these factors and disturb aquatic communities if structures are actually placed in water or wetlands, work is conducted in water or wetlands, or inadequate or improper controls and practices during construction result in erosion or sedimentation to water bodies. A general description of the types of water quality and hydrologic modifications that can occur as a result of vegetation clearing and construction operations is presented below in addition to the measures that can be implemented to minimize these effects.

Disturbance of upland vegetation, such as clearing the right-of-way, may lead to declines in water quality by increasing sediment and warm water inputs. Removing vegetation along a stream may destabilize the bank, which leads to increases in erosion and sediment loads. Removing riparian vegetation also decreases shade cover, which can result in increased water temperature in localized areas. Additionally, increases in warm water runoff from impervious areas can also contribute to increased instream water temperatures, which are a primary concern for cold water streams that provide habitat for species such as trout. An access road or right-of-way running parallel to a stream is generally the greatest concern when considering thermal impacts on cold water streams.

In general, the effects of removing vegetation and soil disturbance at stream crossings is minimized by the implementation of soil erosion and sediment control measures (see Section 5.1) and avoiding paralleling stream courses or water bodies that might require extensive riparian area clearing of shade vegetation. Efforts are made to retain shade cover, prevent destabilization of stream banks, and minimize sedimentation and pollutant inputs in areas where line crosses or parallels a stream. PPL Electric's Vegetation Management Plan (see Appendix E-3) promotes a stable, low-growing plant community on the right-of-way. In general, PPL Electric performs selective vegetation clearing on transmission line right-of-way. In selective clearing, low-growing trees and shrubs that are compatible with the operation of the line are preserved wherever possible. PPL Electric practices restricted clearing in areas of high environmental sensitivity (i.e., steep slopes and stream banks). In restricted clearing, an attempt is made to preserve even noncompatible species. The preserved vegetation helps to minimize habitat

disruption and short-term environmental impacts of line construction, such as erosion, siltation, and loss of shading, which might result from selective clearing.

Access roads have the potential to affect the natural hydrology of a watershed area by intercepting, concentrating, and diverting surface flow from its natural flow pattern. Roads expand the channel network via road ditches and reduce infiltration rates of precipitation, generating larger amounts of surface runoff. All of these factors combine to alter the quantity and timing of surface flow, which, in turn, affects the overall hydrology of a watershed. Improperly designed or inadequately maintained drainage structures can lead to the accumulation of sediment within the upstream channel, increased surface runoff with added sedimentation, or affect the formation of gullies.

Appropriate design and maintenance of drainage structures, as discussed in the soil section of this report, would minimize the potential effects that roads may have on stream hydrology. Properly maintained drainage structures would prevent water from becoming trapped on the road surface or becoming concentrated with increased sediment load. Steps to return disturbed soil in the right-of-way to a stable and vegetated state, as discussed in the soils section (see Section 5.1) of this report, would minimize any increase in surface runoff caused by transmission line construction and maintenance. These measures, through the implementation of an approved Sediment and Erosion Control Plan, will minimize changes in local hydrology and water quality as a result of temporary road construction.

Most of the potential for the addition of pollutants is associated with stream crossings and areas close to streams or floodplains. The number of stream crossings and feet paralleling a stream has been minimized and riparian buffer maintenance techniques would be followed; thus, any effect chemical pollutants may have would be localized. Chemical pollutants associated with transmission line construction and operation include herbicides used to maintain the right-of-way or chemicals used to treat tree stumps. These chemicals can enter nearby streams through direct runoff from compacted surfaces such as rights-of-way and access roads, or indirectly through erosion processes.

The application of herbicides and stump treatment, where necessary, would be performed in accordance with PPL Electric's policies and specifications and any applicable federal, state, or local regulation. Policies and specifications govern such factors as the type of herbicide used and application technique depending on the height and density of vegetation. Although many herbicide applications are currently available for use on rights-of-way, only those that can be applied selectively are used by PPL Electric to manage vegetation. PPL Electric does not employ aerial (broadcast) spraying. PPL Electric utilizes several selective herbicide application methods, including stump treatment, basal spray, foliage spray, and frill and spray. In all of these methods, herbicides are applied using hand-held applicators, spraying only those species that require control, and only in areas originally designated for selective clearing. These techniques would minimize any adverse impacts that right-of-way construction and maintenance may have on the health of the local aquatic communities and habitat.

In addition, protecting water quality will be required under the terms and conditions of federal and state permits that will be required prior to the start of construction of transmission facilities. Compliance with Sections 401 and 404 of the Clean Water Act and Title 25, Chapters 102, 105, and 106 of the Pennsylvania Code will be required through permits that must be in place before construction can begin. County Conservation Districts (CCDs) will also review and approve soil and erosion control plans prior to permit issuance. It is likely that this review will be coordinated through the Pennsylvania Department of Environmental Protection (DEP).

5.2.4 Conclusion

Compared with the other Alternative Routes, Route B (the Preferred Route) would pose the least impact to surface water quality or aquatic species because of the significantly less amount of clearing and new right-of-way needed for this route. Approximately 30 percent of Route B would simply re-energize an existing 230 kV line to 500 kV between Susquehanna and Stanton and, therefore, result in no additional impacts to surface water crossings in this portion of the route. Approximately 61 percent of Route B would require double circuiting of an existing 230 kV line (with both a 230 kV and 500 kV line on a single structure) or paralleling an existing line. Although the width of the right-of-way would require widening in these areas and new structures would be erected, the impact to surface water resources would be minimal. The remaining 8 to 9 percent of Route B would utilize future use or new right-of-way, which may have the potential for slight adverse impacts to surface water in this area. Route B would have the least impact to exceptional value (EV) or high quality (HQ) waters. Route B does not cross any EV designated water bodies, while Route A crosses three EV waters and Route C crosses one EV water body. Although Route B crosses the most HQ water bodies, most, if not all, of these water bodies are already crossed by an existing 230 kV line and, therefore, the incremental impacts should be minimal. Route B would have the least cumulative impact to surface water bodies of the three routes. Although Route A has 76 stream crossings, Route B has 78 stream crossings, and Route C has 67 stream crossings, Route B would pose the least impact to surface water quality because an existing 230 kV line already traverses the majority of the identified streams. Route C primarily utilizes future use right-of-way and, therefore, would introduce several new stream crossings. Route A utilizes virgin right-of-way through Pike County and crosses three EV streams that are not currently crossed by any facilities. Regardless of route, potential surface water impacts will be minimized through the use of best management practices specified in federal and state permit conditions, erosion and sedimentation control plans approved by County Conservation Districts, and PPL Electric's Vegetation Management practices.

5.3 Wetlands

5.3.1 Wetland Resources

The routing team used U.S. Fish & Wildlife Service's National Wetland Inventory (NWI) maps to preliminarily identify potential wetlands crossed by the Alternative Routes. Wetland types are grouped based on the classification system developed by Cowardin et al., 1979. The NWI produces information on the characteristics, extent, and status of the Nation's wetlands and

deepwater habitats. Federal, state, and local agencies, academic institutions, and the private sector use the NWI information for reviewing general wetland distribution for planning purposes. The accuracy of NWI maps varies based upon age, wetland type and size, source photography, and survey methods. Therefore, actual wetland totals are expected to change based upon field surveys and delineations using the U.S. Army Corps of Engineers 1987 Methodology. Field surveys or delineations along the Alternative Routes are not practical during the routing process due to the large geographic area, as well as the lack of land access for portions of the Alternative Routes. PPL Electric is in the process of delineating wetlands located along the Preferred Route. Wetlands and water resources are shown in Figure C-1.

NWI wetlands are mapped using the Cowardin (1979) wetland classification system. Within the Study Area, there are two systems represented: palustrine and riverine. The palustrine system includes all nontidal freshwater wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, as well as unvegetated shallow water wetlands such as ponds. Classes within the palustrine system are defined based upon the dominant vegetation type and include forested (PFO), scrub shrub (PSS), emergent marsh (PEM), and open water (ponds) (POW). The riverine system includes all wetlands and deepwater habitats contained in natural or artificial channels periodically or continuously containing flowing water or which forms a connecting link between the two bodies of standing water. A number of subsystems exist within the riverine system, including lower perennial (R2), which is characterized by a low gradient and slow water velocity; upper perennial (R3), which is characterized by high gradient and fast water velocity; and unknown perennial (R5), which was developed for situations when the distinction between upper and lower perennial cannot be determined from aerial photography and data is not available.

Route A

According to the NWI maps, Route A crosses approximately 8,100 feet of wetlands, of which about 53 percent are palustrine forested or shrub wetlands, 22 percent are palustrine emergent marsh wetlands, and 16 percent are riverine wetlands (see Table C-3).

Route B

According to the NWI maps, Route B crosses approximately 11,550 feet of wetlands, of which about 45 percent are palustrine emergent marsh wetlands, 39 percent are palustrine forested or scrub shrub wetlands, and 8 percent are riverine wetlands (see Table C-3).

Route C

According to the NWI maps, Route C crosses approximately 5,750 feet of wetlands, of which about 35 percent are palustrine forested or shrub wetlands, 33 percent are riverine wetlands, and 17 percent are palustrine open water (pond) wetlands (see Table C-3).

5.3.2 Impacts on Wetland Resources and Proposed Mitigation Measures

In the case of all three Alternative Routes, PPL Electric's objective is to span all wetlands to the extent possible. It is also possible that construction will require access roads to cross streams or wetlands. Where impacts to wetlands are unavoidable, PPL Electric will acquire and adhere to the terms and conditions of all required permits. Whenever possible, PPL Electric will attempt to avoid wetlands by routing the access roads around the wetlands or by terminating access roads on either side of the wetland.

Erosion and sedimentation control will be dictated by the terms and conditions of approved Erosion and Sedimentation Control Plans and National Pollutant Discharge Elimination System (NPDES) permits. If access roads must cross wetlands, the U.S. Army Corps of Engineers would likely require a Section 404 permit and Pennsylvania DEP would likely require Chapter 105 permits, and PPL Electric would adhere to any crossing methods identified in those permits. PPL Electric's vegetation clearing specifications allow many plant species to remain, limiting wetland disturbance. Additionally, PPL Electric would leave stumps in the ground, minimizing soil disturbance and subsequent erosion. PPL Electric does not dispose of any vegetation (e.g., piling, drop and lop, chipping, burning, etc.) in known or suspected wetland areas, does not operate equipment within 50 feet of streams (unless crossed by an access road), and does not apply herbicides within 50 feet of any water body, except stump treatments and herbicides approved for watershed/aquatic use.

PPL Electric clears forested/shrub wetlands of woody vegetation posing operational hazards to the line, as described in Section 5.4, Vegetation, using either the Selective Clearing or Restricted Clearing methods. PPL Electric uses Restricted Clearing of vegetation at designated stream crossings, where the creation of a "buffer" is advisable to preserve existing water quality. This allows both the woody species on the "compatible" list (see Section 5.4) to remain in the right-of-way, as well as some "non-compatible" woody species that do not currently pose a threat to the line. In the remaining areas, Selective Clearing allows some woody/shrubby vegetation to remain as well. PPL Electric preserves all native grasses, ferns, and herbaceous vegetation except within access roads, work areas, and within 15 feet of structures.

In either case, PPL Electric clears woody vegetation from rights-of-way that threatens the reliable operation of the transmission line. As a result, new right-of-way clearing could potentially convert forested and forested/shrub wetlands to either emergent marsh or shrub wetlands. Because the majority of Route B is within existing cleared right-of-way, calculations using NWI data and right-of-way approximations indicate that it has the least amount of wetland acreage in right-of-way areas that would be newly cleared for the proposed project. These approximate calculations are shown in Table C-6.

Of particular importance is the forested/shrub wetland type, because clearing of this type results in a wetland type conversion to emergent marsh or shrub wetland, whereas other wetland types would remain relatively unchanged after project construction. Using the right-of-way assumption described in Table C-1, a GIS intersect was done to determine where new clearing would be required in areas of NWI wetlands on each Alternative Route. NWI maps indicate several acres of forested/shrub wetlands within existing cleared rights-of-way, which could be

the results of outdated or inaccurate NWI wetland mapping, or simply the persistence of shrub wetlands even in cleared areas. PPL Electric would only need to clear about 6 acres of forested/shrub wetland along Alternative Route B, compared with 13 acres for Route A and 9 acres for Route C.

Table C-6. NWI Wetland Areas Crossed by the Alternative Routes in Areas to be Cleared Versus Currently Cleared Right-of-Way (Acres)						
	Route A		Route B		Route C	
	To Be Cleared	Currently Cleared	To Be Cleared	Currently Cleared	To Be Cleared	Currently Cleared
Freshwater Forested/ Shrub Wetland (PFO/PSS1)	13	8	6	15	9	1
Riverine (R2 and R5)	5	<1	4	1	4	5
Freshwater Emergent (PEM)	5	3	8	14	2	1
Freshwater Pond (POW)	2	2	1	2	4	1
Total	25	13	19	32	19	8

5.3.3 Conclusion

Because the majority of Route B is within existing cleared right-of-way, it has the least amount of wetland acreage in right-of-way areas requiring new clearing of the three Alternative Routes. Importantly, construction of Route B would result in the least acreage of forested wetland conversion to emergent or shrub wetland type. PPL Electric has begun wetland delineations along Route B. Formal delineations will allow the line to be engineered to minimize impacts to wetlands as much as possible. PPL Electric is also in consultation with PA DEP and the County Conservation Districts (CCDs) regarding wetland and sediment and erosion permitting requirements for Route B.

5.4 Vegetation

5.4.1 Common Vegetation

Routes A and B

The National Land Cover Dataset (NLCD, 2001) indicates that Alternative Routes A and B are predominantly forest (64 percent and 50 percent, respectively), with lesser amounts of cultivated cropland, and pasture/hay (see Table C-3). Routes A and B cross through three level III ecoregions (EPA, 1999), the Ridge and Valley, Northern Appalachian Plateau and Uplands, and North Central Appalachians (see Figure C-1). Level III ecoregions are ecological areas or divisions small enough to enhance regional environmental monitoring, assessment and reporting, as well as decision-making. Because level III ecoregions are smaller (i.e., compared to level I and II ecoregions), they allow locally defining characteristics to be identified, and more specific management strategies to be formulated.

Luzerne County

Luzerne County is located within two major forest types: Appalachian Oak Forest and Northern Hardwood Forest (Nature Conservancy, 2006). Appalachian Oak Forest is more common east of the Susquehanna River and in drier or less fertile locations in the Appalachian Mountains west of the Susquehanna River. Within Luzerne County, this forest type is an Oak-Chestnut Forest and potentially dominant species include black oak (*Quercus velutina*), red oak (*Q. rubra*), white oak (*Q. alba*), and chestnut oak (*Q. montana*). Other common tree species of this forest type are red maple (*Acer rubrum*), black cherry (*Prunus serotina*), gray and black birches (*Betula populifolia* and *B. lenta*), white pine (*Pinus strobus*), pitch pine (*Pinus rigida*), and aspens (*Populus sp.*). Shrubs include species of blueberries (*Vaccinium sp.*), huckleberries (*Gaylussacia sp.*), teaberry (*Gaultheria procumbens*) and other dry forest species (PHNP, 2006). Routes A/B are mainly on the western side of the Susquehanna River in Luzerne County, where the Northern Hardwood Forest is more common in slightly richer or mesic (i.e., moist) areas. Sugar maple (*Acer saccharum*), red maple, American beech (*Fagus grandifolia*), yellow birch (*Betula alleghaniensis*), Eastern hemlock (*Tsuga canadensis*), and white pine (*Pinus strobus*) are potential dominants in this second growth forest type (PHNP, 2006).

Lackawanna County

As with Luzerne County, the two major forest types crossed by Alternative Routes A and B within Lackawanna County are Appalachian Oak Forest and Northern Hardwood Forest (Nature Conservancy, 1997). Appalachian Oak Forest is more common in the ridge and valley portion of the county, an area that correlates to the Lackawanna Valley and the mountains on either side, which includes most of Routes A and B. Within Lackawanna County, a common type of oak forest is the Chestnut Oak community which is characteristic of dry ridgetops and rocky slopes (Nature Conservancy, 1997). Associates (i.e., species typically associated with a particular forest type or community) include red oak, black oak, scarlet oak (*Q. coccinea*), black birch, and red maple. The understory may be sparse or dominated by ericaceous species (i.e., those requiring an acidic soil) such as blueberries, huckleberry, and mountain laurel (*Kalmia latifolia*). A less common oak forest type is the Pitch Pine-Scrub oak community found on isolated dry, exposed ridgetops. Characteristic species are pitch pine which may be frequent to dominant, scrub oak (*Q. ilicifolia*) which typically forms a nearly impenetrable shrub layer and may be the dominant species in the community, and chestnut oak. Other species common to this community include huckleberry, black chokeberry (*Aronia melanocoma*), lowbush blueberry, teaberry (*Gaultheria procumbens*), and bracken fern (*Pteridium aquilinum*). An example of this community type near Alternative Routes A and B is at the Moosic Mountain Barrens, discussed in more detail under the Special Natural Areas subsection.

Wayne County

Within Wayne County, Alternative Routes A and B cross mostly the Northern Hardwoods Forest type (Nature Conservancy, 1991). Typical hardwood species are red oak (*Q. rubra*), white ash (*Fraxinus americana*), basswood (*Tilia americana*), red maple, and black cherry.

Pike County

Within Pike County, the main forest type crossed by both Routes A and B is the Mixed Oak Forest type (Nature Conservancy, 1990). The forest in this region has been logged for lumber and fuel in the past and is dominated by white, red, and black oaks. White oaks do best in moist soils while red oak prefers drier, better drained soil conditions, and black oak does best on the dry upland slopes. Common associates include red and sugar maple, black cherry, black gum, and white pine. Shrubs include blueberry, shadbush, viburnums, and witch hazel.

Monroe County

Only a small portion of Route B crosses into northeastern Monroe County. In the southern part of the county, the Mixed Oak Forest type dominates, whereas in the northern part of the county, on the Pocono Plateau, the Northern Hardwoods Forest type dominates (Nature Conservancy, 1991b).

Route C

Luzerne County

The portion of Route C that is within Luzerne County is predominantly the Appalachian Oak Forest type, as described above.

Schuylkill County

Within Schuylkill County, Alternative Route C also crosses the Appalachian Oak Forest type (Nature Conservancy, 2003). In this county, this forest type is dominated by white and northern red oak. Additional dominant tree species include chestnut oak, black oak, tulip poplar (*Liriodendron tulipifera*), beech, hickory (*Carya sp.*), sweet birch (*Betula lenta*), and white pine. Red maple is becoming a dominant tree species in areas that have been recently disturbed (Nature Conservancy, 2003).

Another forest type found within the Appalachian Oak forest within Schuylkill County is the Ridgetop Acidic Barrens Community Complex found on Broad Mountain and several adjacent ridges in north-central Schuylkill County. This type is also known as a Ridgetop Dwarf-Tree Forest. The species found on these sites are specially adapted to the conditions of these acidic, droughty, nutrient poor soils, where other species cannot survive. The ridgetops in these areas are identified by pronounced dwarf-stature trees of pitch pine, scrub oak, chestnut oak, scarlet oak, white oak, black gum (*Nyssa sylvatica*), gray birch, and sassafras (*Sassafras albidum*). The dwarfed trees are usually accompanied by a thick undergrowth of blueberries, huckleberries, mountain laurel, sheep laurel, and black chokeberry (*Aronia melanocarpa*). There usually exists a sparse herbaceous cover of bracken fern, teaberry, fly-poison (*Amianthium muscaetoxicum*), wild sarsaparilla (*Aralia nudicaulis*), poverty grass (*Danthonia spicata*) and common hairgrass (*Deschampsia flexuosa*) (Nature Conservancy, 2003).

Lehigh and Northampton Counties

Within both Lehigh and Northampton Counties, the main forest type crossed by Alternative Route C is classified as Appalachian Oak Forest or Mixed Oak Forest (Nature Conservancy, 2005). This forest type occurs mainly on the slopes and tops of the mountain ridges that make up the northern boundaries of the two counties, where Route C crosses. The dominant species are white oak, red oak, scarlet oak, and black oak, often mixed with tulip poplar, red maple, and/or American beech, along with ericaceous shrubs (Nature Conservancy, 2005).

5.4.2 Special Natural Areas

Within the study area, each of the counties crossed by one of the Alternative Routes has a Natural Areas Inventory (NAI) prepared by the Nature Conservancy along with the Pennsylvania Natural Heritage Program (PNHP) which includes information on the locations of rare, threatened, and endangered species and the highest quality natural areas in the various counties. As described below, all three Alternative Routes cross, or are very close to crossing, portions of several natural areas. Because the date of NAI preparation varies, the quality of the special natural area mapping is generally not GIS-level quality. As such, this discussion includes special natural areas that, in fact, may not be crossed but are otherwise located very close (within approximately 500 feet) to an Alternative Route. Unless otherwise noted, all information comes from that county's NAI. Depending on the county and when the NAI was prepared, the identity of some of the rare species may not be revealed. Therefore, although the species' status and ranking as reported in the NAI is listed, it is possible that they have changed since the publication.

Routes A and B

Luzerne County (Nature Conservancy, 2006)

Shickshinny Mountain Ridgetop (Jackson and Plymouth Townships, Segment 1) – This site within the Lackawanna State Forest includes populations of a fair to poor-quality population of a state rare plant species, Leonard's skipper (*Hesperia leonardes*). This species has been observed growing out of thin soil on a narrow ridgetop spine. The plant species occurs in open habitat with areas of exposed conglomerate bedrock. The associated plant species include black huckleberry, blueberry, blackberry (*Rubus alleghaniensis*), hairgrass (*Deschampsia flexuosa*), sorrel (*Rumex acetosella*), dogbane (*Apocynum androsaefolium*), bracken fern, cowwheat (*Melampyrum lineare*), rock-harlequin (*Corydalis sempervirens*), turkey-foot grass (*Andropogon gerardii*), and marginal wood fern (*Dryopteris marginalis*). The sparse overstory includes pitch pine, chestnut oak, and fire cherry (*Prunus pennsylvanica*). In 2003, an additional rare plant species, slender wheatgrass (*Elymus trachycaulus*), was collected from the existing right-of-way at this site. Associated species include *Solidago rugosa*, *Panicum clandestinum*, *Apocynum cannabinum*, and *Deschampsia flexuosa*.

Shickshinny Mountain Slopes (Plymouth Township, Segment 1) – This site is not significant on a state-wide level but is locally significant because of the high diversity of wildflower species present. It occurs on a saddle or cove on the north slope of Shickshinny Mountain, near the headwaters of Hunlock Creek. The forest community is second-growth northern-hardwood of intermediate age. The dominant tree species include sugar maple, American basswood, white ash, black cherry, white oak, and eastern hemlock. Some of the wildflower species present are associated with high-pH or nutrient-rich conditions. The source of the rich soil conditions could be from the several rock outcrops with small seeps that occur just upslope of the site. Herbaceous and shrub species present include maple-leaved viburnum (*Viburnum acerifolium*), witch-hazel (*Hamamelis virginiana*), striped maple (*Acer pensylvanicum*), Virginia creeper (*Parthenocissus quinquefolia*), poison ivy (*Toxicodendron radicans*), maidenhair fern (*Adiantum pedatum*), false Solomon's seal (*Smilacina racemosa*), wild sarsaparilla, silvery spleenwort (*Deparia acrostichoides*), wire grass (*Brachyelytrum erectum*), wild ginger (*Asarum canadense*), bellwort (*Uvularia perfoliatum*), liver-leaf (*Hepatica americana*), baneberry (*Actaea rubra*), sensitive fern (*Onoclea sensibilis*), royal fern (*Osmunda claytoniana*), Canada mayflower (*Maianthemum canadense*), sweet-cicely (*Osmorhiza claytonii*), moonseed (*Menispermum canadense*), and many others. According to the Luzerne County NAI, the site has potential for several rare plant species of concern.

Ice Caves (Kingston and Wilkes-Barre Townships, Segment 1) – This Talus Cave Natural Community on private property has ice caves and a waterfall that drops 50 feet into a high gradient hemlock and yellow birch ravine. Other plant species found in the ravine included American yew (*Taxus canadensis*) and paper birch.

Lackawanna County (Nature Conservancy, 1997 and 2003b)

Susquehanna River Woods (Ransom Township and Duryea Township, Segment 2) - Part of this site is located on an island in the Susquehanna River. A survey of this site in 1999 found a fair to good-quality population of state rare plant prostrate sand cherry (*Prunus pumila* var. *depressa*). It is also good habitat for bird species such as osprey and herons. The island includes two primary habitat types. The higher elevation forested portion is infrequently flooded and has deep alluvial soil. It is dominated by silver maple, sycamore, hackberry, and elm in the overstory, and ostrich fern (*Matteucia struthiopteris*), Japanese hops (*Humulus japonicus*), Japanese knotweed (*Polygonum cuspidatum*), and impatiens (*Impatiens* sp.) in the robust herb layer. The other habitat type is the lower elevation gravelly area occurring at the head of the island. This habitat is characterized by seasonal scouring (i.e., water flushing out and removing vegetation and fine soils) and water and vegetation here occurs in zones reflective of the duration of water inundation. Highest areas, least frequently flooded, support shrubs and stunted trees with a high diversity of herbs. Slightly lower areas support fewer shrubs, and a less robust assemblage of herbs with several species of grass being common. Even lower areas support fewer species and these are interspersed with patches of unvegetated gravel. The two species most common in this zone are the grasses, turkey foot (*Andropogon gerardii*) and Indian grass (*Sorghastrum nutans*). Beyond this area and to the water line (in the late season) is mostly unvegetated gravel with a few scattered weedy species.

Bell Mountain Outcrops (Blakely Borough and Dickson City, Segment 2) - This site is not significant on a state-wide level but is locally significant. It is comprised of sandstone and conglomerate outcrops and associated plant communities. These xeric (i.e., dry) outcrops support associations of stunted trees including chestnut oak, gray birch, red oak, and sweet birch with patches of low growing huckleberries and blueberries. Herbaceous species occurring here are typical of extremely dry conditions.

Meyers Mountain (Archbald and Scott Townships, Segment 3) - This site contains a small population of serviceberry (*Amelanchier humilis*), a Pennsylvania plant species of concern. It was found on a dry opening on Meyers Mountain Summit in State Game Lands #307. The habitat is oak-hardwood-heath vegetation with steep wooded down slopes. Associated species include oak, red maple, mountain laurel, maple-leaved viburnum, black huckleberry (*Gaylussacia baccata*), and chokeberry (*Aronia sp.*).

Moosic Mountain Barrens (Jefferson Township, Segments 3 and 4) - This site is one of the top priorities for conservation in the county. It is a nearly 8,000-acre expanse of good to excellent quality ridgetop acidic barren community (Nature Conservancy, 2008). The barrens are primarily restricted to the highest most exposed portions of the ridge (1,200 to 2,200 feet above sea level) and are surrounded by slopes and drainages with mixed hardwood forest. The site includes both ridgetop acidic barrens, also known as Ridgetop Dwarf-Tree Forest (Nature Conservancy, 2008), and two other high-elevation barrens communities: Heath Barrens Natural Communities and Northern Appalachian Acidic Rocky Summit Natural Community. Moosic Mountain is the only location in the state where they are known to occur. The Nature Conservancy of Pennsylvania owns about 1,500 acres of land on Moosic Mountain (Nature Conservancy, 2008). These communities are characterized by a dominance of low growing ericaceous species which include lowbush blueberry, huckleberry, sheep laurel, black chokeberry (*Aronia melanocarpa*), and teaberry. Herbaceous species such as Pennsylvania sedge (*Carex pennsylvanica*), poverty grass, and Canada mayflower (*Maianthemum canadense*) are infrequent associates found among the heath shrubs. Large expanses of this ankle to knee-high vegetation stretch along the ridgetop. Fire and microclimate are important factors in helping to maintain this community type at other locations in the northeastern United States. Some portions of the ridge at Moosic Mountain have been used historically for blueberry harvest which included cutting and burning.

The Ridgetop Dwarf-Tree Forest Natural Community (part of the Moosic Mountain Barrens in Jefferson Township, Segments 3 and 4) consists primarily of scrub-oak barrens, and in some areas pitch pine/scrub-oak barrens. On some stretches of the ridge it occurs adjacent to the heath barrens, elsewhere it covers the entire width of the ridge. Scrub oak is the dominant canopy species in the dwarf tree forest with pitch-pine, black gum, chestnut oak, and sassafras occurring in localized patches and infrequently scattered throughout. Many plant species of heath barrens and scrub-oak barrens are fire tolerant (e.g., with thick protective bark and/or the capability to resprout and to germinate after fires), and under natural conditions fire has helped to maintain these barrens communities. Portions of this site show evidence of having burned within the last several decades.

Wayne County (Nature Conservancy, 1991)

Alternative Routes A/B do not cross any identified Special Natural Communities with vegetation concerns in Wayne County.

Pike County (Nature Conservancy, 1990 and 1995)

Buckhorn Oak Barren – This site crossed by Route A is a fair example of a Pitch Pine-scrub Oak Barren community. However, fire suppression is causing the pitch pine and scrub oak to succeed to a xeric central hardwood community dominated by oaks and hickories.

Buckham Mountain Matrix Forest Block – The Nature Conservancy has identified a large block of forest as a matrix forest block on the eastern end of Route A. The Nature Conservancy identifies matrix forest blocks as a forest ecosystem that extends over a very large area of 1,000 to many millions of acres, often covering 80 percent or more of an undeveloped landscape. The Nature Conservancy indicates that these matrix forest blocks are important for the conservation of wide-ranging fauna such as large herbivores, predators, and forest interior birds. The block begins approximately where Route A goes south of Walker Lake and extends to the Pennsylvania-New York border where Route A crosses the Delaware River. This block of forest is approximately 32,700 acres (Nature Conservancy, 2008).

High Knob (Segment 5) – This site along Route B is a good example of a Ridgetop- Dwarf Tree Forest community. High Knob has been disturbed by the existing right-of-way and radio towers. This site is on Delaware State Forest property.

Pike – Monroe Matrix Forest Block (Segment 5) – The Nature Conservancy has identified a large block of forest as a matrix forest block along Alternative Route B. The block begins approximately where Alternative Route B crosses Route 84 and Alternative Route B exits the block just south of where Route B crosses Route 402. This block of forest is approximately 44,500 acres of mixed oak and a large portion is Delaware State Forest property (Nature Conservancy, 2008).

Shoemakers Barrens (Segment 5) – This area crossed by Route B is an example of an Acidic Rocky Summit community approximately 10 acres in size located at the southern tip of Pike County. Common species in the area include scrub oak, shield ferns, hair grass, poverty grass and spring beauty. This community supports a good population of an unnamed state rare herbaceous plant which is typically found on the Shale Cliff communities along the Delaware River. Although vegetation is similar to the cliff community, Shoemaker Barrens lacks the steep, near vertical slopes associated with a cliff community; rather it contains open rock outcrops near the summit of the mountain.

Monroe County (Nature Conservancy, 1991, 1999)

Arnott Fen (Segment 5) – This site is a fair to good quality Shrub Fen. It supports populations of five unnamed rare plants, including an unnamed state endangered wildflower, unnamed poor populations of a state endangered wildflower, and an unnamed state rare wildflower. This small natural community is part of a larger wetland complex. Calcareous (sweet) waters derived from

weathering of the underlying limestone bedrock influence the array of species living in the community; the plant species of special concern growing here thrive under these conditions. Dominant plants of the fen include meadow-sweet (*Spiraea latifolia*), marsh fern (*Thelmiteris palustris*), tussock sedge (*Carex stricta*), and peat moss. This site is on National Park Service land along the existing right-of-way.

Route C

Luzerne County (Nature Conservancy, 2006)

Susquehanna Riverlands Environmental Preserve (Conyngham and Salem Townships) – This area consists of approximately 1,200 acres and the Pennsylvania Audubon Society has designated it as a Pennsylvania Important Bird Area because it contains fairly extensive riparian and hillside forest. Both sides of the North Branch Susquehanna are protected for approximately 1 mile. The west-side of the preserve includes public picnic areas, riparian forest, hillside forest, and some marsh and swamp. The site is owned and managed for recreation and environmental education by PPL Susquehanna, LLC. The east side of the preserve encompasses many habitats, including hundreds of acres of oak – hickory – pine forest, cliffs, and abandoned fields. Gould Island, owned by PPL Susquehanna, LLC, has a fairly mature forest, especially on its downstream end. There are large specimens of silver maple (*Acer saccharinum*), sycamore (*Platanus occidentalis*), and black maple (*Acer niger*).

Schuylkill County (Nature Conservancy, 2003)

Wolf Creek Ridgetop Dwarf-Tree Forest (Blythe and Ryan Townships) – This natural community, and several adjacent ridges in north central Schuylkill County, are vegetated in a distinct Ridgetop Acidic Barrens Community Complex, also known as a Ridgetop Dwarf-Tree Forest. This complex is a mosaic of more narrowly defined community types including the Pitch Pine–Scrub Oak Woodland, Pitch Pine–Mixed Hardwood Woodland, Pitch Pine–Heath Woodland, Scrub Oak Shrubland, and Low Heath Shrubland. This community is described above under the Moosic Mountain Barrens natural area. Ridgetop barrens ecosystems need periodic fire to keep the scrub habitat from succeeding to hardwood species. This site includes portions of Weiser State Forest and Locust Lake State Park.

Bears Head Ridgetop Dwarf-Tree Forest (Delano, East Union, Mahanoy and West Mahanoy Townships) – This Natural Community occupies the higher elevations of Locust Mountain north of Shenandoah and Delano, and is bounded on the east by Interstate I-81. This area is also a Ridgetop Acidic Barrens Community Complex, also known as a Ridgetop Dwarf-Tree Forest, as described above.

Wolf Creek Watershed (Blythe Township) – Field visits to the Wolf Creek reservoir watershed in 1991, 1997 and 2002 revealed several populations of three plant species of concern. Several good to excellent quality populations of a state endangered plant species, Collin’s sedge (*Carex collinsii*) were found growing in shrub-swamp thickets along Wolf Creek. Collin’s sedge was found growing in conjunction with Coville’s rush (*Juncus gymnocarpus*), a highly unusual plant association. The yellow-fringed orchid (*Platanthera ciliaris*), a plant of special concern, was

also located in Wolf Creek. The third plant species of concern found at this site is the rare screwstem (*Bartonia paniculata*). Associated species at this site include cinnamon fern, sedges (*Carex folliculata* & *C. trisperma*), Coville's rush, skunk cabbage (*Symplocarpus foetidus*), sundew (*Drosera rotundifolia*), highbush blueberry, dewberry (*Rubus hispida*) and sphagnum moss (*Sphagnum spp.*). A sphagnum-sedge wetland of excellent quality occurs on the site. This community type lacks a canopy of trees or shrubs, and is characterized by a thick layer of sphagnum moss, various graminoids including cotton grass (*Eriophorum virginicum*), Collin's sedge, Coville's rush, and ferns. Stunted-growth shrubs including highbush blueberry and smooth winterberry (*Ilex laevigata*) occur around the perimeter of the canopy opening.

Lehigh County (Nature Conservancy, 2004)

Walnutport Canal Site (Walnutport Borough, North Whitehall Township, Washington Township, Lehigh Township, Lehigh and Northampton Counties) – This site contains a population of Virginia Rose (*Rosa virginiana*), a Pennsylvania plant species of concern. Associated species include sensitive fern, southern arrow-wood (*Viburnum dentatum*), Virginia creeper (*Parthenocissus quinquefolia*), and wild grape (*Vitis spp.*).

Northampton County (Nature Conservancy, 2004)

Bertsch Creek Seep (Lehigh Twp.) – This site is not a county significant site; however, it is locally significant. It is located in a forested stream ravine along Bertsch Creek. The lower reaches of the creek run along the bottom of a moderately steep forested slope and contain segments of rock outcrop and groves of hemlock. A seep-derived tributary of the creek supports a fair quality population of goldenclub (*Orontium aquaticum*), a plant species that has been delisted from the state endangered species list.

Blue Mountain/Kittatinny Ridge – This mountain range is the most extensive relatively contiguous area of natural habitat in Lehigh and Northampton counties. It is a major corridor for the movement of biota in eastern Pennsylvania. It includes extensive forests with streams, seeps, springs, vernal pools, rock outcrops, and boulder fields. Wetland areas associated with streams, seeps and vernal pools are important habitat for a wide diversity of plant species. A Nature Conservancy matrix forest block, the St. Anthony's Wilderness Matrix Forest Block is crossed by Alternative Route C. This block is approximately 128,000 acres and has rare plants such as the yellow lady slippers and scirpus (Nature Conservancy, 2008c).

Bushkill Creek Watershed (Bushkill, Ross, and Monroe Townships) – One of the micro sites within this watershed is a gently sloping forested area that includes an Ephemeral Fluctuating Pools Natural Community. There are at least 12 vernal pools here. The woods are variably wet with some elevated areas being drier. Dominant tree species include white oak and red maple, which occur with scattered tulip poplar, red oak, and hemlock. Spicebush is the common understory species with white pine saplings and arrow-wood also occurring. The pools may have varying cover types as is typical of this community type. Cinnamon fern, sedges, bulrushes, and fowl manna grass are common in these situations with numerous other species possible. This site has the potential for several plant species of special concern. Disturbances at the site include a paved road that bisects the site, as well as some unpaved lanes that cross

through the woods. The woods have been cut over in the past but are nearing maturity again. Another site within this watershed includes areas of marsh and shrub swamp, which are fed by ground water seepage. Red maple, cattail, skunk cabbage, and sedges are common species. It has been impacted by silt runoff from the adjacent farm fields as well as by the roads that may be influencing the hydrology.

5.4.3 State Special Concerns

PPL Electric sent a letter to the Pennsylvania Department of Conservation and Natural Resources (DCNR) on June 30, 2008 requesting current information on federal, state, and rare plant species that may occur in proximity to the Alternative Routes. On July 23, 2008, PPL Electric received a letter from the Pennsylvania Natural Heritage Program Manager at DCNR identifying the agency’s preliminary concerns and recommendations for the Alternative Routes. On July 25, 2008, PPL Electric also received an email from DCNR detailing the plant species surveys that the agency requested that PPL Electric complete for the Alternative Routes. The requested species for each route are listed in Table C-7. Both DCNR communications are included in Appendix E-4.

Table C-7. Pennsylvania DCNR Rare Plant Requests		
Route/Plant Name	Current Status	Proposed Status
Route A		
Serviceberry (<i>Amelanchier humilis</i>)	TU	PE
Long-stemmed water-wort (<i>Elatine americana</i>)	PX	PE
Lupine (<i>Lupinus perennis</i>)	PR	PR
Prickly-pear cactus (<i>Opuntia humifusa</i>)	PR	PR
Slender mountain-ricegrass (<i>Oryzopsis pungens</i>)	PE	PE
Small beggar-ticks (<i>Bidens discoidea</i>)	N	PR
Three-toothed cinquefoil (<i>Potentilla tridentata</i>)	PE	PE
Prostrate sand cherry (<i>Prunus pumila var. depressa</i>)	-	PE
Appalachian sand cherry (<i>Prunus pumila var. susquehanae</i>)	-	PT
Red currant (<i>Ribes triste</i>)	PT	PT
Roseroot stonecrop (<i>Sedum rosea</i>)	PE	PE
Bog-rosemary (<i>Andromeda polifolia</i>)	PR	PR
Sedge (<i>Carex sprengelii</i>)	N	PR
Route B		
Serviceberry (<i>Amelanchier humilis</i>)	TU	PE
Dwarf mistletoe (<i>Arceuthobium pusillum</i>)	PT	PT
Lupine (<i>Lupinus perennis</i>)	PR	PR
Prickly-pear cactus (<i>Opuntia humifusa</i>)	PR	PR
Slender mountain-ricegrass (<i>Oryzopsis pungens</i>)	PE	PE
Slender panic grass (<i>Panicum xanthophysum</i>)	PE	PE
Three-toothed cinquefoil (<i>Potentilla tridentata</i>)	PE	PE
Prostrate sand cherry (<i>Prunus pumila var. depressa</i>)	-	PE

Table C-7. Pennsylvania DCNR Rare Plant Requests		
Route/Plant Name	Current Status	Proposed Status
Appalachian sand cherry (<i>Prunus pumila</i> var. <i>susquehanae</i>)	-	PT
Red currant (<i>Ribes triste</i>)	PT	PT
Roseroot stonecrop (<i>Sedum rosea</i>)	PE	PE
Bog-rosemary (<i>Andromeda polifolia</i>)	PR	PR
Bog sedge (<i>Carex paupercula</i>)	PT	PR
Soft-leaved sedge (<i>Carex disperma</i>)	PR	PR
Many-fruited sedge (<i>Carex lasiocarpa</i>)	PR	PR
Wood's sedge (<i>Carex tetanica</i>)	PT	PT
Cat-tail sedge (<i>Carex typhina</i>)	PE	PT
Mud sedge (<i>Carex limosa</i>)	TU	PT
Sedge (<i>Carex sprengelii</i>)	N	PR
Clinton's wood fern (<i>Dryopteris clintoniana</i>)	N	PT
Downy willow herb (<i>Epilobium strictum</i>)	PE	PR
Small-headed rush (<i>Juncus brachycephalus</i>)	PT	PT
Swamp dog-hobble (<i>Leucothoe racemosa</i>)	TU	PT
Water lobelia (<i>Lobelia dortmanna</i>)	PT	PT
Brook lobelia (<i>Lobelia kalmii</i>)	PE	PE
Carolina grass-of-Parnassus (<i>Parnassia glauca</i>)	PE	PE
Shrubby cinquefoil (<i>Potentilla fruticosa</i>)	PE	PE
Flat-leaved bladderwort (<i>Utricularia intermedia</i>)	PT	PT
Bog bluegrass (<i>Poa paludigena</i>)	PT	PR
Route C		
Waterhemp ragweed (<i>Amaranthus cannabinus</i>)	PR	PR
Brown sedge (<i>Carex buxaumii</i>)	TU	PR
Collin's sedge (<i>Carex collinsii</i>)	PE	PT
Matted spike-rush (<i>Eleocharis intermedia</i>)	PT	PT
Whitlow-wort (<i>Paronychia fastigiata</i> var. <i>nuttallii</i>)	TU	PE
Cloud sedge (<i>Carex haydenii</i>)	TU	PT
Ebony sedge (<i>Carex eburnea</i>)	PE	PE
Schweinitz' flatsedge (<i>Cyperus schweintzii</i>)	PR	PR
Yellow fringed orchid (<i>Platanthera ciliaris</i>)	TU	PT
Nuttall's milkwort (<i>Polygala nuttallii</i>)	N	TU
Spotted pondweed (<i>Potamogeton pulcher</i>)	PE	PE
White water crow foot (<i>Ranunculus aquatilis</i> var. <i>diffusus</i>)	N	PR
Drooping bluegrass (<i>Poa languida</i>)	TU	PT
Wild bleeding-hearts (<i>Dicentra eximia</i>)	PE	PE
Northeastern bulrush (<i>Scirpus ancistrochaetus</i>)	FE, PE	FE, PT
Swamp dog-hobble (<i>Leucothoe racemosa</i>)	TU	PT
Autumn willow (<i>Salix serissima</i>)	PT	PT
FE=Federally Endangered; PE=Pennsylvania Endangered; PT=Pennsylvania Threatened; PR=Pennsylvania Rare; TU=Tentatively Undetermined; N=No Legal Status; PX=Pennsylvania Extirpated (i.e., no longer found in PA).		

Routes A and B

DCNR's July 23, 2008 letter states that Routes A and B would impact the Lackawanna State Forest from 2.2 miles of right-of-way widening, a stream crossing at Harvey's Creek, and impacts to an area of old growth forest. Additionally, they expressed concern that Routes A/B cross through the state's Varden Conservation Area in Wayne County (Segment 4). DCNR stated that potential impacts along the route include forest fragmentation.

Specific only to Route A in Pike County, DCNR stated that Route A crosses sensitive ridge-top barrens communities and that creation of new right-of-way and expansion of existing right-of-way would introduce or exacerbate habitat fragmentation. Additionally, DCNR expressed concern that Route A crosses an undisturbed section of the Delaware State Forest's Buckhorn Tract that includes numerous stream and wetland crossings and would require the elimination of substantial amounts of forested land. DCNR also stated that Route A would negatively impact the Milford Experimental Forest, which was purchased in part through DCNR grants with Forest Legacy funding. Route A, according to DCNR, would also impact multiple plant, natural community, and geologic features known in the vicinity of the project and requested that PPL Electric perform surveys for numerous species of special concern (see Table C-7).

DCNR also stated that they prefer Route B to Route A because it does not include creation of new right-of-way, so forest loss, habitat fragmentation, and other natural resource impact concerns are not as great as with Route A. They do state, however, that widening existing right-of-way, as found in Route B, would exacerbate fragmentation impacts. DCNR stated that because Route B crosses through the Delaware State Forest, it has additional vegetation impacts to state forestland and six river crossings, including Gates Meadow Run, East Spring Run, Big Bushkill, an unnamed tributary to Beaver Run Lake, Saw Creek, and Red Rock Run. According to DCNR, Route B also crosses through the vicinity of multiple plant species of special concern, as well as numerous natural communities and geologic features and requested that PPL Electric perform surveys for numerous species of special concern (see Table C-7). These surveys will begin in Spring 2009 and may continue through late Summer 2009.

Route C

DCNR stated that they have concerns about Route C because it introduces new right-of-way along the southern flank of Blue Mountain/Kittatinny Ridge and in some areas would create significant new habitat fragmentation. According to DCNR, Route C would also impact several areas with sensitive ridge-top barrens communities. DCNR stated that Route C in Northampton County would impact land in the Kittatinny Ridge Conservation Corridor and the Lehigh Valley Greenway Conservation Landscape Initiative, which are high priority landscapes for DCNR. Route C, according to DCNR, would also impact multiple plant, natural community, and geologic features known in the vicinity of the project and DCNR requested that PPL Electric perform surveys for numerous species of special concern (see Table C-7).

5.4.4 Federally Listed Plant Species

PPL Electric sent a letter to the U.S. Fish and Wildlife Service (USFWS) on June 30, 2008 requesting current information on federal, state, and rare animal species that may occur in proximity to all three Alternative Routes. On October 16, 2008, PPL Electric received a response letter from USFWS providing its concerns regarding rare species along Route B. It did not identify any concerns regarding federally listed plants for Route B; however, one federally listed plant species is known to occur in counties crossed by the three Alternative Routes: the federally endangered northeastern bulrush (*Scirpus ancistrochaetus*). In DCNR's July 25, 2008 correspondence detailing rare species survey requests for each route, DCNR only requested PPL Electric conduct northeastern bulrush surveys for Route C.

Habitat types that support the northeastern bulrush include the edges of seasonal pools, shrub, and emergent wetlands; vernal pools; and ombrotrophic (hydrologically isolated) swamps (USFWS 1993). Existing populations are known to occur in Lackawanna, Monroe, Lehigh, and Northampton counties, so all three Alternative Routes could potentially cross Northeastern bulrush habitat. However, DCNR in its July 25, 2008 email correspondence (see Appendix E-4), identified rare plants that could occur along each route (see Table C-7). DCNR only requested surveys for the northeastern bulrush along Route C; USFWS (letter dated October 16, 2008; see Appendix E-4) did not identify the bulrush as a species of concern.

5.4.5 Impacts on Vegetation and Proposed Mitigation Measures

Common Vegetation

PPL Electric has established minimum conductor-to-vegetation clearances and right-of-way widths to be cleared for each class of transmission line voltage. For 500 kV lines, PPL Electric typically clears rights-of-way to a width of 200 feet, with a 32-foot minimum acceptable clearance from vegetation to conductor at time of maintenance. Additionally, to ensure line reliability, vegetation management operations must extend to trees located outside the 200-foot clearing widths when trees present a hazard to the line. These "danger trees" are those that, in falling, would either strike the conductor or pass within the minimum conductor clearance.

PPL Electric has two categories of clearing: Selective and Restricted. In Selective Clearing, PPL Electric will preserve low-growing trees and shrubs that are compatible with the operation of the line wherever possible. In most cases, these species do not grow to heights that present a hazard to the line. The preservation of compatible species inhibits the growth of tall-growing (noncompatible) species, helps to prevent erosion, minimizes visual impact of the cleared right-of-way, and provides a useful wildlife habitat. Compatible species include small woody trees such as flowering dogwood (*Cornus florida*), redbud (*Cercis canadensis*), hawthorn (*Crataegus spp.*), blue beech (American Hornbearn) (*Carpinus caroliniana*), shadbush (juneberry, serviceberry) (*Amelanchier spp.*), eastern red cedar (*Juniperus virginia*), northern white cedar (*Thuja occidentalis*), American chestnut (*Castanea dentata*), and dwarf willow (*Salix spp.*). Large shrubs such as alder, spicebush, chokecherry, and viburnum are also considered compatible species and allowed to remain. Within Selective and Restricted Clearing, PPL

Electric will remove all trees and brush—both compatible and noncompatible species—from access roads (15-foot width); in work areas (stringing, vegetation disposal areas, structure erection areas); and within a 15-foot perimeter of a tower or immediately adjacent to any structure location.

In Restricted Clearing, PPL Electric attempts to preserve additional vegetation that is not a safety hazard of even noncompatible species in areas of high environmental sensitivity (i.e., steep slopes, stream banks). The preserved vegetation helps to minimize habitat disruption and short-term environmental impacts of line construction, such as erosion, siltation, and loss of shading, which might result from Selective Clearing practices. Typically, Restricted Clearing is used:

- At designated stream crossings, where the creation of a "buffer" is advisable to preserve existing water quality.
- On designated steep slope areas, where erosion may be lessened by limiting cutting on the downhill side of the line.
- In designated natural or unique areas not subject to high public visibility.
- In ravines, where limited clearing may be done on upper slopes and little or no clearing is required at the bottom.
- At selected road crossings or along scenic highways/roads and city streets. The size, use, and the scenic or visual characteristics of the road are considered in designating road screens.
- In areas containing cultivated trees or shrubs which have been designated for trimming or topping only.
- In protected watersheds and high quality (HQ) or exceptional value (EV) watersheds.

In ravines or gullies or on side hills, where topography is such that they will not reach the wire security zone, PPL Electric would retain noncompatibles over the life of the line.

Forested land and non-forested land were inventoried for all three Alternative Routes by manually digitizing “on-screen” using ArcMap (ESRI, Redlands, CA) geographic information system (GIS) software. All analysis was completed using photo interpretation of PAMAP imagery at a scale of 1:2000. Land was determined to be forested if tree canopy closure was visually estimated to be equal to or greater than 10 percent. Using the right-of-way assumptions described in Table C-1, a GIS intersect was done to determine where new clearing on each Alternative Route would require clearing of forested land. Based upon this information, required forest clearing acreages were estimated (see Table C-3). Route A would result in PPL Electric clearing approximately 1,058 acres of forest and converting it to shrub or grassland. Route B would result in PPL Electric clearing approximately 590 acres of forest and converting it to shrub or grassland, and Route C would result in PPL Electric clearing approximately 1,117 acres of forest. Because PPL Electric would build Route B either entirely or partially within existing right-of-ways or parallel to existing right-of-ways for more than 90 percent of the route, forest clearing is minimized compared to the other Alternative Routes. Additionally, because most of the forest clearing needed for Route B would be contiguous to the existing right-of-way, most of the cleared forest would be edge forest and not interior forest. Both Routes A and C would require clearing virgin forest, including through Nature Conservancy Forest Blocks (Buckham Mountain Matrix Forest Block and St. Anthony’s Wilderness Matrix Forest Block for Routes A

and C, respectively). Although Alternative Route B crosses through Pike-Monroe Matrix Forest Block (Nature Conservancy Forest), it is along an existing cleared right-of-way.

In accordance with state and federal environmental regulations and policies, PPL Electric will not dispose of any vegetation in known or suspected wetland areas. Outside of wetland areas, PPL Electric will dispose of vegetation by either piling timber along the edges of the right-of-way; stacking all slash (i.e., trees less than 6 inches in diameter, tree tops, limbs) in flattened mounds along the edge of the right-of-way, away from areas of preserved compatible vegetation; dropping and lopping along the edge of the right-of-way; chipping vegetation and randomly scattering it on the right-of-way, except in fields, along city streets, park areas, or on the banks of streams, or ponds; or burning where allowed. In all cases, the procedure and equipment used would minimize disturbance to both the right-of-way soil cover and to the vegetation that is to remain on the right-of-way.

Vegetation maintenance would include herbicide/pesticide application and mechanical methods such as cutting and mowing. Selective herbicide use is the preferred method of eliminating unwanted woody vegetation, while allowing grasses, weeds, and ferns to continue to grow. Herbicide application will be done by stump treatment, basal application, and foliage application. In all these methods, herbicides are applied using hand-held applicators, treating only those species that require control. Herbicide application would abide by all applicable federal, state, and local laws and regulations, including U.S. Department of Agriculture and EPA. PPL Electric will not apply herbicides in the following areas (with the exceptions as noted):

- Pasture areas.
- Within 50 feet of any water body, except stump treatments and herbicides approved for watershed/aquatic use.
- Within any actively maintained orchard or cultivated planting.
- Near susceptible crops or other non-target vegetation, where drift, runoff, or vapors can cause injury. Exact safety distances shall be determined based on wind conditions, topography, soil type, vegetation (crop) type, and label instructions.
- In cases where weather conditions create excessive drift, applications will be temporarily suspended until improved conditions warrant the continuation of the application.
- On rights-of-way under jurisdiction of the Pennsylvania Department of Conservation and Natural Resources, Pennsylvania Game Commission, Pennsylvania Fish and Boat Commission, and the National Park Service unless prior approval is granted by the Department or Commission.
- On watershed properties, or in the vicinity of springs, irrigation ditches, or other potable water sources, unless prior approval is granted by the property owner for use of a watershed/aquatic approved herbicide.
- In gullies or ravines where tree clearing is minimal.

In non-forested areas, right-of-way clearing would temporarily impact herbaceous vegetation, either directly or indirectly from soil compaction, as a result of heavy construction equipment and vehicles traveling through the right-of-way. At structure locations, vegetation would be

entirely cleared, with some permanently lost. Additional vegetation would be cleared for the placement of access roads. Disturbance both from initial right-of-way clearing and project construction, and from subsequent maintenance activities could also create conditions that are favorable to the spread of noxious weeds.

As discussed in the Soils and Geology section (Section 5.1), PPL Electric will keep soil disturbance to a minimum and will immediately begin permanent restoration following grading. PPL Electric will mulch all seeded areas. PPL Electric will hydroseed slopes in all cuts and fills and scarred areas as soon as practical with mix B (coarse lawn mix) for slopes less than 3 to 1 or crown vetch for slopes exceeding 3 to 1, to reduce erosion and restore vegetational cover. The installation of an erosion control blanket may be required at critical locations where high erosion potential exists and when time of year is not suitable for seeding.

Special Natural Areas

All three Alternative Routes would cross various Natural Areas. The proposed project's potential impact on these Natural Areas depends upon the Alternative Route's construction and clearing requirements in that location and whether or not the Alternative Route is utilizing an existing right-of-way. Table C-8 presents the various Natural Areas along with the existing right-of-way cleared width and construction and clearing requirements.

Routes A and B do not require any additional right-of-way clearing for the first 29.7 miles. As a result, the proposed project would have minimal effects on Natural Areas and rare plant species that occur in this stretch. Route A has two portions of the route that would require clearing of virgin right-of-way. One portion, where the route also includes Route B, goes through the Bell Mountain Outcrop and Meyers Mountain Natural Areas, and includes the western edge of the Moosic Mountain Barrens Natural Area. PPL Electric will work with the state resource agencies and The Nature Conservancy in order to minimize effects on rare natural communities and species in these areas. Project construction would require additional right-of-way clearing of varying widths through additional Natural Areas for the remainder of Route B, and portions of Route A; however, because this clearing parallels existing right-of-way, potential impacts are lessened.

Route A also has an area of virgin right-of-way clearing for the last 24.5 miles of its route through Pike County. As discussed previously, in this area Alternative Route A would cross the Buckham Mountain Matrix Forest Block, as well as the Buckhorn Oak Barren Natural Area. New right-of-way clearing that does not parallel other right-of-ways would fragment the habitat in these areas.

Route C requires right-of-way clearing for a large portion of its route. Portions parallel existing rights-of-way, as through the Bushkill Creek Watershed Natural Area; however, the majority of the Natural Areas crossed by this route would require 200 feet of new right-of-way clearing. This is of particular concern with the Blue Mountain/Kittatinny Ridge Natural Area and the various ridgetop barren communities where the new right-of-way would cause fragmentation within extensive and/or sensitive forested areas.

Table C-8. Construction Requirements Within Special Natural Areas			
Natural Area	Route	Existing Right-of-way Width and Clearance	Construction and Clearing Requirements¹
Luzerne County			
Dogtown Mines	A and B	200 ft, mostly cleared to 200 ft	Use existing 500 kV line currently operating at 230 kV; replace older overhead ground wire with fiber optic cable; inspect clearances to ensure adequacy for higher voltage; little or no clearing expected; would require 0.9 mile of new line near Susquehanna on PPL Susquehanna, LLC property to connect to PPL Electric 500 kV substation instead of the 230 kV substation.
Shickshinny Mountain Ridgetop	A and B	200 ft	Use existing 500 kV line currently operating at 230 kV; replace older overhead ground wire with fiber optic cable; inspect clearances to ensure adequacy for higher voltage; little or no clearing expected; would require 0.9 mile of new line near Susquehanna Substation on PPL Susquehanna, LLC property to connect to PPL Electric 500 kV substation instead of the 230 kV substation.
Shickshinny Mountain Slopes	A and B	200 ft	Use existing 500 kV line currently operating at 230 kV; replace older overhead ground wire with fiber optic cable; inspect clearances to ensure adequacy for higher voltage; little or no clearing expected; would require 0.9 mile of new line near Susquehanna on PPL Susquehanna, LLC property to connect to PPL Electric 500 kV substation instead of the 230 kV substation.
Ice Caves	A and B	325 ft, generally cleared to 100 ft with some areas cleared to 150 ft	Construct new 500 kV line parallel to existing 230 kV line on northwest side; clear up to an additional 200 ft for the full 325 ft.
Susquehanna River at Duryea	A and B	325 ft, generally cleared to 100 ft with some areas cleared to 150 ft	Construct new 500 kV line parallel to existing 230 kV line on northwest side; clear up to an additional 200 ft for the full 325 ft.
Susquehanna Riverlands	C	200 ft	Use existing single circuit 500 kV line across river, built for double circuit, string second set of conductors on opposite side of structures. No additional clearing expected.
Lackawanna County			
Susquehanna River Woods	A and B	325 ft, generally cleared to 100 ft with some areas cleared to 150 ft	Construct new 500 kV line parallel to existing 230 kV line on northwest side; clear up to an additional 200 ft for the full 325 ft.
Bell Mountain Outcrops	A and B	350 feet, uncleared, vacant future use, with some gaps	Secure ROW gaps (approximately 3.2 miles); clear ROW to 200 ft; construct new 500 kV line for future double circuit.
Meyers Mountain	A and B	350 feet, uncleared, vacant future use, with some gaps	Secure ROW gaps (approximately 3.2 miles); clear ROW to 200 ft; construct new 500 kV line for future double circuit.
Moosic Mountain Barrens	A and B	200 feet, cleared to 150 ft in wooded areas, with some 100 ft ROW in open areas. It is possible that a small part of the western edge of this Natural Area would have a ROW situation as described for Meyers Mountain.	Replace existing antiquated 230 kV line and structures with new line built for double circuit 500 kV, proposed 500 kV line to occupy one side and original 230 kV on the other; line would twice parallel an existing 69 kV line, once for 5.1 miles and again for 6.6 miles; some additional ROW will be needed in the 100 ft open areas; clear to 200 ft, additional clearing of approximately 50 ft needed in some wooded areas. It is possible that a small part of the western edge of this Natural Area would have a ROW situation as described for Meyers Mountain.

Table C-8. Construction Requirements Within Special Natural Areas			
Natural Area	Route	Existing Right-of-way Width and Clearance	Construction and Clearing Requirements¹
Wayne County			
Heron rookery	A and B	200 feet, cleared to 150 ft in wooded areas, with some 100 ft ROW in open areas	Replace existing 230 kV line and structures with new structures to double circuit new 500 kV on one side and existing 230 kV on the other; line would twice parallel an existing 69 kV line, once for 5.1 miles and again for 6.6 miles; some additional ROW will be needed in the 100 ft open areas; clear to 200 ft, additional clearing of approximately 50 ft needed in some wooded areas.
Pike County			
Buckhorn Oak Barren	A	No existing ROW	Secure new ROW for entire length; clear new ROW (primarily forested) to 200 ft; construct new 500 kV line built for double circuit but operated at single circuit initially.
Buckham Mountain Matrix Forest Block	A	No existing ROW	Secure new ROW for entire length; clear new ROW (primarily forested) to 200 ft; construct new 500 kV line built for double circuit but operated at single circuit initially.
High Knob	B	200 ft, generally cleared to 150 ft	Replace existing antiquated 230 kV line and structures with new line built for double circuit 500 kV, proposed 500 kV line to occupy one side and original 230 kV on the other; some additional ROW may be needed; clear to 200 ft, additional clearing of approximately 50 ft needed in areas.
Pike – Monroe Matrix Forest Block	B	200 ft, generally cleared to 150 ft	Replace existing antiquated 230 kV line and structures with new line built for double circuit 500 kV, proposed 500 kV line to occupy one side and original 230 kV on the other; some additional ROW may be needed; clear to 200 ft, additional clearing of approximately 50 ft needed in areas.
Shoemakers Barrens	B	Width mostly undefined, with 50-ft building restriction on each side of centerline; some widths 100 ft, with 325 ft closest to the Delaware River	Replace existing antiquated 230 kV line and structures with new line built for double circuit 500 kV, proposed 500 kV line to occupy one side and original 230 kV on the other; some additional ROW may be needed.
Monroe County			
Arnott Fen	B	Width mostly undefined, with 50-ft building restriction on each side of centerline; some widths 100 ft, with 325 ft closest to the Delaware River	Replace existing antiquated 230 kV line and structures with new line built for double circuit 500 kV, proposed 500 kV line to occupy one side and original 230 kV on the other; some additional ROW may be needed
Schuylkill County			
Wolf Creek Ridgetop Dwarf-Tree Forest	C	200 ft uncleared, vacant future use, with some gaps	Secure ROW gaps; clear ROW to 200 ft; construct new 500 kV line built for double circuit but operated at single circuit initially.
Wolf Creek Watershed	C	200 ft uncleared, vacant future use, with some gaps	Secure ROW gaps; clear ROW to 200 ft; construct new 500 kV line built for double circuit but operated at single circuit initially.
Bears Head Ridgetop Dwarf-Tree Forest	C	200 ft uncleared, vacant future use, with some gaps	Secure ROW gaps; clear ROW to 200 ft; construct new 500 kV line built for double circuit but operated at single circuit initially.
Lehigh County			
Walnutport Canal Site	C	200 ft uncleared, vacant future use	Construct new 500 kV line built for double circuit but operated at single circuit initially; wooded areas cleared to 200 feet. A new 500 kV switchyard would be constructed on PPL Electric-owned property near Bossards Corner.

Table C-8. Construction Requirements Within Special Natural Areas			
Natural Area	Route	Existing Right-of-way Width and Clearance	Construction and Clearing Requirements¹
Northampton County			
Bertsch Creek Seep	C	200 ft uncleared, vacant future use	Construct new 500 kV line built for double circuit but operated at single circuit initially; wooded areas cleared to 200 feet. A new 500 kV switchyard would be constructed on PPL Electric-owned property near Bossards Corner.
Blue Mountains/Kittatinny Ridge	C	Varies between 200 ft not cleared, vacant future use 200 ft, and cleared to various widths depending on landscape	Varies between new 500 kV line built for double circuit but operated at single circuit initially, 200 ft clearing and constructing new 500 kV line parallel to existing 230 kV with up to 175 feet of additional clearing.
Bushkill Creek Watershed	C	200 ft, cleared to various widths depending on landscape	Construct new 500 kV line built for double circuit but operated at single circuit initially parallel to existing 230 kV line on south side; clear up to 175 ft depending on landscape.
Oughoughton Creek Near Delaware River	C	200 ft, cleared to various widths depending on landscape	Construct new 500 kV line built for double circuit but operated at single circuit initially parallel to existing 230 kV line on south side; clear up to 175 ft depending on landscape.

¹ Clearing requirements could be less than stated; per PPL Electric Vegetation Management Plan, selective and restrictive clearing practices will be followed to the extent possible in sensitive natural areas.

State Special Concerns

DCNR, in its July 23, 2008 letter (see Appendix E-4), expressed concern that Routes A and B would impact the Lackawanna State Forest due to right-of-way widening. Along the portion of the route that crosses through the Lackawanna State Forest, little or no clearing is expected to be required, as PPL Electric would use the existing structures. As such, no impacts are expected in the Lackawanna State Forest.

DCNR also expressed concern about forest fragmentation within the Varden Conservation Area. Because burying 500 kV line is not feasible, construction of either Route A or Route B would require the existing right-of-way to be widened, with up to approximately 50 feet of additional clearing required. Forest fragmentation impacts are minimized because these routes would require an existing right-of-way expansion, as opposed to new right-of-way clearing; however, PPL Electric will work with DCNR to further minimize impacts to this conservation area.

The effects of Route A on forest fragmentation, specifically within the Buckhorn Tract, were discussed previously. These same impacts, due to new right-of-way clearing, would occur at the Milford Experimental Forest as well. Along Route B, DCNR expressed similar forest fragmentation concerns within the Delaware State Forest, where widening the existing right-of-way approximately an additional 50 feet is also likely to occur in at least some areas. PPL Electric will work with the Delaware State Forest to minimize impacts in this area.

As identified by DCNR, construction of Route C in new right-of-way along the southern flank of Blue Mountain/Kittatinny Ridge and sensitive ridge-top barren communities could result in forest fragmentation and other impacts on vegetation as discussed previously in the State Special Concerns section. New right-of-way clearing along much of Route C would result in forest

fragmentation within several high quality communities, including the Kittatinny Ridge Conservation Corridor and the Lehigh Valley Greenway Conservation Landscape.

PPL Electric will conduct rare plant surveys along the Preferred Route in the appropriate time of year. PPL Electric will continue to consult with DCNR, USFWS, and the National Park Service (NPS) at the Delaware Water Gap National Recreation Area (DEWA) regarding protecting and/or minimizing impacts to rare plants. NPS has provided confidential information regarding rare plant species that are known to exist or could occur within DEWA. PPL Electric has begun preliminary surveys in DEWA and will continue them in spring 2009.

Federally Listed Plant Species

All three Alternative Routes cross through counties known to support the northeastern bulrush. Neither DCNR nor USFWS identified this species as a concern along Route B and it is, therefore, unlikely that construction of Route B would affect this species. DCNR only identified Route C as a concern for this species.

5.4.6 Conclusion

Both Routes A and C require lengthy areas of new right-of-way clearing compared to Route B, which for the majority of the route would only require expansion of an existing right-of-way. As a result, Route B would require clearing about half the acreage of forest that Routes A and C would require (estimated at 610 acres compared to 1,078 and 1,117 acres for Routes A and C, respectively). Additionally, because most of the forest clearing needed for Route B would be contiguous to the existing right-of-way, most of the cleared forest would be edge forest and not interior forest. Both Routes A and C would require clearing virgin forest, including through Nature Conservancy Forest Blocks (Buckham Mountain Matrix Forest Block and St. Anthony's Wilderness Matrix Forest Block for Route A and C, respectively). Although Route B crosses through the Pike-Monroe Matrix Forest Block, it is along an existing cleared right-of-way and would not require clearing virgin forest in this area.

Route A has an area of new right-of-way clearing for its final 24.5 miles through Pike County to the Delaware River. As discussed previously, Route A in this area would cross the Buckham Mountain Matrix Forest Block, as well as the Buckhorn Oak Barren Natural Area, creating a 200-foot-wide new cleared corridor, resulting in fragmentation of these forested areas. Route C would result in forest fragmentation within several high quality communities, including various ridge-top barren communities, the Blue Mountain/Kittatinny Ridge Natural Area, the Kittatinny Ridge Conservation Corridor, and the Lehigh Valley Greenway Conservation Landscape. With the exception of the future use right-of-way area in Lackawanna County, PPL Electric would construct Route B within or adjacent to existing cleared rights-of-way, minimizing new forest fragmentation and impacts on any special natural areas of concern.

5.5 Wildlife

5.5.1 Common Wildlife

Pennsylvania fauna includes at least 71 species and subspecies of mammals and more than 186 nesting birds. Common mammal species include white-tailed deer (*Odocoileus virginianus*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), woodchuck (*Marmota marmax*), Virginia opossum (*Didelphis virginiana*), gray fox (*Urocyon cinereoargenteus*), red fox (*Vulpes vulpes*), eastern gray squirrel (*Sciurus carolinensis*), red squirrel (*Tamiasciurus hudsonicus*), beaver (*Castor canadensis*), long-tailed weasel (*Mustela frenata*), eastern chipmunk (*Tamias straitus*), eastern cottontail (*Sylvilagus floridana*), big brown bat (*Eptesicus fuscus*), little brown myotis (*Myotis lucifugus*), and several species of rodents and shrews (Carnegie Museum of Natural History, 2008). Common game species include black bear (*Ursus americana*), white-tailed deer, foxes, raccoons, beavers, and squirrels.

Pennsylvania has over 186 nesting bird species (PADCNR, 2003). Common birds include the northern cardinal (*Cardinalis cardinalis*), killdeer (*Charadrius vociferous*), dark-eyed junco (*Junco hyemalis*), tufted titmouse (*Parus bicolor*), brown thrasher (*Toxostoma rufum*), downy woodpecker (*Picoides pubescens*), white breasted nuthatch (*Sitta carolinensis*), scarlet tanager (*Piranga olivacea*), northern mockingbird (*Mimus polyglottos*), catbird (*Dumetella carolinensis*), and a diversity of sparrows, swallows, and warblers. Major game birds are the wild turkey (*Meleagris gallopavo*), Canada goose (*Branta canadensis*), and ruffed grouse (*Bonasa umbellus*). The most common birds of prey are hawks and owls such as red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), turkey vulture (*Cathartes aura*), and screech owl (*Otus asio*).

Pennsylvania has 73 species of native amphibians and reptiles, including 36 species of amphibians and 37 species of snakes. Common amphibians include common mudpuppy (*Necturus m. maculosus*), spotted salamander (*Ambystoma maculatum*), red-spotted newt (*Notophthalmus v. viridescens*), northern two-lined salamander (*Eurycea bislineata*), northern red salamander (*Pseudotriton r. ruber*), eastern red-backed salamander (*Plethodon cinereus*), eastern American toad (*Bufo a. americanus*), gray treefrog (*Hyla versicolor*), northern leopard frog (*Rana pipiens*), northern spring peeper (*Pseudocris crucifer crucifer*), wood frog (*Rana sylvatica*), and American bullfrog (*Rana catesbeiana*). Common reptiles include, northern red-bellied snake (*Storeria d. dekayi*), eastern gartersnake (*Thamnophis s. sirtalis*), northern black racer (*Coluber c. constrictor*), black rat snake (*Elaphe obsoleta obsoleta*), northern copperhead (*Agkistrodon contortrix mokasen*), eastern box turtle (*Terrapene c. carolina*), painted turtle (*Chrysemys picta*), stinkpot (*Sternotherus odoratus*), northern fence lizard (*Sceloporus undulatus hyacinthinus*), and common five-lined skink (*Eumeces fasciatus*) (Maret, 2008).

5.5.2 Special Natural Areas

Each of the counties crossed by one of the Alternative Routes has a Natural Areas Inventory (NAI) prepared by the Nature Conservancy along with the Pennsylvania Natural Heritage Program (PNHP) which includes information on the locations of rare, threatened, and

endangered species and the highest quality natural areas in the various counties. As described below, all three Alternative Routes cross, or are very close to crossing, portions of several natural areas. Unless otherwise noted, all information comes from that county's NAI. Depending on the county and when the NAI was prepared, the identity of some of the rare species may not be revealed. Therefore, although the NAIs list the species' status and ranking, it is possible that they have changed since the publication.

Routes A and B

Luzerne County (Nature Conservancy, 2006)

Dogtown Mines (Salem Township, Segment 1) – This site on State Game Land 260 contains a series of underground mine portals. Two animal species of concern were captured near one of the mine entrances – northern myotis (*Myotis septentrionalis*) and an unnamed Federally and state-listed endangered species. In addition, the glens in the State Game Land have hemlock forests that provide habitat for Acadian Flycatchers (*Empidonax virescens*). The Eastern small-footed myotis (*Myotis leibii*), a state threatened mammal species of concern was documented at this site in 2000.

Shickshinny Mountain Ridgetop (Jackson and Plymouth Townships, Segment 1) – An unnamed rare animal also occurs on site within the Lackawanna State Forest. This species was collected from open grassy habitat along the existing right-of-way just north of the ridgetop. The right-of-way contains a mixture of grasses and shrubby vegetation, including turkeyfoot grass (*Andropogon gerardii*), goldenrod (*Solidago sp.*), and dogwood (*Cornus racemosa* and *Cornus florida*). According to the Luzerne County NAI, the right-of-way, which runs the length of Shickshinny Mountain, provides extensive additional potential habitat.

Susquehanna River at Duryea (Exeter Township in Luzerne County and Ransom Township in Lackawanna County, Segments 1 and 2) – A marginal quality population of the state rare mussel, yellow lampmussel (*Lampsilis cariosa*), has been found in the North Branch of the Susquehanna River in an unshaded riffle area in sand with boulder and cobble (i.e., small to medium size rocks, generally between approximately 64 and 256 millimeters in diameter) substrate. The associated animal species include elktoe (*Alasmidonta marginata*) and one shell each of triangle floater (*Alasmidonta undulata*) and eastern floater (*Pyganodon cataracta*). Some algae and water stargrass (*Heteranthera dubia*) grew in this riffle area. The river is bordered to the east by railroad tracks and to the west by a sand/cobble/boulder shelf area directly adjacent to the river. An industry (possible mining) is located southwest of the animal population. An additional unnamed animal species of concern was located along the Susquehanna River corridor in 2000.

Lackawanna County (Nature Conservancy, 1997 and 2003)

Susquehanna River Woods (Ransom Township and Duryea Township, Segment 2) – An undetermined population of a Pennsylvania animal species of concern was found on this site in the uplands next to the Susquehanna River. In addition, several populations of a Pennsylvania animal species of concern were found in various locations in this stretch of the Susquehanna River. Associated species include small-mouthed bass (*Micropterus dolomieu*), elktoe

(*Alasmidonta marginata*), algae, water-stargrass (*Heteranthera dubia*), and triangle floater (*Alasmidonta undulata*). The river is bordered to the east by railroad tracks and to the west by a sand/cobble/boulder shelf area. No disturbances are apparent in the immediate area. Siltation and degradation of water quality from surrounding land use are potential threats.

Moosic Mountain Barrens – The Moosic Mountain Barrens complex provides habitat for birds, reptiles, mammals and invertebrates with several species of special concern potentially occurring here (Nature Conservancy, 2008). Scientists have found over 13 regionally rare and 2 globally rare Lepidoptera species here, as well as many birds that are declining in Pennsylvania including common yellowthroat (*Geothlypis trichas*), prairie warbler (*Dendroica discolor*), chestnut-sided warbler (*Dendroica pensylvanica*), rufous-sided towhee (*Pipilo erythrophthalmus*), and chipping sparrow (*Spizella passerina*) (Nature Conservancy, 1997 and 2003). Three moths of special concern have been recorded. A good to excellent quality population of barrens buckmoth (*Hemileuca maia*), a Pennsylvania animal species of concern, was found in this area. A fair population of footpath sallow moth (*Metaxaglaea semitaria*), a Pennsylvania species of concern, was found in the ridgetop dwarf tree forest. This species may be breeding in the acid scrub swamps, forest swamps, or bogs and is not especially indicative of cold barrens. Also, a good to excellent population of the globally rare pink sallow (*Psectraglaea carnosus*), a Pennsylvania animal species of concern, was found in the extensive heath barrens. Surveys conducted in 2005 for rare moths found 15 species of rare moths and butterflies at the site (Nature Conservancy, 2008). Rocky outcrops in the Moosic Mountain Barrens provide habitat for the Allegheny woodrat (*Neotoma magister*) and timber rattlesnake (*Crotalus horridus*), both listed as priority species in the Pennsylvania Comprehensive Wildlife Conservation Strategy (Nature Conservancy, 2008).

Wayne County (Nature Conservancy, 1991)

Routes A and B cross just to the south of a heron rookery identified in the 1991 Wayne County NAI. At that time, herons were last observed in 1986 (Segment 4).

Pike County (Nature Conservancy, 1990 and 1995)

Buckhorn Oak Barren – This site along Route A is an example of a pitch pine-scrub oak barren community. However, fire suppression is causing the pitch pine and scrub oak to succeed to a xeric (i.e., very dry) central hardwood community dominated by oaks and hickories. This habitat supports a population of an unnamed animal of special concern.

Route B does not cross any identified Special Natural Communities with wildlife concerns in Pike County.

Monroe County (Nature Conservancy, 1991, 1999)

Arnott Fen (Segment 5) – This site is a fair to good-quality Shrub Fen. This site supports a population of an unnamed state endangered animal and several rare plant species.

Route C

Luzerne County (Nature Conservancy, 2006)

Susquehanna Riverlands (Conyngham and Salem Townships) - The riparian forest supports populations of yellow-throated vireo (*Vireo flavifrons*), warbling vireo (*Vireo gilvus*), American redstart (*Setophaga ruticilla*), and northern parula (*Parula americana*). Both northern oriole (*Icterus galbula*) and orchard oriole (*I. spurius*) nest in forest and park land. Wetlands support good populations of swamp sparrow (*Melospiza georgiana*), red-winged blackbird (*Agelaius phoeniceus*), willow flycatcher (*Empidonax traillii*), and eastern bluebirds (*Sialis sialis*) nesting in natural cavities. Oak-dominated forests support good populations of scarlet tanager (*Piranga olivacea*), ovenbird (*Seiurus aurocapillus*), wood thrush (*Hylocichla mustlina*), worm-eating warbler (*Helmitheros vermivorus*), pine warbler (*Dendroica pinus*), red-eyed vireo (*Vireo olivaceus*), and rose-breasted grosbeak (*Pheucticus ludovicianus*). At least one state-listed bird species has nested on Gould Island in the past, although none have been observed in recent years.

This area contains a good diversity of reptile and amphibian species, and a reptile species of concern has been observed at this site. River Ors, a mammal species of concern, have also been seen at this site. In 2000, an animal species of concern was seen at this site along the Susquehanna River. Five Lepidopteran species of concern were seen at this site in 1997 and 1999, mulberry wing (*Poanes massasoit*), northern pearly-eye (*Enodia anhedon*), aphrodite fritillary (*Spyeria aphrodite*), long dash (*Polites mystic*), and Baltimore checkerspot (*Euphydryas phaeton*).

Schuylkill County (Nature Conservancy, 2003)

Wolf Creek Ridgetop Dwarf-Tree Forest (Blythe and Ryan Townships) – This natural community, and several adjacent ridges in north central Schuylkill County, are vegetated in a distinct Ridgetop Acidic Barrens Community Complex, also known as a Ridgetop Dwarf-Tree Forest. Plant diversity is typically low in pitch pine barrens, but a high diversity of rare butterflies and moths frequent these specialized habitats. The fly-poison borer (*Papaipema sp.1*) is a globally endangered moth species, endemic to Pennsylvania, which is found solely in these environments. The pitch pine barrens are disturbance dependent ecosystems. This site includes portions of Weiser State Forest and Locust Lake State Park.

Bears Head Ridgetop Dwarf-Tree Forest (Delano, East Union, Mahanoy and West Mahanoy Townships) – This Natural Community occupies the higher elevations of Locust Mountain north of Shenandoah and Delano, and is bounded on the east by Interstate I-81. This area is also a Ridgetop Acidic Barrens Community Complex, also known as a Ridgetop Dwarf-Tree Forest, as described above.

Lehigh County (Nature Conservancy, 2004)

Route C does not traverse any identified Special Natural Communities with wildlife concerns in Lehigh County.

Northampton County (Nature Conservancy, 2004)

Blue Mountain/Kittatinny Ridge – This site has been designated by Audubon Pennsylvania, as the largest of the state’s Important Bird Areas (National Audubon Society, 2008). The many rock outcroppings along the ridge also make it a popular place to watch migrating hawks, eagles, and vultures. A large migration of hawks goes south along the Kittatinny Ridge, stretching across a 250-mile arc from the Delaware Water Gap to the Maryland line (Nature Conservancy, 2008c). The relatively unfragmented forests include habitat for resident animal species including larger mammals such as bear and bobcat, as well as for numerous smaller mammals including the state threatened Allegheny woodrat (National Audubon Society, 2008). The Kittatinny Ridge Conservation Corridor includes 160 miles of the Appalachian Trail and serves as a link in the Appalachian Forest, providing critical, high quality interior-forest habitat for a variety of species of songbirds, mammals, reptiles, and amphibians (National Audubon Society, 2008). Wetland areas associated with streams, seeps and vernal pools are habitat for a number of animals including birds, reptiles, amphibians, odonates (dragonflies and damselflies), and others. A Nature Conservancy matrix forest block, the St. Anthony’s Wilderness Matrix Forest Block is crossed by Alternative Route C. This block is approximately 128,000 acres. In addition to being a bird migration corridor, this area has a high diversity of wildlife including timber rattlesnakes and Allegheny woodrats (Nature Conservancy, 2008c).

Bushkill Creek Watershed (Bushkill, Ross, and Monroe Townships) – One of the micro sites within this watershed is a gently sloping forested area that includes an Ephemeral Fluctuating Pools Natural Community. There are at least 12 vernal pools here. Vernal pools are habitat for the reproduction of amphibian species and can be important in the life cycles of many other animal species. Another site within this watershed includes areas of marsh and shrub swamp, which are fed by ground water seepage. This area supports an unnamed animal species of special concern.

Oughoughton Creek Near Delaware River (Lower Mount Bethel) – This site contains an unknown quality population of osprey (*Pandion haliaetus*), an animal species of concern. This species requires habitat associated with sea coasts and large lakes and rivers. This area hosts a feeding ground for this species by providing the Delaware River and two fairly large lakes for foraging opportunities.

5.5.3 State Special Concerns

As discussed in Section 5.4, Vegetation, PPL Electric received a letter from DCNR on July 23, 2008 identifying its preliminary concerns and recommendations for the Alternative Routes. On July 25, 2008, PPL Electric also received an email from DCNR detailing the rare butterfly and moth species that could be affected by the various Alternative Routes. These species are listed in Table C-9. DCNR did not request surveys for these rare butterflies and moths, but instead requested that impacts to their habitat be minimized and that some of the species’ host plant species be replanted when work is completed. In addition, in a July 11, 2008 letter, the Pennsylvania Game Commission (PGC) detailed its concerns regarding the three Alternative Routes. Correspondence from these agencies can be found in Appendix E-4.

Table C-9. Rare Butterflies and Moths Potentially Occurring in the Vicinity of Alternative Routes
Route A
Barrens buckmoth (<i>Hemileuca maia</i>)
Leonard's skipper (<i>Hesperia leonardus</i>)
Twilight moth (<i>Lycia rachelae</i>)
Footpath sallow moth (<i>Metaxaglaea semitaria</i>)
Pink sallow (<i>Psectraglaea carnosa</i>)
Broad sallow moth (<i>Xylotype capax</i>)
A sallow moth (<i>Chaetaglaea cerata</i>)
Pointed sallow (<i>Epiglaea apiata</i>)
Persius duskywing (<i>Erynnis persious persuis</i>)
Blueberry gray (<i>Glena cognataria</i>)
Route B
Barrens buckmoth (<i>Hemileuca maia</i>)
Leonard's skipper (<i>Hesperia leonardus</i>)
Twilight moth (<i>Lycia rachelae</i>)
Footpath sallow moth (<i>Metaxaglaea semitaria</i>)
Pink sallow (<i>Psectraglaea carnosa</i>)
Broad sallow moth (<i>Xylotype capax</i>)
Trembling sallow or Barrens Chaetaglea (<i>Chaetaglaea tremula</i>)
Blueberry gray (<i>Glena cognataria</i>)
Route C
Northern pearly eye (<i>Enodia anthedon</i>)
Baltimore checkerspot (<i>Euphydryas phaeton</i>)
Mulberry wing (<i>Poanes Massasoit</i>)
Long dash (<i>Polites mystic</i>)
Aphrodite fritillary (<i>Speyeria aphrodite</i>)

In addition to general concerns regarding all three lines crossing State Game Lands (see Section 5.7, Recreation Lands), PGC stated in its letter that Routes A and B may potentially affect bats of several species if the line is routed across State Game Lands 260 and 300, located in Luzerne and Lackawanna counties, respectively. PGC also stated that Route B may adversely impact bald eagles that have a nest located along the proposed route south of White Deer Lake in the Delaware State Forest. According to the PGC, Route C may potentially affect bats of several species if the line is routed across State Game Lands 326 and 257, both located in Schuylkill County, as well as bald eagles, ospreys (*Pandion haliaetus*), and peregrine falcons (*Falco peregrinus*) north of Martins Creek in Northampton County. The PGC also recommended that the transmission line be routed to minimize forest fragmentation, utilize existing transmission line right-of-ways, and avoid wetland impacts to the greatest extent possible (see Appendix E-4).

In an October 16, 2008 letter, the U.S. Fish and Wildlife Service (USFWS) stated that their records indicate that no bald eagle nests are known to occur in the Route B project area, but the

transmission line is located within the range of the bald eagle. As such, the USFWS recommends PPL Electric refer to the *National Bald Eagle Management Guidelines* for specific measures that should be taken in the event that PPL Electric encounters an eagle nest in or near the project area. Additionally, PPL Electric is in consultation with the NPS regarding potential bald eagle habitat within the Delaware Water Gap National Recreation Area.

5.5.4 Federally Listed Wildlife Species

In its October 16, 2008, letter, the USFWS identified two federally listed wildlife species known to occur in counties crossed by Route B; the federally endangered Indiana bat (*Myotis sodalis*) and the federally threatened bog turtle (*Clemmys muhlenbergii*). Although PPL Electric requested listed species data for all three routes, USFWS only provided responses specifically regarding proposed Route B.

Indiana Bat

The Indiana bat use mines and caves for hibernation and forested areas for summer foraging, roosting, and fall swarming. Optimal roosting habitat is forests with an abundance of large trees and snags with exfoliating bark or cavities with a relatively open understory. Primary roosts usually receive direct sunlight for more than half the day. Roost trees are typically within canopy gaps in a forest, in a fenceline, or along a wooded edge. Habitats in which maternity roosts occur include riparian zones, bottomland and floodplain habitats, wooded wetlands, and upland communities. Indiana bats typically forage in semi-open to closed (open understory) forested habitats, forest edges, and riparian areas (USFWS, 2007a).

Within the project area, Indiana bats are known to occur near the Susquehanna Substation at the start of all three Alternative Routes in Luzerne County. During consultation relating to PPL Electric's Susquehanna power plant, the USFWS identified that the Indiana bat has two hibernacula (winter hibernating areas) within close proximity of the Susquehanna plant. USFWS identified these hibernacula as being near the towns of Glen Lyon and Dogtown, Pennsylvania. As discussed previously, Routes A and B cross through the Dogtown Mine Natural Area. In its October 16, 2008 letter regarding Route B (see Appendix E-4), the USFWS states that the Indiana bat could occur throughout the project area.

Bog Turtle

Within the project area, bog turtles are known to occur within Schuylkill, Lehigh, Northampton, and Monroe counties. Route A does not cross through any bog turtle counties. Route B only crosses into Monroe County for a short distance. Route C is entirely within bog turtle counties. Bog turtles usually occur in small, discrete populations, generally occupying open-canopy, herbaceous sedge meadows and fens bordered by wooded areas. These wetlands are a mosaic of micro-habitats that include dry pockets, saturated areas, and areas that are periodically flooded. Bog turtles depend upon this diversity of micro-habitats for foraging, nesting, basking, hibernation, and shelter (USFWS, 2001). According to the NPS, bog turtles are known to occur within the Delaware Water Gap National Recreation Area.

5.5.5 Impacts on Wildlife Resources and Proposed Mitigation Measures

Common Wildlife

Construction and operation of the proposed transmission line could affect wildlife through habitat loss, alteration, or fragmentation; disturbance and/or displacement from noise and construction activities; or, mortality from collisions with conductors and shield wires. As discussed under the Impacts on Vegetation section (Section 5.4), forest clearing is required for right-of-way construction. In areas where the right-of-way goes through large relatively undisturbed tracks of forest, the right-of-way clearing would fragment the forest and create edge habitat. As previously discussed, Route A would result in PPL Electric clearing approximately 1,078 acres of forest, Route B clearing approximately 610 acres, and Alternative Route C clearing approximately 1,117 acres of forest. Because PPL Electric would build Route B either entirely or partially within existing rights-of-way or parallel to existing rights-of-way for almost the entire length of the route, forest clearing is minimized compared to the other Alternative Routes. Additionally, because most of the forest clearing needed for Route B would be contiguous to the existing right-of-way, most of the cleared forest would be edge forest and not interior forest. Edge forest communities provide habitat for a wide diversity and abundance of species that are adaptable and habitat generalists, such as deer, songbirds, raccoons, eastern chipmunks, red-tailed hawks, and red fox. Because the majority of forest crossed by Route B would cross through “edge forest,” the existing edge species in the area of clearing would continue to have suitable habitat following construction activities.

Both Routes A and C would require clearing more areas of uncut forest, resulting in forest fragmentation. Forest interior bird species such as worm-eating warbler, wood thrush, northern goshawk, barred owl and large mammals such as the fisher, eastern wood rat, black bear and bobcat depend on large forest blocks for their prime habitat.

Construction disturbance would displace the more mobile species from the right-of-way to similar habitats nearby; less mobile species, such as small mammals, reptiles and amphibians, and bird eggs and nestlings, could be lost. The loss of individuals from the overall species population, for these less mobile species, is not expected to affect the overall population health. Construction noise would also temporarily disturb some wildlife in the project vicinity, causing some individuals to leave the area. Some displaced wildlife would return to the newly disturbed areas shortly after construction is completed. Piling logs and brush along the right-of-way edges creates habitat for upland game birds, songbirds, and mammals. These brush piles create cover and nesting habitat for these species.

Vegetation cutting during scheduled right-of-way maintenance would 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 right-of-way would be displaced to adjacent habitats. The relatively low frequency of this activity (i.e., every 3 to 6 years) would reduce the severity of the impact. During right-of-way maintenance, herbicide application would abide by all applicable federal, state, and local laws and regulations, including U.S. Department of Agriculture and EPA and would not pose a threat to wildlife.

Although transmission lines pose a threat to birds from collision and electrocution, the effects of the construction of any of the three Alternative Routes is expected to be minimal. The spacing between the conductors on the line would be spaced farther apart than the wing-span of the largest raptors in the project area and, therefore, electrocution would not occur (APLIC, 2006). Bird collision with the conductors, shield wires, and towers is possible, however. 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 (APLIC, 2006). Raptors are less susceptible to collisions because of their keen eyesight and high maneuverability in flight; however, because Route C goes through Kittatinny Ridge, an important hawk migration pathway, collisions could be higher along Route C than along Route A or B.

Special Natural Areas

All three Alternative Routes would cross various Natural Areas. As discussed previously in the Vegetation section, the proposed project's potential impact on these Natural Areas depends upon the route's construction and clearing requirements in that location and whether or not the route is utilizing an existing right-of-way. Table C-8 presents the various Natural Areas along with the existing right-of-way, cleared width, and construction and clearing requirements.

Routes A and B do not require any additional right-of-way clearing for the first 29.7 miles. As a result, the proposed project would have minimal effects on Natural Areas and rare plant species that occur in this stretch. Routes A and B cross the Dogtown Mine Natural Area in an area that does not require any additional right-of-way clearing. As such, this Natural Area is unlikely to be affected by either Route A or B.

Route A has two portions of the route that would require clearing of virgin right-of-way. One portion, where the route also includes Route B, potentially includes the western edge of the Moosic Mountain Barrens Natural Area. A discussion of potential project impacts to this Natural Area and the other areas of new virgin right-of-way on Route A is included in Section 5.4, Vegetation. In large blocks of forest, such as the Buckham Mountain Matrix Forest Block, clearing a new right-of-way would result in forest fragmentation and affect habitat for forest interior dwelling species.

Project construction would require additional right-of-way clearing of varying widths through additional Natural Areas for the remainder of Route B, and portions of Route A; however, because this clearing parallels an existing right-of-way, potential impacts are lessened. The Susquehanna River at Duryea Natural Area contains rare mussel species. Because it is unlikely that project construction would require an access road to cross the Susquehanna River, no culverts are likely and there would be no impacts to river sediments and mussels.

Route C requires right-of-way clearing for a large percentage of its route. Portions parallel existing rights-of-way, however the majority of the Natural Areas crossed by this route would require 200 feet of new right-of-way clearing. This is of particular concern with the Blue Mountain/Kittatinny Ridge Natural Area because it is an important bird migration corridor where the new right-of-way would cause fragmentation within extensive and/or sensitive forested areas.

State Special Concerns

The PGC stated that bats could be affected by Routes A and B crossing State Game Lands 260 and 300. Where Routes A and B cross State Game Land 260, no additional clearing is expected and only minimal construction is needed to replace an overhead ground wire. As such, no impacts to bats are expected in this area. Construction through State Game Land 300 would require either a new 200-foot-wide right-of-way or an expansion of the existing right-of-way, depending upon where the State Game Land is crossed. The PGC also stated that Route C could affect bats where it crosses State Game Lands 326 and 257 in Schuylkill County. Route C would require clearing up to 200 feet of new right-of-way within these State Game Lands. PPL Electric will continue to consult with PGC and will adhere to seasonal timing restrictions recommended for the protection of any federal or state listed bat species.

Both DCNR and PGC expressed concerns regarding a known bald eagle nest near White Deer Lake in the vicinity of Route B. White Deer Lake is located approximately 1 mile to the east of Route B in Blooming Grove Township, Pike County. Assuming the nest is located in proximity of the lake, as it appears from DCNR and PGC descriptions, construction of Route B is unlikely to affect the nest tree itself. In this area, Route B could require up to 50 feet of additional clearing adjacent to the existing right-of-way. Because the nest does not appear to be located immediately on the right-of-way, it is likely a forested visual buffer between the nest and Route B would be maintained even with the additional clearing. According to the National Bald Eagle Management Guidelines (USFWS, 2007b), it is recommended that if the construction is not visible from the nest site, a power line should not be constructed within 330 feet of a bald eagle nest and any clearing, external construction, and landscaping between 330 feet and 660 feet from the nest should be conducted outside the breeding season (December through July). PPL Electric will consult with PGC to determine the exact location of the nest. If the nest is within 660 feet of Route B, PPL Electric will adhere to timing restrictions.

Although the bald eagle is no longer protected under the Endangered Species Act, it continues to be protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act and in Pennsylvania, where it is considered state threatened. Both acts protect bald eagles by prohibiting disturbances, killing, selling or otherwise harming eagles, their nests or eggs. The USFWS, in its October 16, 2008 letter, stated that although no bald eagle nests are known to occur in the Route B project area, the transmission line is located within the range of the bald eagle. The USFWS recommends PPL Electric refer to the National Bald Eagle Management Guidelines (USFWS, 2007b) for specific measures that should be taken in the event that eagle nests are encountered in or near the project area. The NPS has also requested that PPL Electric evaluate areas of the Delaware Water Gap National Recreation Area near the Delaware River for bald eagle habitat. PPL Electric will identify any bald eagle nests, foraging, or roosting habitat near the Delaware River that could be affected by Route B. For Route B within Pennsylvania, potential impacts to bald eagle habitat are minimized because the natural topography provides a steep approach to the river. As such, the structure location on the Pennsylvania side of the river will be on a ridgetop and the line will span the river from a height that allows trees in the right-of-way to be left uncleared for approximately 700-800 feet from the river's edge.

The PGC stated that Route C could affect bald eagles, osprey, and peregrine falcons north of Martins Creek in Northampton County. In this area, PPL Electric could require up to an additional 175 feet of right-of-way clearing. Depending upon the location of these species' nest, roost, and perch trees, forest clearing could eliminate habitat and/or cause construction-related noise disturbance to nesting species. In the event that an eagle nest is encountered in or near the project area, PPL Electric will refer to the USFWS National Bald Eagle Management Guidelines for specific protection measures, such as time of year restrictions and distances. In addition, PPL Electric is aware of at least two known peregrine falcon nests located on top of the existing 230 kV structures in Wayne (Routes A and B) and Pike (Route B) counties. PPL Electric would work with the PGC to determine seasonally appropriate times to remove these nests.

Federally Listed Wildlife Species

Indiana Bat

The known Indiana bat hibernacula are located in the vicinity of the portion of Routes A and B where little or no clearing is expected because PPL Electric will reenergize the existing 230 kV transmission line for 500 kV operation. PPL Electric will need to construct approximately 1 to 1.5 miles of new transmission line on PPL Susquehanna, LLC property to transfer the source from the 230 kV substation to the 500 kV substation. In areas around hibernacula, the USFWS generally prohibits tree cutting activities within a 5-mile radius of the identified hibernacula during the period of April 1st through November 15th on trees larger than 5 inches diameter at breast height (DBH) because it could adversely affect Indiana bat populations. PPL Electric will limit transmission corridor tree cutting activities on trees larger than 5 inches DBH, within the identified areas to the period of November 16th to March 31st of each calendar year, except for the removal of danger trees during maintenance.

In its October 16, 2008 correspondence letter (and clarified in subsequent emails), the USFWS requested that PPL Electric conduct a bat survey of the forested habitat along Route B between May 15 and August 15 by a qualified USFWS-approved biologist using *Indiana Bat Mist Netting Guidelines*. In addition, searches for bat hibernacula (i.e., portals, natural caves, or abandoned mines) should be conducted within 500 feet of both sides of the project right-of-way. Prior to conducting searches, PPL Electric will contact the PGC and the Bureau of Abandoned Mine Reclamation to determine whether the caves or mines have been surveyed in the past. If adequate surveys have been conducted in the recent past, according to USFWS, this may preclude the need to conduct additional surveys. PPL Electric would not need to conduct mist net surveys and hibernacula searches from the Susquehanna Substation to the Stanton Substation (Segment 1; approximately the first 29 miles) since no forest clearing is required.

PPL Electric will conduct mist net surveys and hibernacula searches at appropriate locations along Route B as recommended by the USFWS. Results from the mist netting surveys and hibernacula searches will be submitted to the USFWS for review and concurrence. PPL Electric will continue to consult with DCNR and USFWS regarding protecting and/or minimizing impacts to this species.

Bog Turtle

Route A would not impact any bog turtle habitat. Route B only crosses approximately 2 acres of wetlands (based on NWI data) within Monroe County. Route C is entirely within bog turtle counties, so it is likely that it would cross some potential bog turtle habitat. PPL Electric will conduct appropriate surveys of all wetlands along the proposed line route, along with any access roads, in bog turtle counties. If bog turtles are found in any of these wetlands, PPL Electric will consult with the USFWS to minimize potential impact to the habitat.

5.5.6 Conclusion

Because PPL Electric would build Route B either entirely or partially within existing rights-of-way or parallel to existing rights-of-way for almost the entire length of the route, forest clearing is minimized compared to the other Alternative Routes that require lengthy areas of new right-of-way. As a result, Route B would require clearing about half the acreage of forest required for Routes A and C (approximately 610 acres compared to 1,078 and 1,117 acres for Routes A and C, respectively). Additionally, because most of the forest clearing needed for Route B would be contiguous to the existing right-of-way, most of the cleared forest would be edge forest and not interior forest, minimizing forest fragmentation. Because the majority of forest crossed by Route B would cross through “edge forest,” the existing edge species in the area of clearing would continue to have suitable habitat following right-of-way construction. Both Routes A and C would require clearing more areas of uncut forest, resulting in significant forest fragmentation. Forest interior species depending on large forest blocks for their prime habitat would be most affected.

The use of existing right-of-way on Route B, as recommended by PGC, also minimizes impacts on Natural Areas and species of special concern. Although Route B crosses several Natural Areas, impacts to these areas are minimized because the route is within or along existing rights-of-way for the majority of its length. By comparison, Routes A and C would require new right-of-way through high quality communities of special concern such as the Buckham Mountain Matrix Forest Block and the Blue Mountain/Kittatinny Ridge area, which serves as a migration pathway for numerous species of raptors and songbirds. Raptors are less susceptible to collisions because of their keen eyesight and high maneuverability in flight; however, because Route C goes through Kittatinny Ridge, collisions could be higher along Route C than in A or B. Additionally, the potential for impacts to federally listed wildlife species is higher for Route C than for Routes A or B because nearly all of Route C is located within bog turtle counties (i.e., Schuylkill, Lehigh, and Northampton counties).

5.6 Land Use

There are many types of land uses located throughout the project area, including suburban and rural development, forest land, farmland, open space and fields, state and federal park lands, water and wetlands, and industrial lands (e.g., the coal mining regions in Schuylkill County). The use of such lands and the public’s general desire to develop or protect areas are often managed by federal, state and, especially local plans, policies, and zoning.

A breakdown of the general classifications of land use (i.e., barren land, cultivated crops, pasture/hay, grassland/herbaceous, developed lands, open space, forest, and wetlands) within 1,000 feet of each of the three Alternative Routes is presented in Table C-3. Table C-10 provides a summary of the general land uses within 1,000 feet of the three routes in the eight-county project study area. Table C-11 breaks down each land use by county along each route. General land uses in the study area are depicted graphically in Figure C-2.

Table C-10. Summary of Land Uses Types			
Land Use Type	Percentage of Route¹		
	A	B	C
Barren Land (Rock/Sand/Clay)	0.4	0.4	1.2
Cultivated Crops	1.9	1.6	18.1
Pasture/Hay	3.4	3.2	13.2
Grassland/Herbaceous	0.5	0.5	0.0
Shrub/Scrub	3.8	5.1	0.2
Developed, Low, Medium, and High Intensity	1.0	1.0	1.6
Developed, Open Space	2.2	3.6	6.2
Forest	85.4	82.7	58.0
Wetlands	1.5	1.9	1.6

¹ Percentage of land use type within 1,000 feet of each side of the route centerline.

5.6.1 Forestry Uses

Observations in the eight-county area and study of aerial photography indicate that forest is the predominant land cover along all three Alternative Routes. According to a report published by the U.S. Department of Agriculture (USDA) and the Pennsylvania Department of Conservation and Natural Resources (DCNR), Bureau of Forestry, Pennsylvania is 58 percent forested (USDA, 2007). Specific concerns related to potential impacts to State Forest land is discussed in Section 5.7. Information on forestry resources within the study area that would be affected by each route is provided below.

Pennsylvania forested land is used for various purposes. According to the Bureau of Forestry, Pennsylvania’s forests provide raw material for fine furniture, cabinets, hardwood flooring, paper, and other materials (DCNR, 2004).

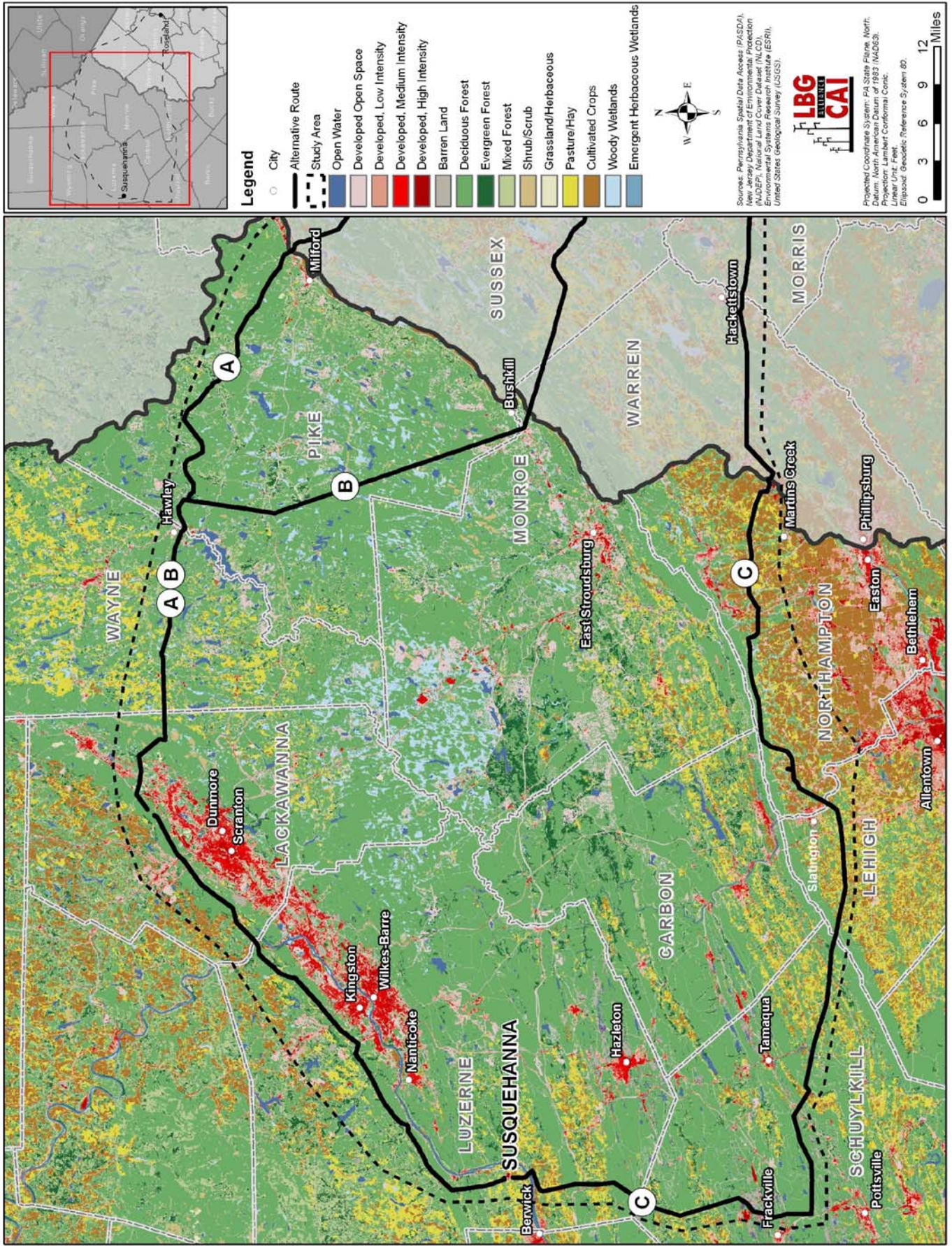


Figure C-2: Land Use.

Table C-11. Land Use Breakdown by County				
County	Land Use	Percentage of Route ¹		
		A	B	C
Lackawanna	Barren Land (Rock/Sand/Clay)	0.1	0.1	0.0
	Cultivated Crops	2.9	2.9	0.0
	Pasture/Hay	1.2	1.2	0.0
	Grassland/Herbaceous	1.3	1.3	0.0
	Shrub/Scrub	2.0	2.0	0.0
	Developed, Low,Medium, and High Intensity	2.0	2.0	0.0
	Developed, Open Space	1.9	1.9	0.0
	Forest	87.0	87.0	0.0
	Wetlands	1.6	1.6	0.0
Lehigh	Barren Land (Rock/Sand/Clay)	0.0	0.0	0.1
	Cultivated Crops	0.0	0.0	25.0
	Pasture/Hay	0.0	0.0	30.6
	Developed, Low,Medium, and High Intensity	0.0	0.0	1.9
	Developed, Open Space	0.0	0.0	6.0
	Forest	0.0	0.0	35.7
	Wetlands	0.0	0.0	0.7
	Luzerne	Barren Land (Rock/Sand/Clay)	1.1	1.1
Cultivated Crops		2.6	2.6	10.8
Pasture/Hay		6.2	6.2	18.4
Grassland/Herbaceous		0.4	0.4	0.0
Shrub/Scrub		6.8	6.8	0.0
Developed, Low, Medium, and High Intensity		0.6	0.6	1.1
Developed, Open Space		2.8	2.8	4.4
Forest		79.0	79.0	62.2
Wetlands		0.4	0.4	2.2
Monroe	Pasture/Hay	0.0	0.4	0.0
	Shrub/Scrub	0.0	2.4	0.0
	Developed, Low, Medium, and High Intensity	0.0	6.0	0.0
	Developed, Open Space	0.0	22.0	0.0
	Forest	0.0	53.7	0.0
	Wetlands	0.0	15.5	0.0

Table C-11. Land Use Breakdown by County				
County	Land Use	Percentage of Route¹		
		A	B	C
Northampton	Barren Land (Rock/Sand/Clay)	0.0	0.0	0.1
	Cultivated Crops	0.0	0.0	34.6
	Pasture/Hay	0.0	0.0	12.1
	Grassland/Herbaceous	0.0	0.0	0.0
	Shrub/Scrub	0.0	0.0	0.6
	Developed, Low, Medium, and High Intensity	0.0	0.0	1.9
	Developed, Open Space	0.0	0.0	9.0
	Forest	0.0	0.0	39.4
	Wetlands	0.0	0.0	2.3
Pike	Cultivated Crops	0.1	0.1	0.0
	Pasture/Hay	0.1	0.0	0.0
	Grassland/Herbaceous	0.0	0.3	0.0
	Shrub/Scrub	1.6	6.3	0.0
	Developed, Low, Medium, and High Intensity	0.4	0.4	0.0
	Developed, Open Space	1.8	5.2	0.0
	Forest	94.8	85.5	0.0
	Wetlands	1.2	2.1	0.0
Schuylkill	Barren Land (Rock/Sand/Clay)	0.0	0.0	2.4
	Cultivated Crops	0.0	0.0	4.7
	Pasture/Hay	0.0	0.0	7.4
	Developed, Low, Medium, and High Intensity	0.0	0.0	1.5
	Developed, Open Space	0.0	0.0	4.6
	Forest	0.0	0.0	78.7
	Wetlands	0.0	0.0	0.8
Wayne	Cultivated Crops	0.8	0.8	0.0
	Pasture/Hay	7.0	7.0	0.0
	Grassland/Herbaceous	0.0	0.0	0.0
	Shrub/Scrub	4.6	4.6	0.0
	Developed, Low, Medium, and High Intensity	0.9	0.9	0.0
	Developed, Open Space	2.6	2.6	0.0
	Forest	81.0	81.0	0.0
	Wetlands	3.1	3.1	0.0

¹ Percentage of land use type within 1,000 feet of each side of the route centerline.

The aesthetic attractions of forested landscapes provide settings for a wide variety of recreational experiences such as hunting, fishing, hiking, skiing, nature observations, camping, and many other outdoor activities (recreational uses are discussed in Section 5.7). Forested lands also provide habitat for various types of flora and fauna, and for watershed protection. In residentially developed areas, forest remnants and woodlots serve as landscaping and provide privacy screening.

5.6.2 Agricultural Uses

Agricultural uses constitute the second largest land use type in the eight-county study area. Agriculture is the largest industry in Pennsylvania and farms within the state produce a wide variety of food and fiber products worth over \$45 billion annually (USDA, 2007).

Agricultural products vary between each county, but in general, the leading agricultural products in 2002 were poultry, cattle, dairy products, and cultivated crops (National Agriculture Statistics Service, 2002). Based on the USDA 2002 statistics, the value of cultivated products were considerably higher than livestock products in six of the eight counties (Luzerne, Lackawanna, Monroe, Northampton, Lehigh, and Pike). Cultivated products were valued at approximately \$13.8 million in Northampton County, \$8.9 million in Lackawanna County, \$18.1 million in Luzerne County, \$4.7 million in Monroe County, \$1.3 million in Pike County, and \$36.4 million in Lehigh County. Livestock products were valued at approximately \$38.7 million in Schuylkill County and \$18.4 million in Wayne County.

Each of the eight counties within the study area have county level conservation districts (CCDs). The Pennsylvania Farmland and Forest Land Assessment (Clean and Green) Act of 1974 assists in preserving farmland through setting property taxes by actual land use instead of at the prevailing market rate. The Pennsylvania Agricultural Security Law of 1981 acts to protect farmland from incompatible development by the voluntary enrollment of land in Agricultural Security Areas (ASAs). The Pennsylvania Agricultural Conservation Easement Purchase Program, created in 1989, allows state and local governments to purchase development rights to preserve farmland from development (Bureau of Farmland Preservation, 2008).

5.6.3 Urban and Developed Land Uses

There are several medium to high density developed areas in the vicinity of the project area associated with the cities of Scranton, Wilkes-Barre, Berwick, Frackville, Slatington, Milford, and Martin's Creek. Scranton and Wilkes-Barre are the only significant urban areas within the study area; these urbanized areas are located in the valley south and east of the joint Route A and B segment (see Figure C-2 and Exhibit B, Figure B-1). Many smaller towns and communities are scattered throughout the project area. For example, Saw Creek Estates is a large community subsequently constructed along both sides of the existing 230 kV transmission line (constructed in the 1920s) on Route B near Bushkill. Most commercial businesses are within the urban areas or the smaller communities.

During the routing process, Berger/CAI and PPL Electric identified a few sporadic new construction or proposed multi-lot residential developments in the vicinity of the Alternative Routes. One large community in the vicinity of Route B is the proposed Highland Village, which would include 5,100 to 5,400 new residential units and be located on the former Tamiment Resort site in Pike County, north and east of Route B and Saw Creek Estates. Another new planned commercial development (Wal-Mart) was noted in the vicinity of Route C on the north/east side of the Lehigh River along Route 145 (Riverside Drive) and Birch Road near Walnutport in Northampton County.

5.6.4 Transportation

The study area is served by many roads including Interstate Highways 80, 81, 476, 380, and 84, several U.S. and State Highways, and numerous county and local roads. Several small county or private airports or landing strips are located within the study area. The Wilkes-Barre/Scranton International Airport (AVP) is located near Avoca, Pennsylvania, approximately 4.5 miles east of Routes A and B at its nearest point. In accordance with the PUC regulations (52 Pa. Code § 57.72(c)(9)), the location and identity of airports within 2 miles of the nearest limit of the right-of-way of the each of the Alternative Routes are shown on the 1:36,000-scale maps at the end of this Exhibit.

5.6.5 Municipal Zoning

PPL Electric collected and reviewed available zoning maps and ordinances for the Pennsylvania municipalities through which the proposed Susquehanna-Roseland 500 kV Transmission Line would cross (Route B only). The proposed line and right-of-way were overlain as closely as possible on the local zoning maps and the corresponding zoning districts were identified and subsequently assessed to determine the proposed transmission line's consistency with these ordinances. The results of PPL Electric's zoning analysis are summarized in the following paragraphs and presented in detail in the Supplemental Information section following Exhibit C.

The various zoning ordinances or land development ordinances reviewed for the 29 municipalities in the five counties through which the proposed route passes are typically quite similar. Only 3 of the 29 municipalities (i.e., South Canaan and Lake Townships in Wayne County and Greene Township in Pike County) do not have zoning ordinances; instead, these municipalities defer to subdivision and land development ordinances. The zoning districts established by the zoning ordinances reviewed are generally designed to guide the future use of the land in the municipality by encouraging the development of desirable residential, commercial, agricultural, and manufacturing areas with appropriate groupings of compatible and related uses. The stated goal is to protect and promote public health, safety, comfort, prosperity, and other aspects of general welfare.

Electric transmission lines by public utilities are typically addressed in municipal zoning codes as an "essential service" or similar categorization. Several municipalities have taken steps to specifically define "essential services" within their ordinance's definitions section (e.g., Jackson, Jefferson, Lehman, Palmyra, Paupack, and South Abington). For example, Jackson Township

defines essential services as “the erection, construction, alteration, or maintenance, by public utilities or municipal or other governmental agencies, of underground or overhead gas, electrical, communication, steam, or water transmission or distribution systems, including poles, wires, mains, drains, sewers, pipes, conduits, cables, fire alarm boxes, police call boxes, traffic signals, hydrants, and other similar equipment and accessories in connection therewith, reasonably necessary for the furnishing of adequate service by such public utilities or municipal or other governmental agencies or for the public health or safety or general welfare, but not including buildings.” Jefferson, Lehman, Palmyra, Paupack, and South Abington Townships use similar language. Although every municipality reviewed does not specifically define essential services, each township with a zoning ordinance does address essential services and allows for essential services within all zoning districts.

5.6.6 Comprehensive and Land Use Plans

PPL Electric also collected and reviewed available County-level comprehensive or land use plans covering counties through which the proposed Susquehanna-Roseland 500 kV Transmission Line would cross. Each county has adopted, or is in the process of updating, a comprehensive plan to guide development within the county. In addition, many of the townships or regions (e.g., the Lake Region in Wayne County) through which the proposed route would cross have also adopted their own comprehensive plans. Several of the counties have also adopted Open Space and Greenways plans. County level plans were reviewed for all three Alternative Routes.

Representative available municipal-level comprehensive plans along the proposed route (Route B) were also reviewed. Some municipalities’ comprehensive planning efforts are guided through area-wide plans or county plans. Some municipalities, including Hunlock, Exeter, and South Canaan Townships and Courtdale Borough, do not have comprehensive plans or otherwise no longer refer to the original outdated plans. Others, such as Greene Township, are currently developing a plan for the first time. The results of PPL Electric’s analysis of county and municipal comprehensive planning efforts are presented in detail in the Supplemental Information section following Exhibit C.

5.6.7 Impacts on Land Use and Proposed Mitigation Measures

Forestry Uses

Clearing of forest lands will be required along any of the Alternative Routes to construct the Susquehanna-Roseland 500 kV Transmission Line. Clearing will entail cutting of all trees and tall growing shrubs at the time of construction. After construction is completed, PPL Electric would encourage the growth of low growing vegetation. Regular maintenance operations would prevent the re-growth of trees and tall growing shrubs. Therefore, the cleared portion of the right-of-way would be removed from further forest production for the life of the transmission line. PPL Electric’s right-of-way clearing policy is described in further detail in Section 5.4, Vegetation. A large portion of the routes would utilize existing transmission lines or parallel existing lines and, therefore, some of the affected forested land has already been cleared. As

indicated in Table C-3, Route A would require clearing approximately 1,078 acres of forest, Route B would require approximately 610 acres of forest clearing, and Route C would require approximately 1,117 acres of forest clearing. Route B would require about half as much forest clearing as routes A or C.

Route A

More than 85 percent of Route A traverses forested land within Luzerne, Lackawanna, Wayne, and Pike Counties. Route A would traverse more forested land than Routes B or C. Portions of Route A would cross the Appalachian Oak Forest in Luzerne and Lackawanna Counties. Approximately 69 percent of Luzerne County is woodland (Luzerne County Agricultural Preservation Program, 2008). However, Route A would not further impact forestry uses in Luzerne County because the existing transmission line would be utilized in this area. Route A would slightly impact forestry uses in Lackawanna County between the Stanton Substation and the Lackawanna Substation. Much of this portion of Route A would parallel an existing transmission line and require additional clearing of existing right-of-way. A smaller portion north of the Archbald Pothole area would require new and future use right-of-way and require forest clearing to a width of 200 feet. Approximately 50 feet of additional right-of-way would need to be cleared in Wayne County. Route A would require the clearing of 130,500 feet of 200-foot-wide virgin right-of-way forest land in Pike County, or approximately 599 acres. This portion of Pike County is heavily forested and includes state forest land, private hunting clubs, and land identified by the County Open Space, Greenways, and Recreation Plan for conservation opportunity. The construction and operation of a new transmission line in Pike County would conflict somewhat with the Pike County Open Space Planning efforts.

Route B

Nearly 83 percent of Route B traverses forested land within Luzerne, Lackawanna, Wayne, Pike, and Monroe Counties. Although Route B would traverse a large percentage of forested land, more than 90 percent of Route B utilizes or parallels existing transmission lines, which would minimize the need for forest clearing. Impacts to forest lands are the same as that described for Route A where both routes are identical from Susquehanna to just east of Lake Wallenpaupack. Almost the entire portion of the line that would traverse Pike County would cross state forest land or private hunting clubs on existing easements; however, an existing 230 kV line already traverses this area and the proposed line would just require the widening of the right-of-way in some areas. Route B would cross through a small portion of Monroe County, most of which belongs to the National Park Service within the Delaware Water Gap National Recreation Area (DEWA). The right-of-way through Monroe County would need to be widened by approximately 50 feet in most areas; PPL Electric will work closely with the National Park Service throughout planning, design, and construction phases of the project to minimize the amount of additional clearing needed through the DEWA.

Route C

Approximately 58 percent of Route C traverses forested land within Luzerne, Schuylkill, Lehigh, and Northampton Counties. Much of Route C traverses future use right-of-way and, in these

locations, forest clearing would be required. Route C would cross through portions of the Northern Hardwood Forest in Luzerne County. According to the Schuylkill County Open Space and Greenway Plan (2006), Route C would also cross through two designated natural areas: the Wolf Creek Ridgetop Dwarf-Tree forest and the Bear's Head Ridgetop Dwarf-Tree forest (see Section 5.4, Vegetation). Route C would also cross through a greenway located in West Penn Township.

Agricultural Uses

Route A

Approximately 5.3 percent of Route A traverses through agricultural land (i.e., cultivated crops and pasture/hay lands) in Luzerne, Lackawanna, and Wayne Counties (see Table C-10). The majority of the agricultural land traversed by Route A would be in the same right-of-way or would parallel an existing transmission line. A large percentage of the agricultural land affected by Route A is located in Luzerne County; however, Route A would utilize existing transmission line in this area and, therefore, minimize potential agricultural impacts. Lackawanna and Wayne Counties would experience slight adverse impacts; however, the line parallels or replaces existing transmission line in much of this area.

Route B

Nearly 5 percent of Route B traverses through agricultural land in Luzerne, Lackawanna, Wayne, Pike, and Monroe Counties. The majority of the agricultural land traversed by Route A would be in the same right-of-way or would parallel an existing transmission line. Only very small amounts (i.e., several hundred feet) of agricultural land in Monroe County and Pike County would be affected.

Route C

More than 31 percent of Route C traverses through agricultural land in Luzerne, Schuylkill, Lehigh, and Northampton Counties. Route C would traverse significantly more agricultural land than Routes A and B. Approximately 9.4 percent of Luzerne County is used as farmland (Luzerne County Agricultural Land Preservation Program, 2008). Route C would cross through one farm in Black Creek Township that is currently preserved through the Luzerne County Agricultural Preservation program. The purpose of the Agricultural Land Preservation Program is to protect and promote the continued agricultural use of valuable agricultural lands by acquiring agricultural conservation easements, which prevent the development or improvement of the land for any purpose other than agricultural production and related agricultural activities. The largest percentage of agricultural land affected by Route C is located in Northampton County, followed by Lehigh County. Route C would cross through Northampton and Lehigh Counties by utilizing future use right-of-way, paralleling an existing 230 kV transmission line, or double circuiting an existing 230 kV line. It should be noted that agricultural preservation agreements permit the construction of aerial electric lines.

Urban and Developed Land Uses

Route A

Only 1 percent of Route A traverses low, medium, or high intensity developed land in Luzerne, Lackawanna, Wayne, and Pike Counties. Route A avoids most urban and other intensively developed areas; however, 5 residences and 11 other structures were identified within 100 feet of the right-of-way centerline, and 58 residences and 35 other structures were identified within 250 feet of the centerline. Route A crosses west of the Wilkes-Barre and Scranton areas; however, the existing transmission line is utilized near Wilkes-Barre and the line parallels an existing 230 kV line northwest of Scranton and, therefore, would minimize impacts to developed areas. Route A would be mostly located on existing right-of-way (with the exception of the portion crossing through Pike County). PPL Electric would work with county and municipal governments and developers as necessary to minimize any impact of the proposed transmission line on potential development.

Route B

Only 1 percent of Route B traverses low, medium, or high intensity developed land in Luzerne, Lackawanna, Wayne, Pike, and Monroe Counties. Route B would be located primarily on existing right-of-way. Route B avoids most urban and other intensively developed areas; however, 8 residences and 18 other structures were identified within 100 feet of the right-of-way centerline, and 216 residences and 47 other structures were identified within 250 feet of the centerline. Many of these nearby residences are located within the Saw Creek Estates community in Pike County (Segment 5; note that the land use data only considers partial areas of the overall Saw Creek Estates development as low, medium, or high intensity developed areas; the remaining area is allocated to other non-developed categories). PPL Electric held an open house with the Saw Creek Estates community in July 2008 to discuss the project and listen to the residents' concerns (see Section 6.0). The existing 230 kV line through Saw Creek Estates was constructed in the 1920s and is in need of replacement, apart from the Susquehanna-Roseland project. PPL Electric would continue to work with the Saw Creek Estates Association, as well as Pike County, Lehman Township, and developers to minimize any impact of the proposed transmission line are minimized on the development whenever possible.

Route C

Route C would pose the highest potential impact to residents located in the vicinity of the proposed transmission line of any of the three Alternative Routes. Route C traverses less than 2 percent of low, medium, or high intensity developed land in Luzerne, Schuylkill, Lehigh, and Northampton Counties. Like Routes A and B, Route C also avoids most urban and other intensively developed areas; however, 63 residences and 28 other structures were identified within 100 feet of the right-of-way centerline, and 259 residences and 121 other structures were identified within 250 feet of the centerline. PPL Electric would work with county and municipal governments and developers as necessary to ensure that any impact of the proposed transmission line on potential development, such as the proposed Wal-Mart near Walnutport, is minimized.

Transportation

Routes A and B cross Interstates 476 and 80; Route A crosses Interstate 84 north of Milford; Route B crosses Interstate 84 near Blooming Grove; and Route C crosses Interstate 80 south of Berwick, Interstate 81 near Frackville, and Interstate 476 (the Pennsylvania Turnpike) west of Slatington. All three routes cross numerous state highways, county roads, and other roads. In addition, many pipelines and other underground utility infrastructure would be crossed. However, the proposed transmission line should have no effect on any of these roads, pipelines, or any other transportation infrastructure. The design of the transmission line would ensure that the conductors span over all roads, railroads, and pipelines. Transmission line structures would not be located in any existing road or pipeline right-of-way without the proper approval of the right-of-way owner. The design of the transmission line would ensure that the conductors would be positioned above the road to meet all clearance and height requirements.

All major airports have been avoided by the routes. PPL Electric would work with the FAA to ensure that the transmission line would not impede or obstruct existing aviation flight patterns and will be below the glide slope ratio required by FAA regulations.

Municipal Zoning

Public utility facilities are exempt from local zoning ordinances. Electric transmission lines by public utilities are typically addressed in municipal zoning codes as an “essential service” or similar categorization. As indicated previously, however, in all instances the zoning districts allow for essential services, which typically include the erection, construction, or alteration of overhead electric transmission and distribution systems and uses by public utilities. All zoning districts include utility structures as well.

A few municipalities (i.e., South Canaan Township, Lake Township, and Greene Township) do not have zoning regulations; instead, they default to subdivision and land development ordinances that do not specifically address public utilities and infrastructure. In these instances, it can be inferred that essential services such as electric transmission lines are permitted.

Some municipalities define specific types of essential services. For example, Dickson City, Blakely, and Archbald Boroughs in Lackawanna County include “Open Essential Services” as a principally permitted land use, and “Enclosed Essential Services” as a special exception land use in some zoning districts. Similarly, Paupack Township allows public utilities and facilities (including towers and incidental structures) as Special Exception Uses in some zoning districts through which the proposed line traverses. In the case of Paupack, construction of such utility facilities more than 35 feet high require a special exception subject to the regulations and procedures for such uses and/or cannot exceed a height equal to the distance from the structure to the nearest lot line, depending on the district. Some ordinances, such as Middle Smithfield Township, specifically exclude electric transmission lines from height restrictions in the various zoning districts. In addition, Palmyra Township (Wayne County) includes essential services within its list of conditional or accessory uses in some districts. In such cases, either special exceptions or variances from the zoning code would typically be required in order to construct the transmission facilities.

Designated Conservation districts in some municipalities would typically require additional approvals from the zoning official prior to construction, e.g., Kingston Township in Luzerne County.

Some zoning ordinances specifically identify environmental restrictions. For example, South Abington Township requires a buffer/setback of no fewer than 25 feet from any identified wetland and/or water body. In addition, Blooming Grove Township requires a buffer/setback of no less than fifty 50 feet from any identified wetland, water body, and Shohola Creek and Blooming Grove Creek (both of which Route B cross), and all their tributaries. In Lehman Township, all structures must maintain minimum buffer distances away from wetlands, perennial waterways, lakes, ponds, and other bodies of surface water, as well as the Delaware River, Bushkill Creek, and Saw Creek, all of which are crossed by the proposed route (Route B).

Although not required to comply with local zoning ordinances, PPL Electric will work closely with each of the affected municipalities to minimize the potential impacts of the line within the various zoning districts through which the Susquehanna-Roseland 500 kV Transmission Line crosses. Wherever feasible, appropriate buffers will be maintained around natural resources as specified; regardless, required federal, state, and county environmental permits and approvals will be obtained and adhered to in order to protect these resources.

Comprehensive and Land Use Plans

Electric transmission lines specifically are not normally addressed in county or municipal comprehensive and land use plans. In general, the proposed transmission line would not conflict with the goals and policies of the comprehensive and land use plans described previously. This is especially true in cases where the line would be constructed on existing rights-of-way where a transmission line already exists (Route B, in particular) as land use would not change from its current use. Because of the height of the proposed transmission structures, all the Alternative Routes may conflict in some cases with policies related to visual impacts in the various communities through which the line would traverse. Routes A (primarily in Pike County) and C may not comply with policies and goals intended to protect or preserve forest lands. Permits that need to be obtained from various federal, state, and local agencies to construct and operate the line will help ensure that the proposed transmission line will be compatible with policies related to protection of the natural environment. Route B, therefore, would be generally more compatible with comprehensive and land use plans than the other two Alternative Routes.

PPL Electric will work closely with each of the affected municipalities to minimize the potential impacts of the line within the various counties and municipalities through which the Susquehanna-Roseland 500 kV Transmission Line crosses. PPL Electric will continue to meet and work with the local planning commissions and departments to respect adopted comprehensive land use plans and policies to the maximum extent feasible. Wherever feasible, appropriate buffers will be maintained around natural resources, and any work within or near conservation and other sensitive areas carefully managed and controlled. Required federal, state, and county environmental permits and approvals will be obtained and adhered to in order to protect these resources.

5.6.8 Conclusion

Of the three Alternative Routes, Route B would pose the least impact to land use in the study area, generally because it would require the least amount of additional right-of-way and clearing. Approximately 30 percent of Route B would simply re-energize an existing 230 kV line between the Susquehanna and Stanton Substations and, therefore, result in no additional impacts to land use in this portion of the route. Approximately 61 percent of Route B would require double circuiting of an existing 230 kV line or paralleling an existing line. Although the width of the right-of-way would need to be widened in some areas and new structures would be constructed, the impact to land use would be minimal relative to the other routes. The remaining 8 to 9 percent of Route B would utilize future use right-of-way, which would result in slight adverse impacts to land use.

Route B would traverse more forested land, but would require about half as much forest clearing as Routes A or C, which would minimize visual impacts to visitors as well as potential forest and habitat fragmentation. As indicated in Table C-3, Route A would require approximately 1,078 acres of forest clearing, Route B would require approximately 610 acres of forest clearing, and Route C would require approximately 1,117 acres of forest clearing. Route B would also have minimal impact on agricultural land by utilizing existing right-of-way. Route C would traverse significantly more agricultural land than either Routes A or B. Although all three routes traverse roughly equivalent lengths of high, medium, and low density developed areas (including Saw Creek Estates on Route B), Route C would pose the biggest impact to residents located in the vicinity of the proposed transmission line because the majority of Route C would utilize future use right-of-way. Currently, only 8 identified residences and 18 other structures have been identified within 100 feet of the Route B right-of-way centerline, as compared to 63 residences and 28 structures within 100 feet of the Route C right-of-way.

5.7 Recreation Lands

Pennsylvania supports a wide array of both dispersed and developed recreational opportunities that occur on federal, state, local, and private lands. Dispersed recreational uses include recreation that occurs over a broad area that does not occur at a developed site, but may include developments or facilities that provide access to recreational opportunities. Examples of dispersed recreational activities include hiking, scenic driving, bicycling, backpacking, hunting, fishing, off-road vehicle use, snowmobiling, bird watching, and cross-country skiing among others. Developed recreation provides permanent facilities designated to accommodate uses such as camping, boat launching, athletic fields, or for day-use activities (e.g., picnicking, interpretive exhibits, and hiking/biking trails).

This section presents information on existing designated recreational areas and opportunities that occur within approximately 2 miles of the Alternative Routes, including national parks, state Game Lands, state parks, city and municipal parks, named trails, swimmable, boatable and fishable waters of the U.S. where access is provided, and other national, state, and local resources. While recreational opportunities do exist on private lands, these lands are not officially designated for public use and, therefore, are not included.

5.7.1 National Recreational Resources and Designated Natural Scenic Resources

This section presents information on the existing national recreational resources and designated natural scenic resources that occur within approximately 2 miles of the three proposed transmission line routes in Pennsylvania. The transmission route alternatives under consideration would pass through or over to the following designated national recreational and scenic resources:

- **The Appalachian National Scenic Trail.** This 2,175-mile footpath stretches through 14 eastern states from Maine to Georgia and traverses wild, scenic, wooded, pastoral, and culturally significant lands of the Appalachian Mountains. Only Route C crosses the Trail in Pennsylvania.
- **The Delaware Water Gap National Recreation Area.** This nearly 70,000 acre park is located on the Pennsylvania-New Jersey boundary and contains the middle Delaware National Scenic River (see below). The Delaware Water Gap National Recreation Area (DEWA) provides recreational opportunities such as camping, hiking, canoeing, and rafting. Route B would traverse approximately 1.54 miles of the DEWA in Pennsylvania on an existing 230 kV transmission line right-of-way. Route A would cross through 300 feet of the extreme northernmost portion of the DEWA.
- **The Middle and Lower Delaware Wild and Scenic Rivers.** Sections of the middle and lower Delaware River are designated under the Wild and Scenic Rivers Act. The middle Delaware covers about 40 miles and is classified as “scenic” and is located in the vicinity of Route B. The lower Delaware is included in the Wild and Scenic River system, and a 38-mile section of the main stem of the Delaware is classified as “recreational.” Route C crosses this section of the river near Martins Creek.

Appalachian Trail

The Appalachian National Scenic Trail was established as a National Scenic Trail by Congress with passage of the National Trails System Act in 1968. The entire length of the footpath is approximately 2,175 miles and stretches through 14 eastern states from Maine to Georgia, traversing wild, scenic, wooded, pastoral, and culturally significant lands of the Appalachian Mountains. Trail amenities include camping sites, 250 shelters, and other associated facilities. Approximately 229 miles of the Appalachian Trail are located in Pennsylvania.

The Appalachian Trail is a component of the national trails system and a unit of the national park system. Since 1983, the Appalachian Trail Conservancy (ATC) has assumed formal management responsibilities for lands directly administered by the Appalachian Trail Park Office of the NPS, with the exception of some authorities such as law enforcement, real estate and federal compliance, which remain under the authority of the NPS.

Delaware Water Gap National Recreation Area

The Delaware Water Gap National Recreation Area (DEWA) was established by Congress under Public Law 89-158 on September 1, 1965 to provide public outdoor recreation use and enjoyment of the then-proposed Tocks Island Reservoir and adjacent lands and for preservation of the related scenic, scientific and historic features of the area.

In order to preserve park values, the NPS developed a 1987 General Management Plan (GMP) for the DEWA. The GMP includes provisions for public outdoor recreation benefits; preservation of scenic, scientific, and historic features contributing to public enjoyment; and utilization of natural resources as in the judgment of the Secretary of the Interior is consistent with, and does not significantly impair, public recreation and protection of scenic, scientific, and historic features contributing to public enjoyment. The 1987 GMP also outlines strategies to meet the following management objectives (NPS 1987):

- Reduce user group conflicts
- Convey better orientation information
- Coordinate activities that affect local communities with townships and counties
- Identify adverse visitor effects on natural resources
- Protect archaeological sites
- Maintain landscape and manage unique blend of natural cultural and scenic features
- Expand facilities for water-oriented and land based activities
- Design key park entrance points to reduce visitor traffic congestion and restore unneeded roads to a more natural appearance.

Alternative Route A would traverse a 300-foot portion of the park near Interstate 84 which is a site for recreational rafting. Route B traverses approximately 1.54 miles of the DEWA in Pennsylvania. This area includes several hiking trails, which provide access to historic abandoned structures east of Depew Island. The Joseph M. McDade Recreational Trail is located in the DEWA on the Pennsylvania side of the river, south of the Route B crossing of the Delaware River and the NPS Park Headquarters.

Delaware Wild and Scenic River

The Wild and Scenic Rivers Act created the National Wild and Scenic Rivers System (Public Law 90-542). The Act defines three classifications for rivers, based on the intensity of human presence along the river corridor, as follows:

- Wild – Rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds and shorelines essentially primitive and waters unpolluted.
- Scenic – Those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

- Recreational – Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

Regardless of classification, each designated river is administered with the general goal of nondegradation and enhancement of the values consistent with its designation.

Upper and Middle Delaware Wild and Scenic River Corridor

Two sections of the Delaware River were added to the National Wild and Scenic Rivers System in 1978. One section, the Upper Delaware Wild and Scenic River (WSR), extends 73 miles from the confluence of the river's East and West branches at Hancock, New York downstream to Milrift, Pennsylvania and is comprised mostly of nonfederal and privately owned lands. This section would not be affected by any of the proposed transmission line alternatives. The second section, the Middle Delaware National Scenic River, covers about 40 miles from just south of Port Jervis, New York downstream to the Delaware Water Gap near Stroudsburg, Pennsylvania (DRBC 2008). This stretch of the Delaware River is located within the DEWA and is classified as scenic.

Lower Delaware WSR Corridor

In 2000, the National Wild and Scenic River System incorporated certain segments of the lower Delaware River to form this unit of the National Park System. The Lower Delaware National Wild and Scenic River includes a 38.9-mile section of the main stem Delaware (and about 28 miles of selected tributaries) linking the Delaware Water Gap and Washington Crossing, Pennsylvania, just upstream of Trenton, New Jersey. Three-quarters of the non-tidal Delaware River is now included in the national system (NPS 2008c; DRBC 2008).

The Lower Delaware River Management Plan, which sets forth guidelines for the use and management of River corridor resources, contains the Lower Delaware National Wild and Scenic River Study Report. Contained in this report are classifications for each of the river segments of the mainstem of the lower Delaware River that provide support in determining the river's eligibility for inclusion into the National Wild and Scenic Rivers System. Each of the segments of the mainstem of the lower Delaware River are classified as "recreational" due to their accessibility by road and/or the presence of some development along the shoreline. The River Study Report also sets forth goals and policies for minimizing the adverse impact of development within the river corridor. One such goal relevant to the proposed Susquehanna-Roseland 500 kV Transmission Line relates to economic development and identifies principles for minimizing the adverse impact of development within the river corridor. Specifically, the report states that continued economic growth, new infrastructure, and the replacement, repair or expansion of existing infrastructure should occur in ways that minimize harmful impacts on the natural, cultural, recreational and scenic values of the river corridor and that are cost-effective. This can be done through such implementation strategies as incorporating Best Management Practices; concentrating public and private utility uses and rights-of-way to minimize impacts; and conducting reviews to anticipate expansion needs with natural gas, electric, telecommunication, and other utility companies operating in the river corridor and develop a plan

that allows those needs to be met in a manner that is compatible with the river corridor's resources and is cost effective (NPS, 2008b).

The Route C crossing at Martins Creek is located in the stretch of the Delaware River guided by Lower Delaware WSR Corridor plans and policies.

5.7.2 Statewide or Locally Significant Resources

Route A

The predominant non-federal recreation activities within the immediate vicinity of Route A are dispersed activities including hunting, fishing, hiking, and visiting historically significant sites. Route A traverses approximately 15,100 feet of Delaware State Forest land, 3,100 feet of State Park land, and 35,550 feet of Pennsylvania Game Lands. Route A passes through or in the near vicinity of the following designated recreational areas:

- Both Routes A and B traverse the Varden Conservation Area, located north of Lake Ariel, for approximately 3,100 feet. The Varden Conservation Area is a 343-acre conservation area in Wayne County. The conservation area includes several small hiking trails. In a letter dated July 23, 2008, the DCNR identified potential disturbance to the Varden Conservation Area as a concern (see Appendix E-4).
- Route A traverses approximately 1,000 feet of property owned by the Blooming Grove Hunting and Fishing Club. The Club property currently includes approximately 20,000 acres. Club property along Route A is located east of the point where Routes A and B diverge east of Hawley. No transmission facilities are currently located in this segment; constructing the line along Route A would require clearing a 1,000-foot-long, 200-foot-wide right-of-way through club property.
- The River Beach Campsites and Kittatinny Canoes boat launch area is located along Route A north of Milford on the Delaware River. This campground offers campsites in both wooded and open grass locations. Boating trips depart from the site along the Delaware. The Route A crossing of the Delaware would span the northern part of this campground in the vicinity of the boat launch.
- Field reviews revealed several hunting and fishing clubs and property along or in the near vicinity of Route A east of Hawley. These include the Grassy Island Creek Rod and Gun Club in Lackawaxen Township; Pioneer Rangers Hunting Club, located along Fire Tower Road northwest of Milford; the Woodtown Game Club; located along Twin Lakes Road near Walker Lake; and the Quiwaumick Hunting and Recreation Club, located near Walker Lake; Shohola Creek Rod and Gun Club, also located near Walker Lake on Little Walker Road; and Bluestone Hunt Club, located in the vicinity of Routes A and B in the vicinity of Lake Wallenpaupack.
- Route A would cross over one scenic road in Pike County: Highway 590 in Lackawanna Township.

- Route A would cross over four conceptual trails/greenways as identified by the Pike County Comprehensive Plan (2006) in Lackawaxen, Shohola, and Westfall Townships.
- Route A would cross over four areas identified by Pike County as conservation opportunity areas in Lackawaxen, Shohola, and Westfall Townships.
- Route A would cross over or in the near vicinity of 10 natural areas inventoried in Pike County including Twin Lakes, Sagamore Swamp, Bald Hill, Shohola Falls, and Shohola Falls Swamp in Shohola Township; Mashipacong Cliffs, Old Port Jervis Road Shale Barrens, and Buckhorn Oak Barren in Westfall Township; and Buckhorn Mountain in Lackawaxen Township. Some of these natural areas are discussed in other sections of this report.

In addition, the following recreational areas were identified within approximately 2 miles of Route A:

- Both Routes A and B would cross approximately 1 mile southeast of Moon Lake Park in Luzerne County. Moon Lake Park is owned and operated by Luzerne County and includes 600 acres of fields and forest which surround a 48-acre lake.
- Both Routes A and B would cross approximately 0.84 mile east of the Frances Slocum State Park. Frances Slocum State Park consists of 1,035 acres in Luzerne County. Frances Slocum Lake is the focal point of the park and forms a horseshoe covering 165 acres.
- Both routes A and B pass approximately ¼-mile north of Archbald Pothole State Park. Archbald Pothole State Park is a 150-acre park named for the Archbald Pothole, a geologic feature that formed during the Wisconsin Glacial Period. The interior lands of the park are undergoing strip mine reclamation. This reclaimed land will be used for outdoor recreation. The park includes a small hiking trail and is open for limited hunting and trapping.
- Both Routes A and B would cross approximately 1.3 miles northwest of Roosevelt Park in Luzerne County.
- Aylesworth Creek Park is located to the north of Routes A and B (Segment 3). Aylesworth Park is a 252-acre public recreational park situated in the Borough of Archbald, Lackawanna County, with access from East Jermyn.
- Palm Acres Campground is located near Route A east of Hawley.
- Route A would cross just to the north of the Milford Experimental Forest in Pike County. The Milford Experimental Forest program goal is to carry on forest research to improve the environment and quality of life within the Pocono plateau and the Delaware Highlands region, with the primary focus being long-term studies in forest ecology and sustainable forest management.

Route B

Similar to Route A, the predominant recreation activities within the project area are dispersed activities including hunting, fishing, hiking, and visiting historically significant sites. Route B traverses 81,300 feet of State Forest land (Delaware State Forest and Lackawanna State Forest), 3,100 feet of State Park land, and 29,400 feet of Pennsylvania Game Lands. In addition to the recreational areas in the vicinity of the joint segment of Routes A and B described above, Route B passes through or in the near vicinity of the following designated recreational areas:

- Route B traverses approximately 16,800 feet (3.2 miles) of lands owned by the Blooming Grove Hunting and Fishing Club. The existing 230 kV transmission line runs the entire length of this segment through club property.
- The Fernwood Hotel and Resort maintains an 18-hole golf course located off Route 209 (Milford Road) in the community of Shoemakers (Bushkill) near PPL Electric's Bushkill Switching Station and on the edge of the Delaware Water Gap National Recreation Area (Segment 5). The resort also operates a ski tubing operation, which is located adjacent to the golf course. The existing 230 kV transmission line is located in the northern part of the Fernwood course.
- Route B crosses two scenic roads in Pike County, Highway 402 and Interstate 84 in Blooming Grove and Porter Townships.
- Route B crosses several conceptual trails/greenways that have been identified by the Pike County Comprehensive Plan (2006). These are located in Blooming Grove and Porter Townships (Segment 5).
- Route B crosses portions of three areas identified as conservation opportunity areas by the Pike County Comprehensive Plan. Route B might also cross the easternmost portion of conservation opportunity area 17.
- Route B crosses over or in the vicinity of 21 natural areas in Pike County. These are Balsam Swamp, Big Swamp, Bruce Lake, Buckhorn Mountain, Bushkill Falls, Fairview Lake, Gates Run, High Knob, Lake Belle, Lake Minisink, Lake Scott, Long Pond Swamp, Low Knob, Mainses Pond, Molsey Meadow Swamp, Pecks Pond, Shoemakers Barren, Tim Swamp, Twelvemile Pond, White Birch Swamp, and Winona Falls. These natural areas are discussed where appropriate in Section 5.4, Vegetation, and Section 5.5, Wildlife.
- Beaver Run Hunting and Fishing Club is located along Route B and the existing Bushkill-Blooming Grove 230 kV line in the vicinity of the Delaware State Forest in Porter Township (Segment 5).

In addition to those resources identified previously in the joint section of Routes A and B, the following recreational areas were identified within approximately 2 miles of Route B:

- The Hobday Lodge is located in the vicinity of Route B northwest of Bushkill (Segment 5).
- Spruce Lake Natural Area, which is part of the Promised Land State Forest, is located in the vicinity of Route B to the west. The line does not traverse the Spruce Natural Area, but crosses the northwestern corner of the State Forest in this area.

Route C

The predominant recreation activities within the project area are dispersed activities including hunting, fishing, hiking, and visiting historically significant sites. Route C traverses 39,650 feet of Pennsylvania Game Lands. Route C passes through or in the near vicinity of the following designated recreational areas:

- The Woodstone Golf Club is a private 18-hole golf course located along Mountain View Drive in Danielsville, Lehigh Township in Northampton County. Although no existing transmission line is located in this area, the golf course was built around PPL Electric's future use right-of-way in this area.
- Route C would traverse through or near several small areas designated as very high to high conservation areas or important natural areas in the Lehigh Valley. A strip of very high conservation area borders the Appalachian Trail to the south, including the Blue Mountain-Kittatinny Ridge Project Area. Route C would cross within this area, which is a significant migration flyway in spring and fall for hawks, eagles, and a variety of songbirds. This region has been designated by the Audubon Society as the state's largest Important Bird Area. Other important natural areas in close vicinity to the line include Mt. Jack Limestone Outcrop, Foul Rift, and Oughoughton Creek Power House Site in Lower Mt. Bethel Township, the Rismiller Woods and Knechts Pools in Bushkill Township, and Rockdale Cliffs, Bertsch Creek and Neffs Pond in Lehigh Township.
- Route C would traverse through or in close vicinity to several areas within the Lehigh Valley designated as farmland preservation areas. It should be noted that farmland preservation regulations specifically permit construction of aerial electric lines.
- Route C would cross over the Bushkill Creek corridor in Plainfield and Bushkill Townships. The Bushkill Creek Corridor extends from the Delaware River at Easton, north and west to the foot of the Blue Mountain in Moore, Bushkill, and Plainfield Townships. The corridor includes Bushkill Creek, Little Bushkill Creek, and both branches of Sobers Run, all of which are designated as high quality waters. The Bushkill Creek Corridor establishes a connection between the Lehigh River and the Kittatinny Ridge greenways and is a major part of the Two Rivers Area Greenway Plan.

- Route C would traverse through part of the Jacobsburg Environmental Education Center/Jacobsburg Historic District hub. A hub is defined by the Lehigh Valley Greenways plan as a large center of activity. The Jacobsburg Hub provides visitors opportunities to relax and recreate and provides habitat for wildlife. The Jacobsburg Environmental Education Center (EEC) offers over 1,100-acres of natural land.
- Route C would traverse through or in close vicinity to the Conrad W. Raker Wildlife Preserve.
- Route C would traverse through two designated natural areas in Schuylkill County: the Bear's Head Ridgetop Dwarf-Tree Forest and the Wolf-Creek Ridgetop Dwarf-Tree Forest.
- Route C would cross over several trails in Schuylkill County including the North Schuylkill Rail Trail, Bartrum Trail, Little Schuylkill Trail, and Lehigh Valley and New England to Carbon County Trail. These trails are identified in the Schuylkill County Comprehensive Plan, Open Space and Greenway Plan.
- Route C would cross over the Plainfield Township Recreation Trail in Plainfield Township.

In addition, the following recreational areas were identified within approximately 2 miles of Route C:

- The Red Ridge Lake Campground is located in the vicinity of Route C southwest of Hazelton.
- The Park Crest Fish and Game Commission area is located in the vicinity of Route C southwest of Hazelton.
- Wildcat Park is located in the vicinity of Route C southwest of Tamaqua.
- Eaglenest Park is located in the vicinity of Route C south of Slatington.
- Route C would cross in close vicinity to the PPL Martins Creek Environmental Preserve located in Lower Mt. Bethel Township.

5.7.3 Impacts on Recreational Resources and Proposed Mitigation Measures

The potential impacts on recreation caused by the construction and operation of the transmission line would occur when:

- Recreational uses are created, displaced, or eliminated;

- Objectives for maintaining national recreation areas and scenic resources recreation cannot be met;
- Existing recreational facilities and uses are changed;
- Potential users of recreational areas who focus on the aesthetics of natural surroundings are disturbed; and
- The cleared right-of-way increases access into a forest which leads to unintended uses such as trespassing and unauthorized ATV use.

National Recreational Resources and Designated Natural Scenic Resources

During the initial route planning, the three alternatives under consideration were sited to avoid sensitive lands when possible and thereby minimize impacts. However, the routes traverse segments of the Delaware Wild and Scenic River and the Appalachian National Scenic Trail. The transmission line under any of the three alternatives would unavoidably cross through visual resources in these national recreational resource areas. In Pennsylvania specifically, the transmission line would result in crossings of Wild and Scenic portions of the Delaware River (Routes A, B, and C) and one crossing of the Appalachian Trail (Route C). The transmission line structures, conductors, and the cleared right-of-way will be visible in varying degrees to area residents, travelers, and visitors. The visual accessibility of the line will be influenced by a multitude of factors, such as the amount of screening, the amount of natural light present, the distance from the viewpoint to the line, the amount of other human disturbance in the viewshed, background terrain and colors, and the sensitivity of the viewer. Transmission line construction and maintenance may also affect other resources that are important components to recreational areas, such as wildlife and native vegetation.

In Pennsylvania, Route C would be the only alternative to affect the Appalachian National Scenic Trail, thereby having an impact on the recreational and scenic values of portions of the Trail. No direct recreational use of the Delaware Water Gap National Recreation Area would be affected under Routes A and B. Scenic values of the Delaware Water Gap National Recreation Area could be diminished under Alternatives A and B, with most impacts occurring under Route B. These values would be unaffected under Route C because Route C avoids the DEWA. The recreational and scenic values of the Delaware Wild and Scenic River would be somewhat diminished under Alternatives A and B, and generally unaffected under Route C because water-based recreational activities would not be affected. The potential impacts of each route and possible mitigation measures to minimize those impacts are discussed in the following sections.

Route A

The transmission line proposed under Route A would cross 300 feet of the DEWA near its northern boundary and would require the clearing of existing vegetation to provide right-of-way. The line would avoid much of the NPS-managed lands of the park.

The river segment over which Route A would pass is designated as “scenic” under the Wild and Scenic River Act. Changes to the river’s scenic resources would occur under this alternative as

the result of disruptions in the continuity of the hillside vegetation, which would be apparent to recreational boaters on the Delaware River.

The transmission line structure would project above the forest canopy. This would increase visual accessibility of the line. The installation of taller (and thus more visible) structures would allow for a narrower right-of-way; conversely, construction of two single circuit lines could reduce structure height but would require a wider right-of-way, resulting in greater ground disturbance due to the necessary clearing of forest and vegetation.

Short-term operational nuisances may temporarily diminish the recreational value of designated recreation areas as a result of activities associated with the construction and maintenance of the transmission line, including periodic vegetation management of the proposed right-of-way. Similarly, during the operation of the transmission line, the cleared right-of-way and the presence of transmission structures may disrupt the enjoyment of those individuals who seek the aesthetic qualities of a natural landscape. Potential adverse impacts may be minimized in these areas by employing structure designs that blend into the background and reduce aesthetic impacts, and avoiding paralleling trails and scenic roads where practicable.

Route B

Route B would traverse approximately 1.54 miles of the DEWA (in Pennsylvania), crossing the Delaware River approximately 0.5 mile north of Depew Island. The new installation would be aligned on existing 230 kV transmission line right-of-way. The transmission line structure would project above the forest canopy, increasing the visual accessibility of the line.

The desired (typical) right-of-way width for a single circuit 500 kV line is 200 feet. However, a customized 230 kV/500 kV double circuit structure could be built within a 150-foot-wide right-of-way. A number of possible structure options could be considered within a 150-foot-wide right-of-way ranging in height from approximately 170 to 195 feet in height. The typical height of the existing 230 kV transmission line is 90 feet. Thus the introduction of taller structures into the existing environment would result in a perceived height increase of 80 to 105 feet to man-made structures in the landscape. Typical right-of-way cross-sections and structure photos and depictions are included in Exhibit D.

Taller structures would represent a change to visitors of the DEWA, especially for recreational boaters. As a result, park resource values would be somewhat diminished under Route B. However, there are few recreational opportunities within the DEWA on the Pennsylvania side of the river (i.e., on land) in the near vicinity of the Route B crossing; therefore, users on the land side of the park in this area should not experience significant impacts from the line through the DEWA.

The river segment over which the proposed Route B would pass is designated as “scenic” under the Wild and Scenic River Act. Changes to the river’s scenic resources would occur under this alternative and would be apparent to boaters on the Delaware River. Depending on the structural option selected and the degree to which the existing right-of-way width would be preserved,

disruptions in the continuity of the hillside vegetation and /or noticeable increases in the height of existing structures would occur under Route B.

As discussed under Route A, short-term operational nuisances may temporarily diminish the recreational value of designated recreation areas as a result of activities associated with the reconstruction of the existing 230 kV transmission line. However, maintenance activities are expected to decline since an antiquated transmission line would be replaced by a new transmission line using modern materials. As with the existing line, periodic vegetation management of the right-of-way is still required.

Although a transmission line already traverses the DEWA in this location, any additional cleared right-of-way and the presence of taller transmission structures will somewhat alter the landscape and existing views in that portion of the DEWA. Potential adverse impacts may be minimized in these areas by employing structure designs that blend into the background and reduce aesthetic impacts, and avoid paralleling trails and scenic roads to the extent practicable.

Route C

Route C would cross the Appalachian Trail near north of Mosserville, Pennsylvania on the Lehigh-Schuylkill County border. The line would then roughly parallel the trail at a distance of less than 1 mile for an approximate length of 6 miles (and within ½ mile primarily in Moore Township in Northampton County) between the Leroy A. Smith and George W. Outerbridge shelters in Pennsylvania. Due to the existing terrain and vegetation, the proposed transmission line may be intermittently visible to the south from the trail, for example in locations where gaps from other utility facilities cross the trail. Because taller structures would be used and additional vegetation clearing would likely be required in certain areas over and in the vicinity of the trail, the visual appearance of the immediate area would also be modified, particularly to those looking up toward the ridge and Appalachian Trail from the lower-lying lands below. While use of the trail at this crossing would not be affected (other than possibly for a short period during placement of new structures and lines at this location), Route C could potentially result in somewhat diminished resource values (i.e., aesthetics) for the Appalachian National Scenic Trail.

The transmission line proposed under Route C would cross the Delaware River near PPL's Martins Creek and Lower Mt. Bethel power plants in Lower Mount Bethel Township, thereby avoiding the Delaware Water Gap National Recreation Area. As a result, there would be no direct or indirect impact to the DEWA under Route C.

The installation would be aligned on existing right-of-way with the existing 230kV transmission line and would cross the Lower Delaware WSR Corridor parallel to this existing line at the PPL power plants. The river segment over which Route C will pass is designated as recreational. It is not anticipated that any impacts to recreational values of the stream itself would occur as a result of this alternative.

As is the case with all three alternatives, several short-term effects may diminish the recreational value of designated recreation areas as a result of activities associated with the construction of the transmission line.

Statewide or Locally Significant Resources

All three Alternative Routes traverse sections of Pennsylvania State Game Lands and Routes A and B traverse portions of State Forest and State Park (Varden Conservation Area). As discussed previously, other recreational opportunities or lands are located in the vicinity of each of the Alternative Routes. A significant portion of Route B would utilize existing transmission line corridors and, therefore, minimize forest clearing and other impacts to recreational resources.

In a letter dated July 23, 2008, the DCNR expressed several concerns regarding potential impacts resulting from the proposed lines (see Appendix E-4). In addition to concerns regarding the Varden Conservation Area discussed previously, DCNR anticipates that Route B would cause additional impacts to the Delaware State Forest including expansion of the right-of-way along the Blooming Grove hiking trail (where the trail crosses the current right-of-way three times), two crossings of the Thunder Swamp hiking trail, two crossings of the Edgemere-Pecks Pond snowmobile trail system, and impacts to the viewscape from High Knob, a hiking and biking destination. DCNR also expressed concern that Route A would cross an undisturbed portion of the Delaware State Forest in the Buckhorn Tract, which would require forest clearing and impact viewsheds. DCNR also stated that Route A might affect the Milford Experimental Forest; however, Route A would cross just north of this forest. DCNR also expressed concern for Route C because it would introduce a new right-of-way along the southern flank of Blue Mountain/Kittatinny Ridge, where DCNR has invested to conserve land in this area. Finally, DCNR stated that Route C would traverse close enough to the Appalachian Trail to have a potential negative visual impact and impact land in the Kittatinny Ridge Conservation Corridor and the Lehigh Valley Greenway Conservation Landscape.

5.7.4 Conclusion

In general, Route B (the Preferred Route) would pose the least impact to recreational opportunities of the three routes. Recreational and scenic values of the Delaware Water Gap National Recreation Area (DEWA) would be somewhat diminished in limited areas under Route B. Although Route B crosses through the DEWA, several State Game Lands, State Forest land, hunting clubs, and a number of hiking/biking trails, more than 90 percent of Route B would either involve re-energizing an existing 230 kV line, double circuiting the 230 kV line, or paralleling the 230 kV line, which would minimize impacts to recreational opportunities. While a 230 kV line already crosses through the DEWA and the Delaware River on Route B, the higher structures and potential wider clearing through some areas of the DEWA would result in some additional incremental aesthetic impacts. The recreational and scenic values of the Delaware Wild and Scenic River could be somewhat diminished under Alternatives A and B (both designated as scenic) and somewhat less under Route C (designated as recreation only).

Route B would require about half as much forest clearing as routes A or C, which would minimize visual impacts to visitors as well as potential habitat fragmentation. Route A would utilize virgin right-of-way in Pike County and therefore require significant forest clearing through many areas that have statewide or county level importance as conservation opportunities and recreational uses. Route C would largely utilize future right-of-way and, therefore, would

require the construction of a new transmission line through many of the recreational areas identified in Section 5.7.2 where no line presently exists. Route C would most notably affect recreational opportunities in the vicinity of the Appalachian Trail, especially from a viewshed standpoint in Northampton County.

5.8 Cultural Resources

Resources of historic architectural and archaeological significance are located in the Study Area and in the vicinity of each of the three Alternative Routes. As with other resources, the relative potential of each Alternative Route to affect cultural resources is a factor in the selection of a Preferred Route. Initial comparison of the alternatives for their potential to affect cultural resources involved a review of the Pennsylvania Historical and Museum Commission (PHMC)/Bureau of Historic Preservation (BHP) Cultural Resource Geographic Information System (CRGIS) on-line inventory of cultural resources. The review involved identifying all inventoried (known) prehistoric and historic period archaeological sites in a 2,000-foot-wide corridor (i.e., 1,000 feet on either side) of the right-of-way of each Alternative Route and all known historic architectural resources and historic districts within a 2-mile-wide corridor (i.e., 1 mile on either side) of the right-of-way of each Alternative Route. The widths of the search corridors were suggested as appropriate areas of potential effects (APEs) by the BHP Archaeologist and Historic Building Reviewer during a consultation meeting between the BHP and representatives from PPL Electric and The Louis Berger Group on July 9, 2008 (see further discussion in Section 5.8.2).

In addition, cultural resources within a 4-mile-wide corridor (i.e., 2 miles on either side) of the right-of-way of the Preferred Route were also identified in accordance with PUC regulations (52 Pa. Code § 57.72(c)(8)). Historic structures identified within the 4-mile corridor of the Preferred Route are mapped on the 11 x 17 topographic maps located in Exhibit C; archaeological resources have not been mapped as the locations of these resources are generally considered sensitive by the PHMC/BHP. A list of architectural and archaeological resources identified in the CRGIS within 2 miles of the right-of-way of the Preferred Route is presented in Exhibit E-10.

5.8.1 Historic Architectural and Archaeological Sites

Route A

Ten previously recorded historic architectural sites were identified within 1 mile of the centerline of the joint section of Routes A and B: three in Luzerne County, six in Wayne County, and one in Pike County. Each of these sites and its listing status on the National Register of Historic Places is shown in Table C-12. Two of the sites in Wayne County (the Octagon Stone Schoolhouse in South Canaan Township and the J.S. O'Connor building in Hawley Borough), are listed on the National Register of Historic Places.

Six previously recorded archaeological sites were noted within approximately 1,000 feet (0.25 mile) of the right-of-way of Route A. None of these sites have been evaluated for eligibility for inclusion in the National Register of Historic Places (NRHP) by the PHMC/BHP. These sites are shown in Table C-13.

Table C-12. Historic Architectural Sites Within 1 Mile of Route A							
Ref #	Name	County	Municipality	Type	NRHP Status	Evaluation or Listing Date	Distance from C/L (miles)
105179	Retreat State Correctional Institution Entrance Bridge	Luzerne	Hunlock/Newport	Bridge	Eligible	1/9/1995	0.75
143275	Hillside Farms	Luzerne	Jackson/Kingston	District	Eligible	5/10/2007	0.75
117449	Larksville Historic District	Luzerne	Larksville	District	Eligible	7/11/2001	0.00
114676	Bone House No. 2 (Building No. 6)	Wayne	South Canaan	Building	Eligible	8/7/2000	0.25
114678	Building No. 3 (Shaffer Homestead?)	Wayne	South Canaan	Building	Eligible	8/7/2000	0.25
114680	Building No. 4 (Shaffer Store?); Downs Store	Wayne	South Canaan	Building	Eligible	8/7/2000	0.25
1150	Octagon Stone Schoolhouse	Wayne	South Canaan	Building	Listed	5/6/1977	0.50
86387	Joseph Atkinson House	Wayne	Hawley	Building	Eligible	11/4/1985	0.50
126777	J.S. O'Connor, American Rich Cut Glass	Wayne	Hawley	Building	Listed	3/23/2005	0.50
105820	Lake Wallenpaupack Dam & Pipeline	Pike	Palmyra	Dam	Eligible	11/27/2007	0.25

Table C-13. Archaeological Sites Within Approximately 1,000 Feet (0.25 Mile) of Route A						
Site #	County	Municipality	Resource Type	NRHP Status	Evaluation/Listing Date	Distance from C/L (miles)
36LU0101	Luzerne	Newport	Prehistoric Open Habitation	Not Evaluated	N/A	0.25
36LU0053	Luzerne	Ransom	Prehistoric Open Habitation	Not Evaluated	N/A	0.00
36LU0200	Luzerne	Shickshinny	Rock Shelter, Cave	Not Evaluated	N/A	0.25
36Pi0070	Pike	Lackawaxen	No Info	Not Evaluated	N/A	0.10
36Pi0110	Pike	Shohola	Prehistoric Open Habitation	Not Evaluated	N/A	0.10
36Pi0133	Pike	Westfall	Rock Shelter, Cave	Not Evaluated	N/A	0.20

In addition, a total of 18 previously recorded architectural sites were identified within approximately 2 miles of the right-of-way of Route A in accordance with PUC regulations. A total of 61 previously recorded archaeological sites were identified within approximately 2 miles of the right-of-way of Route A. Each of these sites and its listing status on the National Register of Historic Places are shown in the tables in Exhibit E-10.

Route B

Fourteen previously recorded historic architectural sites were identified within 1 mile of the right-of-way of Route B: three in Luzerne County, six in Wayne County, one in Pike County, and four in Monroe County. Each of these sites and its listing status on the National Register of Historic Places is shown in Table C-14. Two of the sites in Wayne County (the Octagon Stone Schoolhouse in South Canaan Township and the J.S. O'Connor building in Hawley Borough) and three of the sites in Monroe County (Captain Jacob Shoemaker House, Schoonover Mountain House, and Cold Spring Farm Spring House, all in Middle Smithfield Township) are listed on the National Register of Historic Places.

Fifteen previously recorded archaeological sites were noted within approximately 1,000 feet (0.25 mile) of the right-of-way of Route B. None of these sites have been evaluated for eligibility for inclusion in the National Register of Historic Places (NRHP) by the PHMC/BHP. These sites are shown in Table C-15.

Table C-14. Historic Architectural Sites Within 1 Mile of Route B							
Ref #	Name	County	Municipality	Type	NRHP Status	Evaluation or Listing Date	Distance from C/L (miles)
105179	Retreat State Correctional Institution Entrance Bridge	Luzerne	Hunlock/Newport	Bridge	Eligible	1/9/1995	0.75
143275	Hillside Farms	Luzerne	Jackson/Kingston	District	Eligible	5/10/2007	0.75
117449	Larksville Historic District	Luzerne	Larksville	District	Eligible	7/11/2001	0.00
114676	Bone House No. 2 (Building No. 6)	Wayne	South Canaan	Building	Eligible	8/7/2000	0.25
114678	Building No. 3 (Shaffer Homestead?)	Wayne	South Canaan	Building	Eligible	8/7/2000	0.25
114680	Building No. 4 (Downs Store)	Wayne	South Canaan	Building	Eligible	8/7/2000	0.25
1150	Octagon Stone Schoolhouse	Wayne	South Canaan	Building	Listed	5/6/1977	0.50
86387	Joseph Atkinson House	Wayne	Hawley	Building	Eligible	11/4/1985	0.50
126777	J.S. O'Connor, American Rich Cut Glass	Wayne	Hawley	Building	Listed	3/23/2005	0.50
105820	Lake Wallenpaupack Dam & Pipeline	Pike	Palmyra	Dam	Eligible	11/27/2007	0.25
39488	Daniel Clark/William Clark House	Monroe	Middle Smithfield	Building	Eligible	9/10/2002	0.25
587	Captain Jacob Shoemaker House	Monroe	Middle Smithfield	Building	Listed	7/17/1979	0.25
588	Schoonover Mountain House	Monroe	Middle Smithfield	Building	Listed	8/21/1979	0.10
596	Cold Spring Farm Spring House	Monroe	Middle Smithfield	Building	Listed	12/3/2001	1.00

Table C-15. Archaeological Sites Within Approximately 1,000 Feet (0.25 Mile) of Route B						
Site #	County	Municipality	Resource Type	NRHP Status	Evaluation/ Listing Date	Distance from C/L (miles)
36LU0101	Luzerne	Newport	Prehistoric Open Habitation	Not Evaluated	N/A	0.25
36LU0053	Luzerne	Ransom	Prehistoric Open Habitation	Not Evaluated	N/A	0.00
36LU0200	Luzerne	Shickshinny	Rock Shelter, Cave	Not Evaluated	N/A	0.25
36PI0075	Pike	Blooming Grove	Rock Shelter, Cave	Not Evaluated	N/A	0.10
36PI0076	Pike	Blooming Grove	Rock Shelter, Cave	Not Evaluated	N/A	0.25
36PI0077	Pike	Blooming Grove	Rock Shelter, Cave	Not Evaluated	N/A	0.25
36PI0017	Pike	Lehman	Prehistoric Open Habitation	Not Evaluated	N/A	0.25
36PI0018	Pike	Lehman	Prehistoric Open Habitation	Not Evaluated	N/A	0.15
36PI0138	Pike	Lehman	Prehistoric Open Habitation	Not Evaluated	N/A	0.15
36PI0139	Pike	Lehman	Prehistoric Open Habitation	Not Evaluated	N/A	0.20
36MR0009	Monroe	Middle Smithfield	Prehistoric Open Habitation	Not Evaluated	N/A	0.20
36MR0060	Monroe	Middle Smithfield	Prehistoric Open Habitation	Not Evaluated	N/A	0.10
36MR0061	Monroe	Middle Smithfield	Prehistoric Open Habitation	Not Evaluated	N/A	0.25
36MR0063	Monroe	Middle Smithfield	Prehistoric Open Habitation	Not Evaluated	N/A	0.25
36MR0182	Monroe	Middle Smithfield	Historic and Prehistoric	Not Evaluated	N/A	0.20

In addition, a total of 25 previously recorded architectural sites were identified within approximately 2 miles of the right-of-way of Route B (the Preferred Route) in accordance with PUC regulations. In addition, a total of 72 previously recorded archaeological sites were identified within approximately 2 miles of the right-of-way of Route B. Each of these sites and its listing status on the National Register of Historic Places are shown in the tables in Exhibit E-10.

Route C

Seven previously recorded historic architectural resources were identified within 1 mile of the right-of-way of Route C: two in Northampton County, one in Northampton/Lehigh Counties, one in Lehigh County, and one in Schuylkill County. Three of these sites (both sections of the Lehigh Canal in Lehigh and Northampton/Lehigh Counties and St. Paul’s Union Church in Schuylkill County) are listed on the National Register of Historic Places. Each of these sites and its listing status on the National Register of Historic Places is shown in Table C-16.

Ten previously recorded archaeological sites were identified within approximately 1,000 feet (0.25 mile) of the right-of-way of Route C. Nine of the previously recorded archaeological sites along Route C are prehistoric open habitation sites, one is an historic domestic site, and none have been evaluated by the PHMC/BHP. These archaeological sites are listed in Table C-17.

Table C-16. Historic Architectural Sites Within 1 Mile of Route C							
Ref #	Name	County	Municipality	Type	NRHP Status	Evaluation or Listing Date	Distance from C/L (miles)
96145	Bridge 61 over Mad Run	Schuylkill	Blythe	Bridge	Not Determined	1/24/2002	0.28
86916	St. Pauls Union Church	Schuylkill	Nescopeck	Building	Listed	8/18/1989	1.00
82499	Merchants Bank	Schuylkill	Mahanoy City	Building	Eligible	12/23/1996	0.60
1015	Lehigh Canal; Lehigh Gap to Walnutport Section	Lehigh	Walnutport	Structure	Listed	10/2/1978	0.25
50956	Lehigh Canal: Walnutport to Allentown Section	Northampton/Lehigh	Multiple	Structure	Listed	10/2/1978	0.00
103555	Ackermanville Historic District	Northampton	Washington	District	Eligible	5/26/1995	0.75
137059	Bridge No. 48720705119149	Northampton	Lehigh	Structure	Eligible	12/6/2006	0.60

Table C-17. Archaeological Sites Within Approximately 1,000 Feet (0.25 Mile) of Route C						
Site #	County	Municipality	Resource Type	NRHP Status	Evaluation or Listing Date	Distance from C/L (miles)
36NM0098	Northampton	Lehigh	Prehistoric Open Habitation	Not Evaluated	N/A	0.00
36NM0123	Northampton	Plainfield	Prehistoric Open Habitation	Not Evaluated	N/A	0.00
36NM0306	Northampton	Bushkill	Prehistoric Open Habitation	Not Evaluated	N/A	0.10
36NM0063	Northampton	Lower Mt. Bethel	Prehistoric Open Habitation	Not Evaluated	N/A	0.10
36NM0307	Northampton	Bushkill	Prehistoric Open Habitation	Not Evaluated	N/A	0.15
36NM0038	Northampton	Plainfield	Prehistoric Open Habitation	Not Evaluated	N/A	0.15
36LH0171	Lehigh	Lynn	Prehistoric Open Habitation	Not Evaluated	N/A	0.20
36LH0175	Lehigh	Washington	Prehistoric Open Habitation	Not Evaluated	N/A	0.20
36NM0031	Northampton	Plainfield	Historic Domestic	Not Evaluated	N/A	0.20
36NM0064	Northampton	Lower Mt. Bethel	Prehistoric Open Habitation	Not Evaluated	N/A	0.25

In addition, a total of 15 previously recorded architectural sites were identified within approximately 2 miles of the right-of-way of Route C in accordance with PUC regulations. A total of 41 previously recorded archaeological sites were identified within approximately 2 miles of the right-of-way of Route C. Each of these sites and its listing status on the National Register of Historic Places are shown in the tables in Exhibit E-10.

5.8.2 Impacts on Cultural Resources and Proposed Mitigation Measures

Review of the PHMC/BHP CRGIS inventory yielded a number of previously recorded cultural resources within the PHMC/BHP-suggested archaeological and historic architectural areas of potential effect (APE) along Routes A, B, and C. Based on the CRGIS database analysis, Route B appears to have somewhat more architectural and archaeological resources located within the APE than Routes A or C. It should be noted, however, that the precise locations of the archaeological resources are often uncertain due to mapping inaccuracies or intentionally vague because of concern for sensitivity of the resource and will need to be confirmed in the field and through further consultation with the PHMC/BHP. In addition, it should be noted that the numbers of resources identified in the CRGIS databases in and/or near the respective routes is not necessarily indicative of the relative potential of transmission line construction along each route to affect cultural resources. Differing survey intensities and methods in the vicinity of each route have resulted in an inventory of cultural resources in the CRGIS that is not necessarily representative of the actual number and distribution of resources that would be identified were the routes to be thoroughly and comparably surveyed. Specifically, in comparison with Route B, many parts of Routes A and C (e.g., the 24.5 miles through predominantly forest in Pike County on the eastern portion of Route A) would involve construction of transmission facilities in areas that are relatively far afield from settled and developed areas where infrastructure and commercial development has been likely to stimulate surveys for cultural resources. The inventory of recorded cultural resources in the vicinity of Route B is understandably higher than the inventories for Routes A and C because there have been more surveys conducted in the vicinity of Route B.

More indicative of the relative potential effects of each Alternative Route is a comparison of the nature of the work required to install 500 kV transmission lines along each route. An intensive survey of the Preferred Route will likely result in the discovery of additional archaeological sites and historic structures. The numbers of archaeological sites discovered in a survey area is directly related to the size of the survey area. Therefore, Route B, which involves the least amount of new ground disturbance and fewer new structure locations and access roads than the other Alternative Routes, will have the potential to affect the fewest archaeological sites and historic structures of the three routes because it will require survey of a much smaller area.

None of the archaeological resources identified within approximately 1,000 feet (0.25 mile) of the route rights-of-way have been evaluated by the PHMC/BHP. A summary of the resources within the anticipated area of potential effect (APE) for each route is shown in Table C-18.

Table C-18. Previously Recorded Cultural Resources Within the Area of Potential Effect of the Alternative Routes				
Route/Resource	NRHP Listed	Eligible	Not Evaluated	Total
Historic Architectural				
A	2	8	0	10
B	5	9	0	14
C	3	3	1	7
Archaeological				
A	0	0	6	6
B	0	0	15	15
C	0	0	10	10

The preferred treatment for archaeological sites and historic structures is avoidance. While avoidance is not always feasible, reasonable efforts will be made to avoid affecting historic properties. Where effects to historic properties listed on or assessed by the PHMC as eligible for listing on the National Register of Historic Places cannot be avoided, and where the effects are assessed as adverse, a mitigation plan will be prepared in consultation with PPL Electric and the PHMC. Resources that have not been evaluated, either those previously recorded or those newly identified during surveys, will be evaluated during field work on the Preferred Route.

Historic Architectural Properties

Effects to historic architectural properties (buildings, structures, and historic districts) will primarily be visual, created by installation of new structures where none exist, or higher structures where shorter towers now exist, and by clearing of forested land. Any direct (physical) effects to historic architectural properties will be avoided, where possible, by relocating access roads and staging areas.

Potential adverse visual impacts are those which would modify the viewsheds from properties for which the viewshed is a contributing characteristic of the property's historic importance. The extent of areas that might contain historic architectural properties potentially affected by the appearance of structures or forest clearing will vary depending on the relief of the surrounding terrain and the height of vegetation between particular structures and cleared areas and particular historic architectural properties.

The area of potentially adverse visual effects is likely to be greater where transmission line structures do not now exist as the addition of new elements in a historic property's viewshed is more likely to be considered an adverse effect than the modification of existing elements (e.g., replacement structures and expanded cleared areas) in the viewshed. Construction of the proposed transmission line in areas where no transmission lines now exist, therefore, has a greater potential to adversely affect historic architectural properties than construction along existing transmission line corridors. In this light, the construction of Route B would require only 8.4 miles of new transmission line corridor (plus a 0.9-mile connection to the Susquehanna Substation) while construction along Alternative Routes A and C would require 32.9 miles and 47.7 miles of new corridor, respectively. Alternative Route B, therefore, has the lowest potential to adversely affect historic architectural properties.

PPL Electric will continue to consult with the PHMC throughout the planning, design, and construction process and conduct field work and surveys as necessary as part of the project permitting process to minimize potential impacts to historic architectural properties in accordance with the requirements of Section 106 of the National Historic Preservation Act of 1966 as amended.

With respect to historic architectural resources, it will be necessary to identify buildings, structures, districts, and objects 50 years of age or older (the general threshold for determining significance of historic properties) within the view shed/vistas of the proposed route and structure locations. Structure locations will be a particular focus of the investigation. As such, the identification of NRHP-listed or eligible historic architectural resources will be required as part of the permitting process.

Preliminary reconnaissance level historic architectural surveys will be conducted. These surveys are intended to provide a general overview of the history of the project area and preliminary assessment of the built (i.e., man-made) environment. Examination of the files maintained at PHMC and the Pennsylvania State Archives, examination of cartographic sources and documents at county and local historical societies, and a reconnaissance (“windshield”) survey to assess the character and extent of the built environment (historic architectural resources) within the APE for historic architectural resources will be conducted as part of the identification survey. Any historic architectural properties identified within the APE that have been previously documented and evaluated prior to 2003 and historic architectural resources that have not been previously evaluated will require the completion of PHMC historic architectural survey forms, an evaluation of their eligibility for inclusion in the NRHP, and the assessment of direct and indirect project effects to each resource. The PHMC requires that resources that were documented more than four years ago will require re-evaluation to ensure that intervening modifications have not altered the resource’s characteristics.

As agreed to with the PHMC in the previously mentioned July 9, 2008 meeting, the protocols for historic architectural resource investigations and mitigation are as follows:

- The APE for historic architectural resources will include all areas within 1 mile of the proposed transmission line from which the transmission line facilities and associated cleared areas will be visible.
- The APE for historic architectural resources will be surveyed to identify, record, and evaluate for eligibility for inclusion on the NRHP all standing structures, linear resources, and rural historic landscapes greater in age than 50 years.
- The effects of the proposed transmission line on identified historic resources will be assessed.

Adverse effects to unavoidable eligible resources will be mitigated according to plans developed in consultation with the PHMC/BHP.

Archaeological Resources

The characteristic of any construction project that has the greatest potential to directly affect archaeological resources is the extent of ground disturbance associated with the project. The activities associated with transmission line construction that are most likely to affect archaeological resources are:

- Construction of new access roads to and within transmission line corridors
- Equipment staging areas
- Removal of trees and other vegetation
- Over-driving by tired and tracked vehicles during construction and for subsequent maintenance
- Excavations for structure foundations.

Indirect effects are caused by disturbances not directly associated with the installation of the transmission line. Indirect effects can include, but are not limited to, disturbance associated with enhanced access to archaeological resources by collectors, off-road vehicles by access roads and cleared corridors, and increased erosion as a result of forest clearing.

The need to construct new access roads to and within transmission line corridors, the creation of staging areas, and the removal of trees and other vegetation is generally much greater where the new transmission line will traverse areas where no existing transmission lines are present. Of the three Alternative Routes, Route B contains approximately 91.5 miles of existing transmission lines but construction of the proposed transmission line in Route B would require only 8.4 miles of new corridor primarily in Lackawanna County as well as approximately 0.9 mile around the Susquehanna Substation for a total of 9.3 miles of new clearing in Route B. Routes A and C would require clearing 32.9 miles and 47.7 miles, respectively. Therefore, the overall potential to affect archaeological resources is substantially less on Route B than on Routes A or C.

Existing PPL Electric transmission corridors are at least partially cleared and will require minimal widening in some locations to accommodate the installation of the proposed 500 kV line. The site-yield of a survey is directly related to the area of the survey; the bigger the area, the more sites that are likely to be discovered. Acreage requiring clearing to accommodate the installation of the proposed transmission line would be substantially less on Route B than on Routes A or C. Therefore, the number of archaeological resources likely to be affected by construction of new transmission lines on Route B is substantially less than on Routes A or C.

Both Route A and B include 29.7 miles within which an existing 500 kV capable transmission line exists and no additional construction is required. As a result, the project will not have any effect on archaeological resources in this part of Routes B.

PPL Electric will continue to consult with the PHMC throughout the planning, design, and construction process and conduct field work and surveys as necessary as part of the project permitting process to minimize potential impacts to archaeological resources in accordance with the requirements of Section 106 of the National Historic Preservation Act.

The PHMC has established specific requirements for the identification, evaluation, and preservation of significant archaeological resources and historic architectural properties. Archaeological surveys in Pennsylvania are guided by the PHMC's *Guidelines for Archaeological Investigations (PHMC 1991)* and Act 70 (*Pennsylvania State History Code*). These guidelines complement the *Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation*.

On July 9, 2008, PPL Electric and The Louis Berger Group met with the PHMC/BHP and agreed upon protocols for cultural resource studies for the proposed Susquehanna-Roseland 500 kV Transmission Line project. These protocols have been established for the entire project in Pennsylvania and are as follows:

- The Area of Potential Effect (APE) for archaeological resources will include all areas of proposed ground disturbance.
- The APE for archaeological resources will be surveyed to identify and record all archaeological resources present.
- Archaeological survey will be required in all areas where direct impacts (ground disturbances) will occur.
- The APE will be stratified by virtue of portions' high or low potential to contain archaeological resources.
- Areas of high archaeological potential initially will be systematically surveyed using subsurface tests (shovel tests) at 15-meter intervals (18 tests/acre). Areas of high archaeological potential in the APE will include:
 - Areas within 300 feet of surface water (streams, springs, and wetlands);
 - Areas within 300 feet of previously recorded archaeological sites;
 - Areas within 300 feet of historic resources;
 - Floodplains;
 - Kames and other elevated glacial features providing view sheds over valleys; and
 - Saddles (low passes between drainages).
- Areas of low archaeological potential in the APE will be surveyed using subsurface tests (shovel tests) at 25-meter intervals (6 tests/acre). Areas of low archaeological potential will include:
 - All areas not assessed as having a high potential to contain archaeological resources; and
 - Areas with slopes greater than 15%. Slopes will be examined for the presence archaeological deposits in caves and rock overhangs.
- Deep testing in conjunction with pedological/geomorphological study will be conducted on floodplains and other high probability areas containing colluvial and alluvial sediments.
- All identified archaeological sites to which adverse effects cannot be avoided will be evaluated for eligibility for inclusion in the National Register of Historic Places (NRHP).

- Adverse effects to unavoidable eligible sites will be mitigated according to plans developed in consultation with the PHMC/BHP.

Any identified archaeological sites that may be adversely affected will require an evaluation of eligibility for inclusion in the NRHP. Such evaluations are termed “Phase II” evaluations and require sufficient field work and laboratory analysis to determine whether the archaeological resources are eligible for the NRHP. “Phase III” mitigation studies would be required for any archaeological resources considered eligible for the NRHP that will be directly or indirectly adversely affected by the proposed project. Curation would be coordinated with the State Historic Preservation Office (i.e., PHMC).

Reasonable efforts will be made to avoid affecting archaeological resources. Where possible, archaeological resources identified in the transmission line corridor, in the direct path of access roads, or at the locations of proposed work areas will be avoided by relocation of tower positions and rerouting of roads and reconfiguring or relocating work areas.

5.8.3 Conclusion

PPL Electric is preparing to conduct field surveys to identify potential historic archaeological and architectural properties along the Preferred Route in accordance with PHMC/BMP requirements. Based on the CRGIS database analysis, Route B has a slightly higher number of previously recorded architectural and archaeological sites within the PHMC/BHP’s agreed-upon area of potential effect for each respective resource (14 architectural sites compared to 10 for Route A and 7 for Route C; and 15 archaeological sites compared to 6 for Route A and 10 for Route C). However, as explained above, this difference is likely the result of differing levels of survey work along the three routes. Moreover, it is not possible to definitively determine the numbers of historic architectural resources that may be adversely affected by the proposed transmission line as the mitigative effects of terrain relief and forested areas will have to be assessed in the field on a case-by-case basis. However, the area of potentially adverse visual effects and direct impacts related to historic architectural structures will be greater where new transmission line structures will have to be installed where they do not currently exist.

Construction of Route B involves the least amount of new ground disturbance and fewer new structure locations and access roads than the other Alternative Routes. Therefore, Route B has the potential to affect the fewest archaeological sites and historic structures of the three routes. Construction and operation of the proposed 500 kV transmission line along Route B has the lowest potential to affect cultural resources because it would require only 8.4 miles (plus an additional 0.9-mile connection at the Susquehanna Substation) of new transmission line, cleared corridors, and access roads in areas where no transmission lines or corridors currently exist. In contrast, approximately 32.9 miles of Route A and 47.7 miles of Route C would require new structures in newly cleared corridors and new access roads.

5.9 Aesthetics

For the purpose of this report, aesthetics are defined as a mix of landscape character, the context in which the landscape is being viewed, and the scenic integrity of the landscape. To analyze the potential visibility and visual impact of the proposed project, the three Alternative Routes were reviewed through landscape character analysis, field evaluation, and environmental factor tabulations.

5.9.1 Existing Landscape Character

Landscape character encompasses the patterns of landform (topography), vegetation, land use, and aquatic resources (i.e., lakes, streams, and wetlands). The landscape character is influenced both by natural systems (see Section 5.1, Geology and Soils, Section 5.2, Surface Water, Section 5.3, Wetlands, and Section 5.4, Vegetation) as well as people's interactions with and use of land (see Sections 5.6, Land Use, Section 5.7, Recreation, and Section 5.8 Cultural Resources). In natural settings the landscape character attributes are natural elements, where as in pastoral or rural/agricultural settings they may include man made elements such as fences, walls, barns and occasional residences. In a more developed setting the landscape character may include buildings, lawn areas and landscaping, pavement, and utility infrastructure.

Route A

From the Susquehanna Substation, Route A heads northeast to the Stanton Substation. Here the route will utilize the existing 230 kV line for approximately 30 miles. As discussed elsewhere in this Application, the line can be converted to 500 kV without replacement of structures or conductors except at the substations. Where the line connects to the Susquehanna Substation, a new 0.9-mile 500 kV line connecting into the 500 kV system would need to be constructed, all on PPL Susquehanna, LLC property. At Stanton, the substation voltage is 230 kV so the proposed 500 kV line will be disconnected from the substation. This portion of the route crosses deciduous and mixed hardwood forests along with some agricultural lands on a gently rolling plateau above the Susquehanna River.

Crossing the Susquehanna River the route continues northeast parallel to the existing Mountain-Lackawanna 230 kV Line. In the river valley, the route will cross dense deciduous vegetation. Rising out of the valley the landscape is a mix of deciduous woodlands and open pasture and croplands as shown in the following photo.



The areas of pastures and croplands offer some long vistas across the landscape due to the varied elevations and long expanses of open lands. Reforested former coal mining land is also prevalent in this area. Heading northeast the line runs parallel to the ridges of Bald and Bell Mountains above Keyser Avenue and Business Route 6 as shown in the following photo.



Northeast of the Lackawanna Substation, the route does not parallel an existing line. The line continues northeast approximately 2 miles running slightly below the mountain ridge and then turns east crossing the valley just north of Archbald Pothole State Park. Long vistas across the valley to the mountains beyond can be observed from the ridges and mountains east and west of Route 6 and Business Route 6. Route 6 is a designated Pennsylvania Byway north to Carbondale. The following photo is an example of the long open vistas which can be seen along the roadways in this area.



As the route heads southeast from Route 6, the landscape again crosses reforested former anthracite coal mining land. Near Salem Heights Road and Collins Boulevard the route turns east to parallel the existing Peckville-Blooming Grove 230 kV Line. Here the line runs parallel along a cleared right-of-way within a mixed hardwood forest with intermittent residential properties cut in the forest. At Mountain Road near Moosegap Road, the forested landscape becomes more evergreen in nature and then transitions into a mix of open fields and meadows with farmsteads, mixed forested patches, and occasional residential properties. East of Lake Ariel Highway, the landscape becomes more forested with fewer residences. Approaching the town of Hawley, development increases including several housing developments surrounding lakes such as Whitney Lake and Lake Wallenpaupack. The following photo shows the existing Peckville-Blooming Grove 230 kV Line in a commercial area outside of Hawley in Wayne County.



East of Lake Wallenpaupack, Routes A and B separate, with Route A continuing southeast and Route B heading south. From the point where Routes A and B split, the remainder of Route A is within virgin right-of-way, primarily through forested lands.

Continuing east, Route A crosses a lowland mixed deciduous/evergreen forest at Decker Hollow Road and then the landscape transitions into a mixed upland forest. West of Route 590 south of the town of Lackawaxen, the route parallels an existing gas main crossing through the forested landscape and then continues southeast to Walker Lake. The landscape in this area continues to be forested with a few scattered residences. The line runs south of a housing development surrounding Walker Lake. At Twin Lakes Road, the line turns east away from the gas main. Here the route crosses approximately 10 miles of forested land with little encroachment from development, roads, or other utilities. The woodland landscape ends at a high bluff above I-84, US 6/209, and the Delaware River Valley. The following photo taken from US 6/209 shows the bluff above the highways and valley of the Delaware River. After crossing US 6/209, the route crosses a forested campground (River Beach Campground) and then the Delaware River.



Route B

Route B follows the Route A alignment from the Susquehanna Substation to a point near the community of Kimble, Palmyra Township in Pike County, east of Lake Wallenpaupack. As Route A continues southeast across forested lands, Route B heads south along the existing Bushkill-Blooming Grove 230 kV Line (Segment 5). Here the line crosses State Game and Delaware State Forest lands. Light development is interspersed with state lands and residential properties with open lawns and associated outbuildings, such as the scene shown in the following photograph near the Blooming Grove Substation and Kleinhans Road.



Occasional cabins, jeep trails and roadways create breaks in the forested landscape. Knob Hill (elevation 2,162 feet) is a local high point. Several communication towers have been built at this location. The following photo shows the Bushkill-Blooming Grove 230 kV Line and communication towers on the top of Knob Hill in the background.



Heading south from the Delaware State Forest, the landscape becomes more developed with the Saw Creek Estates residential development abutting both sides of the existing Bushkill-Blooming Grove 230 kV Line for approximately 4 miles. Here houses, yards and roads have been cut into the woods and remnants of the woods remain in clusters of trees between the developments. The following photo was taken from Saw Creek looking across the existing transmission line easement and across the valley to the mountains beyond.



Heading south the route crosses approximately 0.6 mile of the Delaware Water Gap National Recreation Area (DEWA), US Route 209 (Milford Road), and then Fernwood Resort and its golf course. The Bushkill 230 kV Switchyard is located next to the golf course. East of the golf course the route enters back into the DEWA for approximately 0.9 mile until it reaches the Delaware River. Here the landscape is that of mixed hardwoods interspersed with stands of evergreens.

Route C

Route C heads south from the Susquehanna Substation and occupies the vacant side of an existing double circuit 500 kV line for about 1.25 miles and a crossing of the Susquehanna River. From the Susquehanna Substation, the existing line crosses forested areas adjacent to farmlands, US Route 11 (Salem Boulevard), and then the Susquehanna River to the higher bluffs and farmlands on the south side of the river in Nescopeck Township. The existing line can be seen on a high bluff above the river as shown in the following photo.



South of the river, the route heads west occupying the vacant side of an existing double circuit transmission line for approximately 1.6 miles. At this point, it leaves the existing transmission line and heads south, where the landscape becomes more rural and agricultural. The route subsequently enters mixed hardwood forested land at the base of Nescopeck Mountain. The route then crosses the mountain perpendicular to the long ridge near a saddle in the mountain. The photo below shows the saddle of the mountain; the line would cross the top of the saddle, just to the left of where it slopes to the right (i.e., west).



Continuing south of I-80, the route crosses a mix of farmlands, reforested former anthracite coal mining land as well as some areas of active coal mining and processing near the towns of Shenandoah and Gilberton. Although the area is generally rural in nature, the route crosses near occasional residences, farmhouses, barns, and outbuildings. The route will traverse currently uncleared future use right-of-way for approximately 23 miles in this area. North of the town of Saint Clair and southeast of Frackville, the route turns east for another 8 miles of uncleared, future use right-of-way, then joins the Siegfried-Frackville 230 kV line. The route crosses the Blue Mountain and the Appalachian Trail in this area. Here the dominating landscape character is agricultural with scattered residences and woodlands along the mountains and ridges. East of the Pennsylvania Turnpike (I-476), the route splits off from the existing 230 kV line and heads northeast across a mix of hardwood forests, agricultural fields and tree plantations. East of Long Lane Road, residential properties become more prevalent until the route approaches Blue Mountain east of Danielsville. The ridge of Blue Mountain can be seen in the distance in the photo below. Here the route would run through woodlands along the tow of the slope (or within approximately 1 mile of) on the south side of the ridge below the Appalachian Trail for approximately 8 miles. At certain points in Moore Township, the route gets as close as 0.25 to 0.50 mile from Blue Mountain.



Continuing east, the route joins up with the Martins Creek-Siegfried 230 kV line near Katellen on the south side of the existing line. The landscape is a mix of residences, farm fields, and scattered woodlands. A few housing developments exist along the route near State Route 33, but otherwise residential development is primarily large lot single-family homes in this area. This mixed landscape continues to the Delaware River crossing. Approaching the crossing, the PPL Martins Creek and Mt. Bethel power plants and associated transmission lines dominate the landscape as illustrated in the following photo.



5.9.2 Impacts on Aesthetic Resources and Proposed Mitigation Measures

Viewer/User Groups

The visual impact of the proposed alternatives is influenced by many factors. The viewer is one of these factors, not only who is viewing the line but their expectations, activities and frequency of viewing the line. Four types of viewers were identified within the study area.

Local Residents

Local residents are those people who live in the area of the proposed transmission line. These individuals may view the line from their yard or home, while driving on local roads or during other activities in their daily lives. The sensitivity to the visual impact of the line by local residents may be mitigated by exposure to existing transmission lines and other dissonant features already within the viewshed. Changes in the landscape that can be viewed from homes and neighborhoods can be highly sensitive.

Commuters and Travelers

These are people who travel by the transmission line on their way to other destinations. They may view the line on a regular basis or only once. Typically, drivers will have limited views of the transmission line where vegetation or structures provide screening and where the line is running high above the road surface. The visual perception of the line for commuters and travelers is anticipated to be relatively low. The commuters and travelers are typically moving and have a relatively short duration of visual exposure to the line. Drivers tend to be occupied with traffic and navigation and are to a much lesser degree concerned with off-road views. Passengers would have a greater occasion for off-road views.

Employees

These are people who work at local businesses, primarily in commercial areas along the routes. Employees may experience the line as they commute to and from their place of employment. They may view the line from the parking lot as they enter their place of business or from inside the building. Workers may not have views to the outside and will be focused on their work rather than views of the landscape. Due to limited views and focus, employees are not anticipated to have high sensitivity to a new transmission line near their place of work.

Recreational Users

This includes local residents and tourists involved in recreational activities at the Delaware Water Gap National Recreational Area and Delaware River, the Appalachian National Scenic Trail and other trails, state and local parks, beaches and boating facilities, golf courses, historic and culture sites, and natural areas. Scenery and visual quality may or may not be an important recreational experience for these viewers. For some users scenery may be an important part of their experience as their activities may include attentiveness to views of the landscape for a long period of time. Such viewers may also have a high appreciation for visual quality and high sensitivity to visual change. These viewers and the effect of the Alternative Routes on these resources are discussed in Section 5.7, Recreational Lands and Section 5.8, Cultural Resources.

Scenic Integrity and Visual Absorption

Scenic integrity is the degree from which the landscape character deviates from a natural, 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. Furthermore, 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 in landscape.

The scenic integrity of Route A is the greatest of the three proposed routes because it has the greatest crossing of natural lands (forested land, aquatic resources, and wetlands). Route A crosses approximately 63 miles of natural lands while Route B crosses approximately 52 miles and Route C crosses approximately 36 miles.

Each alternative will, to different extents, either parallel or double circuit the proposed 500 kV circuit with another existing circuit. Furthermore all routes will utilize a portion of existing right-of-way reserved for future use which currently has no transmission structures. Route A and Route C require substantially more new clearing of right-of-way than Route B, either through future use right-of-way secured but not built upon or through new right-of-way that would need to be secured. From a visual perspective, in similar landscapes, the future use rights-of-way do not appear any different than virgin rights-of-way in this study area. In either case there is no utility structure present. The future use rights-of-way have not been cleared or otherwise maintained to make them easily visibly discernable from similar non-right-of-way. Adding virgin right-of-way and future right-of-way, Route C will have the most noticeable change in the visual landscape with approximately 47 miles of virgin and future use right-of-way, while Route A crosses approximately 33 miles and Route B crosses approximately 8 miles. The ability of these areas of virgin and future rights-of-way to absorb the changes in the visual landscape is less than along Route B which utilizes or parallels existing rights-of-way to a greater degree.

Designing and rebuilding an existing single circuit line for double circuit 500 and 230 kV offers the least degree of notable change on the landscape. Route B offers the greatest double circuiting opportunities with approximately 49 miles. Alternatives A and C provide approximately 20 miles each. Alternatives A and B also provide approximately 30 miles of energizing an existing 230 kV line to 500 kV with minimal structure or conductor change as outlined previously.

Project Visibility

Regardless of the route, the transmission line will cross through visual resources and the line structures, conductors, and the cleared right-of-way will be visible in some degree. The visual presence of the line will be influenced by many factors such as the height of the structures, amount of screening, the distance viewed, other disturbances in the viewshed, background terrain and textures, and the sensitivity of the viewer.

In open pastoral settings, long vistas may be afforded from elevated views across pastures, fields, and open lands. Route C traverses substantially more crop and pasture lands (approximately 31 percent of the line) than Routes A and B (each approximately 5 percent of the line).

In forested settings, an extensive amount of natural screening is present which will limit direct visual access to the line except when viewed from within the cleared right-of-way. Assuming a typical height of 150-195 feet and a tree height of about 70 to 110 feet (based on the species of trees and average maturity of the woodlands observed during field reconnaissance), in areas where mid to long views of forested ridges and tree lines are afforded, the upper portion of the structures will be visible above the forest canopy. The degree the line affects the scenic integrity of the landscape will be reduced at longer viewing distances as the line becomes a smaller part of the overall vista. If viewed from within the cleared right-of-way or an adjacent clearing such as the gas main easement along Route A, the line will be highly visible. Where the woodlands adjacent to the clearing are intact, the visibility of the line will quickly diminish with distance from the clearing. Although Route A crosses more forested lands (more than 85 percent of the line), these same woods offer the greatest natural screening of the line. Route C crosses the least

forested lands (approximately 58 percent of the line) and therefore has the least natural screening of the line. In addition to forests, smaller stands of trees, hedgerows, adjacent landscaping and structures provide a degree of screening for the transmission line along all the alternative routes.

Where the lines are double circuited with an existing transmission line, the new structures will be taller than the existing structures and therefore there will be an increased visual impact both in mass and in distance that the structures are discernable. The existing structures are approximately 85 to 100 feet in height, where the proposed structures may range from 150 to 195 feet in height.

Residents along the route will have the most frequent visual interaction with the transmission line. Comparing the number of residences within a nearby distance from each route can provide relative visual impacts by route. Considering the number of residences within 250 feet of the centerline of each of the Alternative Routes, Route C would place the transmission line and structures within foreground view of the most residences (259), followed by Route B (216), and Route A (58), as shown in Table C-3.

5.9.3 Conclusion

A new 500 kV transmission line will have a visual impact on the landscape character of any of the alternative routes. Aesthetics and visual impact of a transmission line is influenced by multiple factors: the landscape character of the surrounding area, the viewer's activities and scenic expectation, the visual integrity and visual absorption potential of the landscape, and the visibility of the line. Taking these factors into consideration, Route B would have the least visual impact of the three alternatives studied. When compared with Route C, Route B will utilize significantly less future use right-of-way. Similarly, Route B will require far less new clearing of "virgin" right-of-way than Route A, which would require nearly 25 miles of new clearing through Pike County forest land, thereby notably affecting the high scenic integrity of this landscape. Route B follows the alignment of existing transmission lines to a greater degree than the other routes, minimizing additional modification of visual integrity. Route B does, however, bisect the Saw Creek Estates community in Pike County. While a 230 kV line predates the community, some additional incremental impacts could be expected, particularly to those residents living along or near the edge of the right-of-way or those with otherwise clear views of the transmission structures. Route C passes within 250 feet of more residences than the other routes, thereby resulting in potentially overall higher aesthetic impacts to residents in the near vicinity of the line. Alternative C crosses the most agricultural land allowing for long pastoral views across the landscape which, along with the introduction of transmission facilities in the vicinity of the Blue Mountain/Kittatinny Ridge in Northampton County, would result in substantial visual impacts to viewsheds along much of the eastern part of Route C.

PPL Electric will work with as many interested parties as practical to minimize the aesthetic impact of this project to the extent feasible. For example, as part of the public outreach efforts of this project (see Section 6.0), PPL Electric actively sought comments from interested parties regarding vegetation management and screening, right-of-way issues, and the placement of transmission structures. PPL Electric is now working to set up meetings with residents and groups along the Preferred Route to address these types of aesthetic concerns.

5.10 Project Costs

The cost of the Alternative Routes was also a factor, though not the controlling factor, in the selection of the Preferred Route. Comparative conceptual estimates were developed by PPL Electric and PSE&G considering labor, materials, contracts, and other costs for Routes A, B, and C.

The overall cost of building the Susquehanna-Roseland 500 kV Transmission Line in Pennsylvania and New Jersey using the Preferred Route (Route B) is substantially less than Alternative Routes A or C. Table C-20 shows cost estimates for both PPL Electric's portion as well as PSE&G's portion of the project.

Table C-19. Susquehanna-Roseland 500 kV Transmission Line Estimated Project Cost (\$ Millions)			
	Route A	Route B	Route C
PPL Electric	\$457	\$512	\$547
PSE&G	\$1,200	\$701	\$1,200
Susquehanna-Roseland Total	\$1,657	\$1,213	\$1,747

With respect to the Pennsylvania portion of these cost figures, it should be noted that nearly 30 miles of the new transmission line along Route B will replace 80-year-old conductor and structures that were already scheduled to be replaced under PPL Electric's Vintage Conductor Program. The cost of this replacement is expected to be approximately \$75 million and would be incurred even if Routes A or C were selected. On this basis, the total effective cost of Routes A and C should be increased by \$75 million, yielding a total cost of \$532 million for Route A, \$512 million for Route B, and \$622 million for Route C.

6.0 Public Outreach

Once the three Alternative Routes were identified and announced, PPL Electric conducted an extensive communications outreach program to solicit input from and disseminate information to the public about the Susquehanna-Roseland 500 kV Transmission Line project and begin gathering public input for incorporation into the decision-making process. This public outreach program included: phone calls, meetings, and a webcast with elected officials; mailings to approximately 2,200 people who own property within a 1,000-foot corridor along each Alternative Route; posting of newspaper advertisements in various Pennsylvania newspapers; distribution of a press release to local newspapers; and postings on the project through the project website (www.pplreliablepower.com).

Throughout the public outreach process, PPL Electric has responded to questions and concerns from property owners, residents, and other interested parties directly through open houses, in-person meetings, personal phone calls and emails, and periodic project update letters.

6.1 Open Houses – Alternative Routes

6.1.1 Methods

Using these communications methods, PPL Electric scheduled and notified the public regarding nine open houses that were to be held in the project area between June 16 and June 30, 2008. These open houses were scheduled along each of the Alternative Routes to provide people with further information about the project and Alternative Routes and to give them the opportunity to ask questions and provide input and information to PPL Electric staff regarding their concerns. Announcements of the open houses were published in advance of the scheduled dates in the following newspapers serving the project area:

- Abington Journal – June 11
- Allentown Morning Call – June 22 and 25
- Bangor Blue Valley Times – June 24
- Blakeslee Journal of Pocono Plateau – June 11
- Bloomsburg Press Enterprise – June 17 and 22
- Easton Express Times – June 18 and 22
- El Torero (Allentown area) – June 20
- Hawley News Eagle – June 11, 14, and 21
- Hazleton Standard-Speaker – June 10 and 15
- Honesdale Wayne Independent – June 14 and 17
- Honesdale Weekly Almanac – June 12
- Hunlock Suburban News – June 18
- Lehighon Times News – June 18 and 21
- Middletown Times-Herald Record – June 18
- Mountaintop Eagle – June 11
- Narrowsburg River Reporter – June 12 and 19
- Pike County Dispatch – June 12
- Pittston Sunday Dispatch – June 15
- Port Jervis Gazette – June 13
- Pottsville Republican – June 19 and 22
- Scranton Times-Tribune – June 11 and 15
- Stroudsburg Pocono Record – June 15 and 18
- Wallenpaupack Summer Weekly – June 13
- White Haven Journal Herald – June 12
- Wilkes-Barre Citizens Voice – June 11 and 15
- Wilkes-Barre Times Leader – June 10 and 15.

Summary information on the open houses is shown below in Table C-20.

Table C-20. Public Open House Information				
Date	Location	County	Route Emphasis	No. of Attendees
Monday, June 16	PPL East Mountain Business Center 1190 East Mountain Dr., Wilkes-Barre	Luzerne	A, B	54
Tuesday, June 17	Hilton Scranton & Conference Center 100 Adams St., Scranton	Lackawanna	A, B	56
Wednesday, June 18	Wallenpaupack Area High School 2552 Route 6, Hawley	Wayne	A, B	154
Thursday, June 19	Fernwood Resort & Conference Center Route 209 and River Rd., Bushkill	Monroe/Pike	B	43
Monday, June 23	Berwick Area High School 1100 Fowler Ave., Berwick	Luzerne	A, B, C	41
Tuesday, June 24	Tamaqua Community Center 229 Center St., Tamaqua	Schuylkill	C	115
Wednesday, June 25	Forks Township Community Center 500 Zucksville Rd., Easton	Northampton	C	135
Thursday, June 26	Northampton Community Center 1601 Laubach Ave., Northampton	Lehigh/ Northampton	C	551
Monday, June 30	Best Western Inn at Hunt's Landing 120 Routes 6 and 209, Matamoras	Pike	A	140

In addition to the newspaper advertisements, 30-second radio spots were run on the Honesdale (combo WDNH-FM and WYCY) and Port Jervis (combo WDLC and WTSX-FM) radio stations between June 13 and June 20 advertising the June 30 open house in Matamoras. This open house was scheduled after a Pike County Commissioner requested that a public forum be held in the Matamoras/Milford area.

A similar open house was held on July 22, 2008 for the residents of Saw Creek Estates in Bushkill, Pennsylvania, through which Route B and an existing 230 kV transmission line pass. This open house was not part of the original eight scheduled open houses to announce the project, but was later added at the request of the Saw Creek Estates Community Association Board of Directors. As with other property owners along the Alternative Routes, PPL Electric sent letters to property owners within a 1,000-foot corridor of the proposed line through Saw Creek Estates; Saw Creek management advertised the open meeting via flyers to their residents, the Association's monthly newsletter, and their website.

An exhibition-styled format was employed at the public workshops using a variety of displays to explain various aspects of the project. Displays were staffed by representatives of PPL Electric, routing team members from Berger/CAI, and other experts who explained the project to attendees, received feedback and other input from attendees, and answered questions and/or recorded questions for subsequent follow-up. The displays and the literature covered various subjects, such as the electrical need for the line, engineering and construction requirements, right-of-way acquisition procedures, and route selection procedures. The following seven "stations" were employed to help provide information to the attendees:

- Station 1 – Welcome and Sign-In. Attendees were asked to sign in and were given directions to the stations and general information about the format of the meeting.
- Station 2 – Overview of Current Transmission System. Representatives of PJM and PPL Electric discussed the need for the project and displayed graphics showing the current electric delivery system and future needs.
- Station 3 – Summary of the Route Selection Process. Representatives of PPL Electric and the routing team discussed the route selection process and various factors that were considered in identifying Alternative Routes for the transmission line. Interested attendees were shown general maps of the three Alternative Routes identified and shown aerial photography map sheets (1 inch = 500 feet scale) to locate their homes, businesses, and other points of interest relative to routes. In addition to the maps and aerial photography, graphics at Station 3 depicted the overall routing process, routing criteria, and large and small scale constraints (i.e., environmental, land use, cultural, etc.) considered when developing the routes.
- Station 4 – Detail on Planned Work. PPL Electric representatives displayed graphics depicting possible transmission structures being considered for use in the Pennsylvania portion of the project, discussed engineering design concepts, identified likely dimensions of the transmission facilities, and discussed general construction techniques and operating requirements.
- Station 5 – Project Schedule. Graphics were displayed identifying the overall project schedule and dates, including meetings with agencies, open houses, selection and announcement of the preferred alternative, submission of the application to the Pennsylvania Public Utility Commission (PUC), planning and engineering milestones, and anticipated construction and in-service dates.
- Station 6 – Energy Conservation. PPL Electric representatives discussed ways to conserve electrical use and demonstrated PPL Electric’s Energy Analyzer tool.
- Station 7 – How You Can Stay Informed. PPL Electric representatives and the project team identified various methods of submitting comments (including collecting taking comment cards submitted during the open house), ask further questions throughout the process, receive additional information and updates regarding the project, and other communication specifics.

In addition to submitting verbal and written comments during the open houses, attendees were provided with several other methods of offering additional information on the project, including questionnaires, responding by email or letter, and monitoring the project website (www.pplreliablepower.com) where project information and maps showing the routes under consideration were placed for public review and comment.

As indicated previously in the discussion of Station 3, an important aspect of the open houses was the use of the 1-inch to 500-foot scale aerial photography map sheets. These sheets showed

the Alternative Routes under consideration at the time of the open houses, along with features such as residences, barns, field edges, roads, streams, and other information that allowed landowners and other attendees to see their area of concern. Attendees were asked to write any comments they believed important pertaining to the location of the Alternative Routes or other resources in the study area on the map sheets or on comment cards. Routing team members assisted attendees in locating their property or other areas of concern on the photographs and assisted them in marking the photo sheets with their concerns. Following the open houses, comments recorded on the aerial photo map sheets were digitized and included in the GIS database for this project.

6.1.2 Results

Overall, the open houses (including the additional July 22 meeting at Saw Creek Estates) were attended by approximately 1,400 people. Out of the 1,400 people who attended, more than 400 individuals filled out formal comment cards/surveys requesting detailed maps of the proposed routes and follow-up calls regarding specific questions that were not answered at the open house. Many of these individuals also offered general comments and concerns about the specific routes. Results of the input received at the open houses are summarized below.

- Monday, June 16 — PPL East Mountain Business Center, Wilkes-Barre. Attendance at this open house was 54 people and consisted mostly of individuals who live and work along Routes A and B. Some people who attended the open house were concerned with whether or not the current transmission towers near their homes would change as a result of the project.
- Tuesday, June 17 — Hilton Scranton & Conference Center, Scranton, PA. Attendance at this open house was similar to the Wilkes-Barre open house as 56 people attended. Attendees consisted mostly of people who lived and worked along Routes A and B, including people from the City of Scranton and surrounding townships. Some people who attended the open house said that they preferred Route C over Routes A or B.
- Wednesday, June 18 — Wallenpaupack Area High School, Hawley. This open house saw the second largest attendance of all the first round of open houses as 154 people attended. Most people who attended this open house either lived or worked along the northern and eastern portions of Routes A and B. During the meeting, PPL Electric met outside of the open house with a large contingent of people, led by the Shohola Township Supervisor and Secretary. This group expressed opposition to the siting of the line along Route A because of disturbance to the environment and the proximity of the line to the Shohola Elementary School. The group provided a letter to PPL Electric after their discussion about its opposition to Route A and support of Route B.
- Thursday, June 19 — Fernwood Resort & Conference Center, Bushkill. This open house was attended by 43 people and consisted mostly of individuals who live and work along Route B in Pike and Monroe County. This part of Route B travels through the Delaware State Forest and the Saw Creek Estates residential community through which the existing 230 kV line traverses. Of the registered attendees, only three of the 43 people who

attended the event were residents of Saw Creek Estates. This open house was held prior to any planning of the Saw Creek Estates meeting that was held on July 22. A representative of the National Park Service's Delaware Water Gap National Recreation Area (DEWA), through which Route B traverses east of Route 209 (Milford Road) to the Delaware River, was also in attendance.

- Monday, June 23 — Berwick Area High School, Berwick. This open house was attended by 41 people and consisted mostly of people who live and work north of the Susquehanna substation on Routes A and B and people who live and work south of Susquehanna substation on Route C. People who attended this open house were generally more concerned about the proposed nuclear plant at Bell Bend than they were about the transmission line project.
- Tuesday, June 24 — Tamaqua Community Center, Tamaqua. This open house was attended by 115 people and consisted mostly of people who live and work along Route C. Most people who attended this open house were opposed to Route C because of potential impact to wildlife, health, and property values. One member of the Tamaqua Borough Council said that he would like to see the transmission lines located in an area that would allow for a coal/waste coal generating facility in Tamaqua Borough.
- Wednesday, June 25 — Forks Township Community Center, Easton. This open house was attended by 135 people and consisted mostly of people who live and work along Route C. People who attended this open house were generally opposed to Route C because of its proximity to their properties and to the Appalachian Trail.
- Thursday, June 26 — Northampton Community Center, Northampton. This was the most heavily attended open house with 551 people. Attendees of the open house consisted mostly of individuals who live and work along Route C in Lehigh and Northampton counties. During the meeting, PPL Electric met with a large contingent of people from the "Drop the Lines" organization. This group and others who attended the open house said they are opposed to Route C because of impacts to property value, wildlife, and the scenery of the Blue Mountain and the Appalachian Trail.
- Monday, June 30 — Best Western Inn at Hunts Landing, Matamoras. This open house was attended by 140 people and consisted mostly of people who live and work along Route A near the Delaware River crossing. This open house was not planned as a part of the original open house schedule, but was added later after a Pike County Commissioner, requested that a public forum be held in the Matamoras/Milford area. Some people who attended this open house were opposed to Route A because of the impact that it would have to the environment and recreation in the area, specifically the River Beach Campsites. Attendees of this event also included the owners of the River Beach Campground/Kittatinny Canoes and the principal from the Shohola Elementary School.
- Tuesday, July 22 — Saw Creek Estates' Top of the World Complex, Bushkill. Attendance at this open house was 102 people and consisted of individuals who live in Saw Creek Estates along Route B. This meeting included an impromptu presentation and

question and answer session in which Saw Creek Estates residents asked questions related to Route B. Questions predominantly focused on how roads around Saw Creek would be affected by construction; who would be responsible for fixing roads and other related property after construction was completed; how property values would be impacted and whether PPL Electric would reimburse homeowners for a perceived “loss in property values”; whether electromagnetic fields (EMF) would change if the line was upgraded from 230 kV to 500 kV; and the health risks associated with EMF exposure. During the session, several attendees spoke at length about their opinions of Route B, including the President of the Saw Creek Estates Board of Directors, who expressed his belief that the line would not benefit Saw Creek and would instead hurt the community; and a Lehman Township Supervisor, who commented that he believed it would be difficult to build transmission towers on Route B because of the geology of the area. Overall, residents and property owners who attended this open house were opposed to Route B because of concerns with: height of towers; reduction in property value; impact on the community’s roads (which had been recently repaired at the expense of homeowners); and health risks associated with EMF.

As of July 30, 2008, PPL Electric had received 944 comment responses from residents, property owners, agencies, and other people through comment cards distributed at the public meetings; through responses received on PPL Electric’s project website; and through additional letters or comments received via regular mail or email. PPL Electric sorted the comments received into several categories, including aesthetics, conservation, electromagnetic fields (EMF), health, the desire to keep informed about the project, requests for maps, the need for the project, noise, property values, recreation, vegetation management, water, wildlife, and “other.” Of the 944 total responses received, 1,573 specific comments within those responses were noted and categorized. Based on these results, the desire to keep informed, property values, health/EMF, and wildlife were of primary concern for most of those that commented. A substantial number of comments were also received requesting maps and expressing concern for aesthetic and water impacts related to the project. The largest number of comments were entered in the “other” category. The results of the public comments received as of July 30, 2008 are shown as a bar graph in Figure C-3.

6.2 Open Houses – Preferred Route

6.2.1 Methods

PPL Electric publicly announced its decision to move forward with Route B as the proposed route on August 5, 2008 following input from the public on the Alternative Routes. PPL Electric subsequently held four open houses from August 25 to 28, 2008 to discuss the decision with the public and begin seeking their input on the selected route. Generally, residents who attended these open houses live and/or own property along Route B. Residents were invited to these open houses through a number of methods, including a letter to all residents in the 1,000-foot corridor along Route B and an advertisement in various newspapers along that route. The advertisement appeared in some of the same newspapers mentioned in the Round 1 assessment of open house outreach (see Section 6.1).

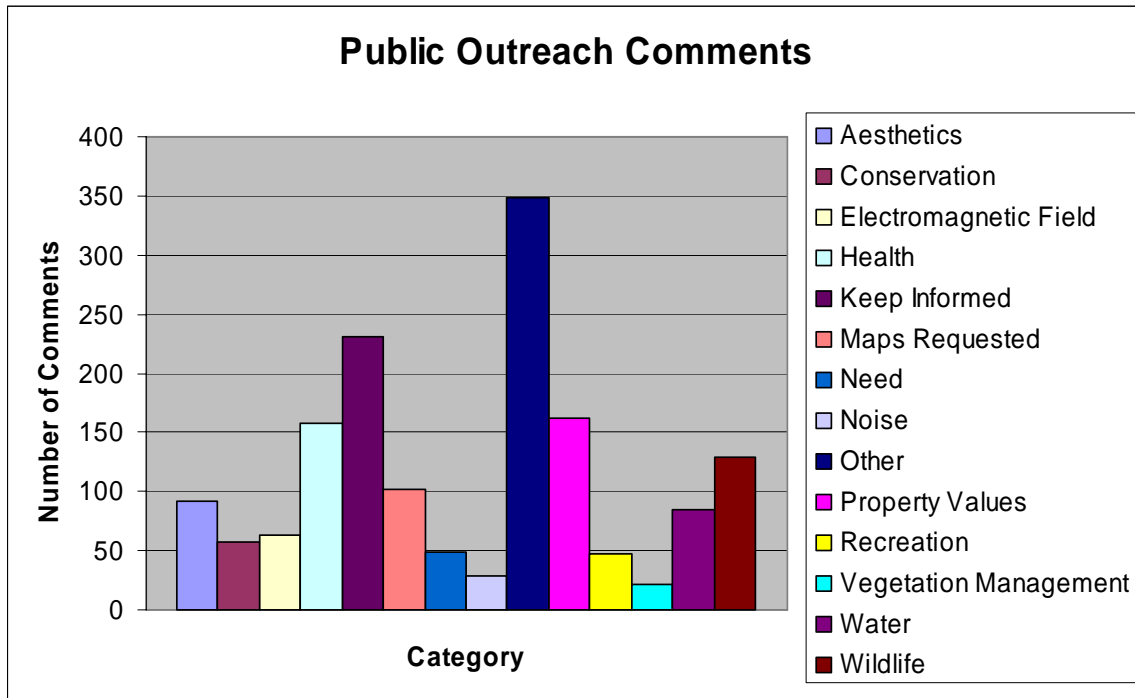


Figure C-3: Public Comments Received on Alternative Routes.

6.2.2 Results

At these open houses, PPL Electric gathered input from residents and property owners. PPL Electric assured the attendees that the company was dedicated to working individually with each resident to address their specific concerns related to the proposed project.

- August 25, 2008 — American Legion Post 644, Swoyersville. Attendance at this open house was 23 people and consisted mainly of people who live along the Preferred Route in the townships of Larksville and West Pittston. Some people who attended the open house were concerned with EMF impacts and further specifics about line construction in this area.
- August 26, 2008 — Newton-Ransom Fire Hall, Clarks Summit. Attendance at this open house was 19 people and consisted mainly of people who live along the Preferred Route in Clarks Summit Township and the City of Scranton. Some people who attended the open house were concerned about right-of-way issues and the impact of the project on the environment.
- August 27, 2008 — Wallenpaupack Area High School, Hawley. Attendance at this open house was 28 people and consisted of people who live along the Preferred Route in Hawley and Lake Ariel Townships. Some people who attended the open house were concerned about the width of the right-of-way in the area and impacts on the environment and water runoff.

- August 28, 2008 — Fernwood Hotel & Resort, Bushkill. Attendance at this open house was 27 people and consisted mostly of people who live along the route in the Saw Creek Estates community in Bushkill. People who attended the open house were concerned about the selection of Route B and its impact on the Saw Creek Estates community and infrastructure. Attendees were also concerned about EMF impacts and the size of towers in the community. Residents from Saw Creek Estates who attended this open house expressed opposition to Route B because of their concern with: health risks associated with EMF; reduction in property value; and the height of the towers. Approximately half of the 27 people who attended this open house live in the Saw Creek Estates community.

PPL Electric subsequently held four additional open houses from November 17-20, 2008 to encourage input from residents who live along the route about their individual concerns with the project and to foster a one-on-one dialogue on a variety of topics including: vegetation management, location of temporary access roads, structure placement, screening, and right-of-way issues. Generally, people who lived along the route attended these events and spoke with PPL Electric staff about their specific concerns.

Residents were invited to these open houses through a number of different methods, including: a letter to all residents who live in the 1,000-foot corridor along Route B, a follow-up flyer to these same residents and an advertisement in various newspapers along the route. The advertisement appeared in some of the same newspapers mentioned in the Round 1 assessment of open house outreach (see Section 6.1).

- November 17, 2008 — Newton-Ransom Fire Hall, Clarks Summit. Attendance at this open house was 40 people and consisted mostly of people who live along the route in Clarks Summit Township and the City of Scranton. Some people who attended this open house were concerned about wetlands surveys occurring in their area, impacts on the environment, location of structures in their area, and other right-of-way issues.
- November 18, 2008 — PPL Environmental Learning Center, Hawley. Attendance at this open house was 10 people and consisted mostly of people who live along the route in Honesdale, Hawley, and Lake Ariel. Some people who attended this open house were concerned about the width of right-of-way in the area, the need for the project, and the impact on the environment.
- November 19, 2008 — Fernwood Hotel & Resort, Bushkill. Attendance at this open house was 205 people and consisted mostly of people who live along the route in the Saw Creek Estates community in Bushkill. People who attended the open house were generally opposed to the choice of Route B. Open house attendees were generally concerned with the height of the structures, width of the right-of-way in Saw Creek, health impacts from EMF, devaluation of their property, damage to the Saw Creek Estates infrastructure (e.g., roads and the Mountainside pool), and why the line could not be built underground. While there were few comment cards filled out by open house attendees, Saw Creek Estates residents expressed their opposition to Route B verbally to PPL staff members.

- November 20, 2008 — Black Diamond Post 395, American Legion, Kingston. Attendance at this open house was 16 people and consisted mostly of people who live along the Preferred Route in the City of Wilkes-Barre and Wyoming Township. Some people who attended the open house were concerned about the need for the project and wanted more detail on structures in this area.

As of December 7, 2008, a total of 1,173 comment responses had been received from residents, property owners, agencies, and other people through responses received on PPL Electric's project website, and through additional letters or comments received via regular mail or email. The additional comments received since the route was announced follow a similar pattern as that seen after the initial rounds of open houses, with the desire to keep informed, property values, health/EMF, wildlife, and aesthetics as primary concerns. The largest number of comments received continued to be in the "other" category.

6.3 Changes Made as a Result of Feedback

A number of alterations or changes to the proposed route (Route B) were made as a result of public input received following the open houses and through additional discussions with interested landowners. These include the following:

- ***Width of Right-of-Way in Saw Creek Estates, Lehman Township.*** Saw Creek Estates expressed concern to PPL Electric with the expansion of the existing right-of-way and reduction of vegetative screening through the community. As a result, PPL Electric is now planning to utilize the existing 150-foot right-of-way to preserve as much vegetative screening as possible.
- ***Relocation of Route in Archbald Borough.*** PPL met with a property owner to discuss rerouting of a portion of the line in Archbald Borough, Lackawanna County. This property owner contacted PPL Electric and asked if the line could be rerouted around his property. As a result, PPL redesigned this portion of the line to accommodate this property owner's request.
- ***Work with Bushkill Group.*** A representative from the Bushkill Group, the organization that owns Fernwood Resort in Bushkill, PA, attended the August 28, 2008 open house and spoke with PPL Electric about relocating a switching station that is currently on Fernwood's property. Since then, PPL Electric has had discussions with Bushkill Group and is currently working with the Bushkill Group on alternatives. This alternative would preserve the parking lot and first fairway of Fernwood golf course.

6.4 Other Commitments/Significant Responses to Interested Parties

The following items include some of the more significant commitments and responses that PPL Electric has made to people and organizations during our public outreach program.

- PPL Electric has mailed periodic letters to all Saw Creek Estates residents, including a letter on October 8, 2008 in which the company made a number of commitments to the community residents, including:
 - PPL Electric will avoid any construction damage where possible, and pay for any damage the company may cause to roadways during construction.
 - PPL Electric has reassured property owners that this project will not require the Company to take any homes in Saw Creek Estates. Many Saw Creek residents expressed concern about this issue. PPL Electric already owns all of the right-of-way needed to rebuild this line through Saw Creek Estates.

- Two residents of Clarks Summit and Lake Ariel, PA requested that “No Trespassing” signs be posted near their properties. These property owners specifically expressed concerns with ATV vehicles accessing the right-of-way near their residences. PPL Electric provided these property owners with signs to address their concerns.

- PPL Electric intends to work with as many interested parties as practical to minimize the impact of this project. As mentioned previously, PPL Electric actively sought comments from interested parties during the November 17-20 open houses regarding vegetation management and screening, right-of-way issues and the placement of transmission structures. For example, in November, five residents in Skytop Ranch Estates and Hidden Lakes Estates in Hawley, PA expressed concern with the width of the right-of-way and the amount of vegetation that will need to be cleared for this project. PPL Electric is now working to set up meetings with these residents to address their concerns.

- PPL Electric is actively meeting with people who own property within 500 feet (on either side) of the centerline of Route B. The company is reaching out by phone and through door-to-door visits to communicate with each affected person about the project, to address their concerns, to develop plans to screen views of the project (where requested and practical), and to make adjustments to project plans, whenever possible and feasible.

7.0 Selection of the Preferred Route

After evaluating all the factors considered during the routing process as documented in this Application, PPL Electric has identified a Preferred Route for the Pennsylvania portion of the Susquehanna-Roseland 500 kV Transmission Line project from the Susquehanna Substation near Berwick to the crossing of the Delaware River. As stated previously, the goal of the Alternative Route identification study was to select the most suitable route for a 500 kV electrical transmission line between the Susquehanna and Roseland substations. The most suitable route is defined as the route minimizing the effect of the transmission line on all factors of the natural and human environment, while minimizing overall project costs and avoiding unreasonable routes and non-standard design requirements to the extent possible.

Based on these factors and the results of the routing evaluation, PPL Electric selected **Route B** as its Preferred Route. Route B is approximately 101.1 miles long in Pennsylvania (including the 500 kV connection segment [B4] at the Susquehanna Substation; see Exhibit D) and traverses 29 municipalities in five counties as shown in Table C-21.

Route B was selected as the Preferred Route for the following reasons:

- Over 90% of Route B would be located on, or parallel to, existing structures within the same right-of-way, far more than Routes A or C.
- Route B utilizes 30 miles of existing 500/230 kV transmission line, making the actual new construction of structures and line considerably less than that needed for Route C (approximately 71 miles on Route B vs. 90 miles on Route C); fewer structures and line equates to substantially less land disturbance.
- Route B would require minimal right-of-way acquisition (i.e., some gaps in the future use right-of-way and other property northeast of Lackawanna in Archbald Borough, as well as new land on PPL property near the Susquehanna Substation). Route A would require 25 miles of new right-of-way through Pike County forest, while Route C also has gaps in its future use right-of-way in Schuylkill and Lehigh counties.
- Fewer residences are located within 75, 100, and 250 feet of the Route B centerline than Route C; Route B does traverse through Saw Creek Estates near Bushkill in Lehman Township, Pike County. However, PPL Electric's Bushkill-Blooming Grove 230 kV Line predates the Saw Creek Estates development.
- Approximately 28 miles of antiquated 230 kV line along Route B between the Wallenpaupack Hydroelectric Station near Hawley and the Bushkill Switching Station in Shoemakers need to be replaced regardless of where the Susquehanna-Roseland 500 kV Transmission Line is located. Impacts of this 230 kV replacement project are similar to the impacts described in this report and will occur even if the Susquehanna-Roseland line, for whatever reason, is not built.
- Route B would cross 1.54 miles of National Park Service (DEWA) land at Bushkill and across the Delaware River; however, an existing 230 kV line predates establishment of the DEWA.

Table C-21. Municipalities Crossed By the Proposed Route		
County/Municipality	Distance Crossed	
	Feet	Miles
Luzerne County	164,150	31.09
Salem Township	28,200	5.34
Union Township	20,100	3.81
Hunlock Township	20,700	3.92
Plymouth Township	25,500	4.83
Jackson Township	6,650	1.26
Larksville Borough	11,650	2.21
Courtdale Borough	2,700	0.51
Kingston Township	15,050	2.85
West Wyoming Borough	10,150	1.92
Exeter Township	23,450	4.44
Lackawanna County	124,350	23.55
Ransom Township	43,000	8.14
Newton Township	0 ¹	0 ¹
South Abington Township	3,450	0.65
Scott Township	0 ¹	0 ¹
City of Scranton	4,500	0.85
Dickson City Borough	10,150	1.92
Blakely Borough	8,400	1.59
Archbald Borough	36,200	6.86
Jefferson Township	18,650	3.53
Wayne County	77,200	14.62
South Canaan Township	32,000	6.06
Lake Township	10,600	2.01
Paupack Township	25,250	4.78
Palmyra Township	9,350	1.77
Pike County	159,950	30.29
Palmyra Township	26,350	4.99
Blooming Grove Township	52,000	9.85
Greene Township	2,800	0.53
Porter Township	47,950	9.08
Lehman Township	30,850	5.84
Monroe County	8,050	1.52
Middle Smithfield Township	8,050	1.52
Totals	533,700	101.08

¹Part of total right-of-way only.

- Route B has the lowest potential to affect soils, vegetation, wildlife, aesthetics, land use, and cultural resources because it would require constructing the least amount of new structures and line where a transmission line does not presently exist (i.e., 8.4 miles north and east of Lackawanna and 13.4 miles parallel to the existing 230 kV line between the Stanton and Lackawanna substations), resulting in fewer new access roads; and significantly less forest land/tree clearing than Routes A or C (approximately 50 percent less).
- Route B traverses 15 miles of Delaware State Forest and 0.5 mile of State Park (Varden Conservation Area), but the line will be located along existing 230 kV line that would be replaced.
- Route B would generally result in the least noticeable change in the visual landscape as the majority of the route would be located on or parallel to existing high voltage transmission lines. Only 8.4 miles of Route B would require construction in areas where no transmission lines currently exist, compared with approximately 33 miles on Route A and 47 miles on Route C.

Overall, Route B will have substantially less impact on the natural and built environment, land use, and citizens of northeast Pennsylvania than the other Alternative Routes considered.

Importantly, PSE&G's route selection process also resulted in the selection of Route B as the Preferred Route for the New Jersey segment of the Susquehanna-Roseland Transmission Line project. After a similar routing process, which included mapping, field visits, development of a potential route network, and subsequent public outreach meetings and agency consultation, PSE&G also concluded that Route B is the best alternative from an environmental, land use, and public perspective.

Furthermore, as discussed in Section 5.10, the overall cost of building the Susquehanna-Roseland 500 kV Transmission Line in Pennsylvania and New Jersey using the Preferred Route (Route B) is substantially less than Alternative Routes A or C.

8.0 Specific Right-of-Way Requirements (PPL)

8.1 Description of Right-of-Way Requirements

PPL Electric's standard right-of-way width for a single circuit 500 kV, or double circuit 500 kV and 230 kV, transmission line is 200 feet. The right-of-way width is determined by structure type, design tensions, span length, and conductor "blowout" (i.e., the distance the wires are moved by crosswind).

Cross-sections illustrations of the right-of-way for each of the five line segments, described below, are included toward the end of this Exhibit C. The aerial maps of the proposed line route (see Exhibit C map pockets, Sheets 1-21) identify the location of the proposed route, the properties that are traversed by the route, and existing and proposed right-of-way widths.

Additionally, a list of all persons or entities owning property within the right-of-way is included in Appendix E-5.

8.2 Description of Right-Of-Way by Segment

The five segments of the proposed Susquehanna-Roseland 500 kV Transmission Line include the following:

- **Segment 1 – Susquehanna Substation to Stanton Substation.** This segment is approximately 29.7 miles long. The existing right-of-way is 200 feet wide. An existing 230 kV transmission line, capable of operation at 500 kV currently, occupies the right-of-way. No new right-of-way is required in this segment, except from PPL Electric’s affiliate company, PPL Susquehanna, LLC. Right-of-way across PPL Susquehanna is required to relocate the beginning of the line from a 230 kV substation to a 500 kV substation. This relocated segment is approximately 0.9 mile long.
- **Segment 2 – Stanton Substation to Lackawanna Substation.** This segment is approximately 13.4 miles long. The existing right-of-way is 325 feet wide. A 230 kV line occupies 150 feet of this right-of-way. The proposed 500 kV line will parallel the existing 230 kV line to the northwest. No additional right-of-way is required in this segment.
- **Segment 3 – Lackawanna Substation to Jefferson Township.** This segment is approximately 8.4 miles long. This is the only segment that does not follow the path of an existing power line. In the late 1960s and early 1970s, a 350-foot-wide right-of-way was acquired for approximately 70 percent of this segment. Negotiations are currently in progress with property owners to secure a 350-foot easement for the remaining 30 percent of this segment. However, if property owners object to the 350-foot wide right-of-way request, PPL Electric will accept the standard 200-foot easement across their property. A portion of the line will pass through State Game Land 300, where a License Agreement from the Pennsylvania Game Commission will be required. PPL Electric may be able to acquire a permanent easement from the Game Commission via a land exchange transaction.
- **Segment 4 – Jefferson Township to Lake Wallenpaupack.** This segment is approximately 19.5 miles long. The existing right-of-way widths for this segment vary from 100 feet in open areas to 200 feet in wooded areas. Both have additional 50-foot building setbacks on both sides for an effective right-of-way width of 200 or 300 feet. An existing 230 kV line occupies this segment. This line will be removed and replaced with a new double circuit line containing the proposed 500 kV line and reestablishing the 230 kV circuit that was removed. Negotiations to convert those 100-foot easements to 200-foot easements are ongoing. To date, PPL Electric has secured 24 of 37 rights-of-way for this segment. Negotiations with the remaining 13 property owners are ongoing.

- Segment 5 – Lake Wallenpaupack to Delaware River. This segment is approximately 29.2 miles long. Like Segment 4, an existing 230 kV line occupies this segment. This line will be removed and replaced with a new double circuit line containing the proposed 500 kV line and reestablishing the 230 kV circuit that was removed. The existing right-of-way for the majority of this segment is 200 feet wide, except for the sections that cross the Delaware Water Gap National Recreation Area (DEWA) and Delaware State Forest properties. In the DEWA, the right-of-way width is mostly undefined, with a 50-foot building restriction on each side of the existing transmission line’s centerline. A few areas defined the right-of-way width to be 100 feet, and the right-of-way width in the area closest to the Delaware River is 325 feet. A Special Use Permit for additional tree cutting and trimming will be required in this area. The section of this segment that passes through the Delaware State Forest under an existing License Agreement with the State Department of Conservation and Natural Resources (DCNR), Bureau of Forestry, allows a 150-foot width for tree cutting and trimming. A new License Agreement that allows 200 feet of cutting and trimming will be negotiated.

In addition to the right-of-way described above, an additional 0.44 mile of 150-foot-wide right-of-way is required from PPL Susquehanna, LLC to construct a single circuit 230 kV line between the existing Susquehanna 230 kV Substation and the T-10 Switchyard.

8.3 Status of Right-of-Way Negotiations

Of the proposed 101.1 miles, approximately 97 miles will utilize rights-of-way for existing lines, or those acquired previously for future use. The proposed Susquehanna-Roseland 500 kV Transmission Line crosses 693 individual property parcels (including undeeded private roadways) using existing rights of way for the majority of the 101.1-mile line. A small amount of additional right-of-way is required from 49 individual property owners to add the additional 500 kV connection at the Susquehanna Substation, fill in the gaps in the future use right-of-way in Segment 3, and widen the existing right-of-way in a few areas of Segments 4 and 5. PPL Electric has acquired easements from 24 of these owners. Negotiations continue with the remaining 25 property owners.

8.4 Corridor Certification

PPL Electric proposes to have a corridor certified in Segment 3 along the preferred route (see Sheets 9 and 10 of the aerial maps in the Exhibit C map pockets). This Corridor Certification will allow for flexibility in determining the centerline of the transmission line as property owner negotiations continue. PPL Electric is currently negotiating with property owners along this segment to secure a 350-foot-wide right-of-way. If this 350-foot-wide right-of-way is unavailable, PPL Electric will secure the standard 200-foot easement, potentially shifting the centerline.

9.0 Aerial Exhibits

A set of 21 “D Size” (i.e., 22 inches by 34 inches) aerial photographs detailing the Preferred Route are included following this section. A guide map “grid” showing each of the 21 drawings is also included to assist the reader in finding a particular area of interest. The aerial photographs show the Preferred Route centerline, edge of right-of-way, property boundaries, and property owners along the right-of-way along with corresponding ID numbers (also see Appendix E-5 for a list of property owners), and various other information required under 52 Pa. Code § 57.72(c)(13)(i).