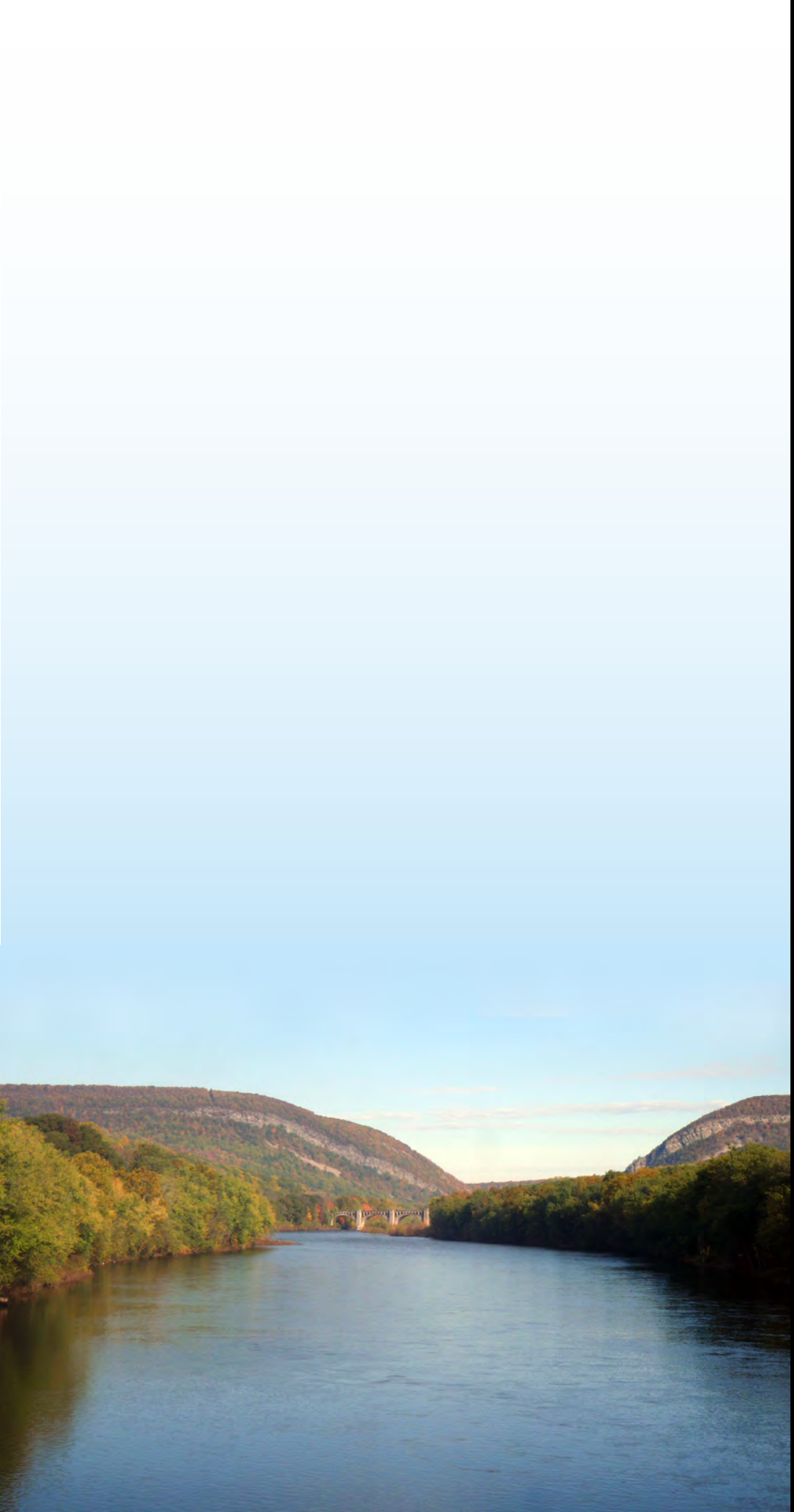


Chapter 2
Alternatives

CHAPTER 2: ALTERNATIVES

INTRODUCTION

This chapter describes the proposed action and alternatives to it. Included is an overview of the transmission system, followed by a description of the alternatives development process and of the elements common to all alternatives. The remainder of the chapter addresses the following: details of the alternatives; alternatives that were eliminated from further study; impacts of the alternatives; the National Park Service (NPS)-preferred alternative; the environmentally preferable alternative; and consistency with sections 101(B) and 102(1) of the National Environmental Policy Act (NEPA).

NEPA requires that federal agencies explore a range of reasonable alternatives and provide an analysis of impacts the alternatives could have on the natural and human environment. "Chapter 4 Environmental Consequences," presents the results of the impact analyses.

The National Environmental Policy Act requires that federal agencies explore a range of reasonable alternatives and provide an analysis of impacts the alternatives could have on the natural and human environment.

Six alternatives are analyzed in this environmental impact statement (EIS). The alternatives under consideration include a no-action alternative, as prescribed by 40 CFR § 1502.14. Under the no-action alternative in this EIS, the Bushkill-to-Kittatinny Line (B-K Line) within the parks would remain in place without expansion or replacement. Five action alternatives for the Susquehanna-to-Roseland Line (S-R Line) were developed based on input and scoping activities conducted with the NPS, the applicant, stakeholders, and the public. The action alternatives were subsequently evaluated and determined to be technically feasible. Detailed design has been completed for alternative 2, the applicant's proposed route, and alternative 2b, the applicant's alternate proposal. A comparable level of planning has not been carried out for alternatives 3 through 5; however, these alternatives have been designed at a conceptual level, which is sufficient for analyzing impacts.

ALTERNATIVES OVERVIEW

Figure 2 presents the alternative routes from the Susquehanna Substation in Pennsylvania to the Roseland Substation in New Jersey. Alternatives 1, 2, and 2b follow the same alignment from Susquehanna to Roseland. Alternative 1 is identified as the no-action alternative. Alternative 2, the applicant's proposed route, is an expansion of the current transmission line with the addition of a second 500-kV line. Alternative 2b is the applicant's alternative route and is a modification of alternative 2. Alternatives 3, 4, and 5 follow routes different than the applicant's two proposed alternatives.

All of the action alternatives described in this section have alignments that would cross at least two units of the national park system and would therefore require NPS permits. Due to the geography of the Appalachian National Scenic Trail (APPA), no action alternative is possible that avoids all park units – any reasonable plan for a transmission line linking the Susquehanna and Roseland substations must cross the Appalachian Trail. The NPS cannot require the applicant to follow a certain route outside the boundaries of park lands; therefore, the portion of the route outside park lands is not discussed in detail in this chapter. Although the applicant could select any route outside of park lands, the NPS identified potential alternatives that could connect the Susquehanna and Roseland substations. These are described in detail in appendix C. The routes described in appendix C were developed by the NPS simply to determine whether construction on a route was possible and does not constitute an attempt to determine

the actual location in areas outside NPS jurisdiction. The NPS is not suggesting or endorsing the route of any alternative beyond its actual crossing of parklands.

The alignments for all alternatives would follow existing transmission or distribution line rights of way across NPS lands.

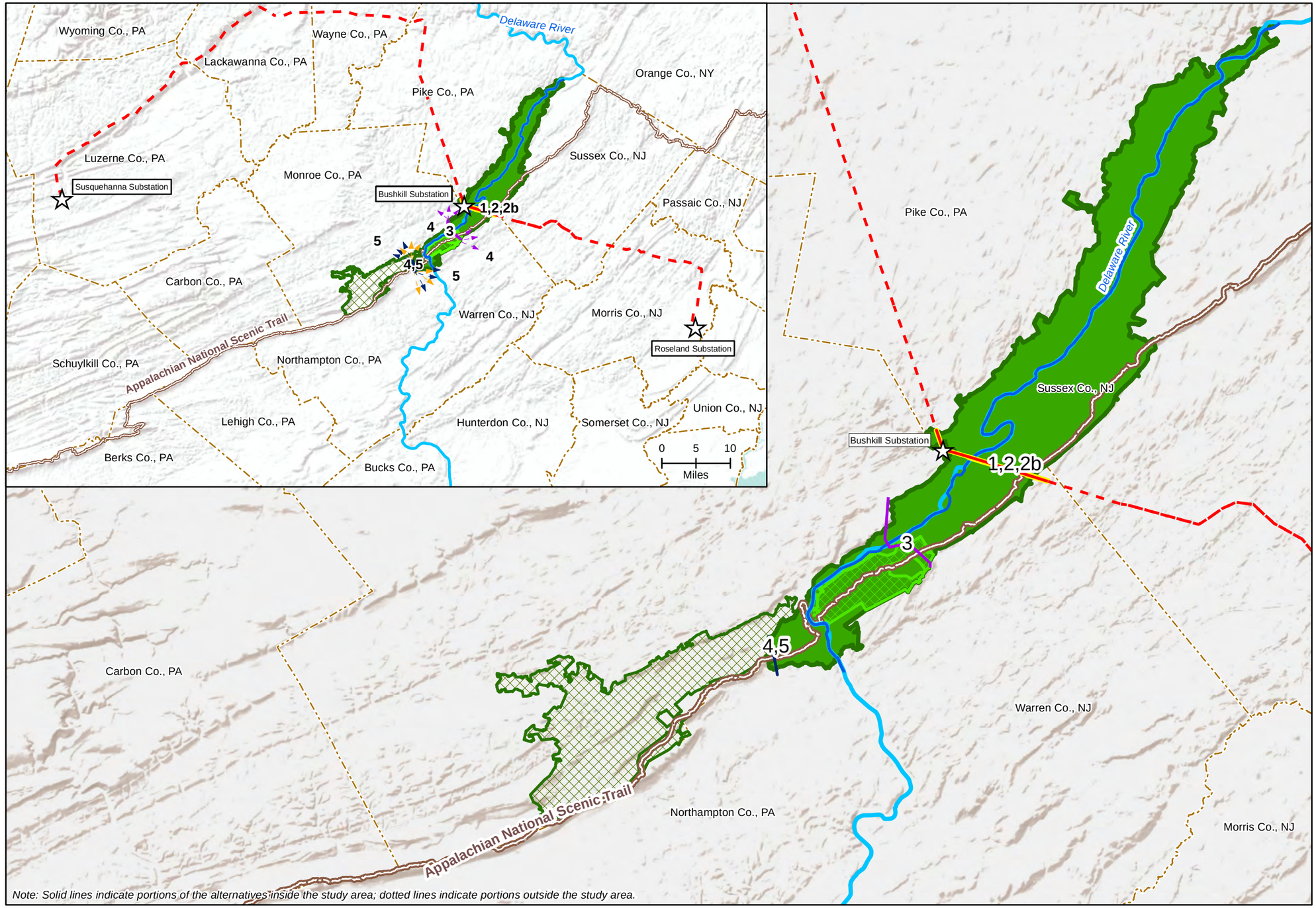
The alignments for all alternatives would follow existing transmission or distribution line right-of-ways (ROWs) across NPS lands. Alternatives 1, 2, 2b, and 3 would cross all three parks; alternatives 4 and 5 would cross Delaware Water Gap National Recreation Area (DEWA) and APPA but not Middle Delaware National Scenic and Recreational River (MDSR). Alternatives 1, 2, and 2b would use the B-K Line alignment across the parks, which would involve crossing approximately 4.3 miles of NPS land through DEWA, while crossing MDSR and APPA. Alternative 3 would traverse a total of 5.4 miles of NPS lands. This alternative would follow the same alignment as alternatives 1, 2, and 2b from the DEWA boundary eastward to the Bushkill Substation, crossing 0.6 mile of NPS lands before leaving NPS lands. The alternative would then reenter the parks and cross a 3.0-mile section, crossing MDSR and APPA within DEWA before again exiting NPS lands. Alternative 3 would then travel along the eastern boundary of DEWA for approximately 1.8 miles, approximately 0.2 mile east of and parallel to APPA. The alignments for alternatives 4 and 5 across the parks are similar to each other, moving through approximately 0.9 mile of NPS lands. Like alternative 3, the alternative 4 alignment would cross the 0.6-mile section of DEWA west of the Bushkill Substation.

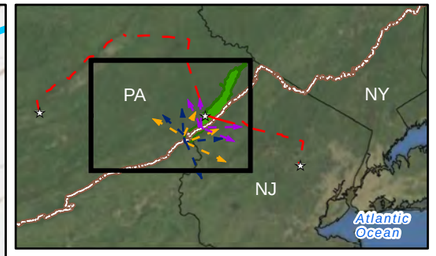
TRANSMISSION SYSTEM OVERVIEW

For the proposed project, power plants would supply electricity, which would flow through transformers and transmission lines to the Susquehanna Substation. From the Susquehanna Substation, electricity would flow through the proposed S-R Line to the Bushkill and Roseland substations to distribution lines, and then finally through the electrical grid to the consumer. Power plants generate three-phase alternating current (AC), which is transmitted through three wires, or conductors. Conductors are usually about an inch in diameter. There is also a smaller shield wire at the top of transmission structures, which is designed to protect the power line from lightning. The proposed double-circuited transmission line structures would carry two transmission lines, each with three conductors (PSC of WI 2010).

The electrical grid consists of two separate infrastructures: the high-voltage transmission system and the lower-voltage distribution system. High-voltage transmission lines, such as those proposed by the applicant, minimize electrical losses and are therefore used to carry electricity hundreds of miles. The Susquehanna, Bushkill, and Roseland substations act as interfaces between the project's transmission lines and the distribution system. The substations use transformers to step down voltages from the higher transmission-system voltages to the lower distribution-system voltages. Transformers located along distribution lines further step down the voltages for household use.

In areas where single-poled structures are preferred, weak or wet soils may require concrete foundations for support. Where a transmission line must change direction, large angle structures or guy wires may be required. Poles with guy wires impact a much larger area because they require foundations where the guy wires are anchored to the ground in addition to the concrete foundation for the structure. Angle structures without guy wires are made of steel and are usually 5 to 6 feet in diameter, more than double the diameter of other steel poles. These structures have a large concrete base, which may be buried 10 or more feet below the ground surface. The diameter of the pole and the depth to which the base is buried depend on the condition of the soils and the voltage of the line (PSC of WI 2010).





Legend

- Substation
- Alternative 1,2
- Alternative 2b
- Alternative 3
- Alternative 4
- Alternative 5
- Appalachian National Scenic Trail
- Middle Delaware National Scenic and Recreational River
- Delaware River
- Delaware Water Gap National Recreation Area
- Worthington State Forest
- CVNWR Boundary
- County Line

Note: Designated boundary of CVNWR is depicted, not all property is owned within the boundary

0 4 8
Miles

Note: Solid lines indicate portions of the alternatives inside the study area; dotted lines indicate portions outside the study area.

Susquehanna to Roseland Transmission Line Proposal and Right-of-Way Request EIS

Figure 2
Alternatives within the Study Area

Source: ESRI Streetmap 2006, Penn State 2010, ESRI ArcGISonline Map Service 2010, PennDOT 2011, NJOIT 2010, USGS 2006, NJ DEP 2008,

Projection: NAD 83 UTM Zone 18N
Date: July 2012

ALTERNATIVES DEVELOPMENT PROCESS

METHODOLOGIES

The NPS-generated alternatives considered in this EIS (alternatives 3 through 5) were identified based on the resource goals and objectives described in chapter 1, results of the alternatives workshops conducted with NPS staff, applicant representatives, and public comments received during both the scoping period and alternatives workshops comment period. Using the criteria established, such as the design considerations described below and described publicly by the applicant, transmission line engineers under contract to the NPS developed alternatives 3 through 5 primarily by identifying existing linear corridors, via aerial satellite imagery, that could support the proposed 500-kV transmission lines. Existing corridors included electrical transmission lines, an underground pipeline, highways, and a railway.

The transmission engineers, as contracted by the NPS, first identified possible alternate routes through the parks, such as existing transmission lines, where the S-R Line could be co-aligned with the existing line. No new crossings through the parks were identified because new crossings are not compatible with NPS mandates; the NPS would only grant permits for one crossing by the applicant. After exhausting possibilities within DEWA, options were sought that would cross APPA outside the boundaries of DEWA. In all cases, options that would cross APPA at a perpendicular angle were preferred to those that paralleled the trail, to minimize impacts on trail visitors.

Potential routes were then refined by applying clearance distances defined by the National Electric Safety Code (NESC) to avoid sensitive areas, including residences, schools, businesses, and other protected resources, such as public lands. Adopted by law by the majority of states and public service commissions across the United States, NESC is a performance code that defines safeguards from hazards arising from the installation, operation, or maintenance of conductors and equipment in electrical supply stations and overhead and underground electrical supply and communication lines. NESC includes work rules for the construction, maintenance, and operation of electrical supply and communication lines and equipment. The standard is applicable to the systems and equipment operated by utilities; therefore, NESC guidelines were used to minimize impacts of new alternatives on landowners outside NPS boundaries. As a result, transmission engineers identified subalternatives for each alternative, which provided secondary options to a primary route.

These efforts resulted in identification of primary alternatives, each of which included multiple subalternatives. The alternatives and subalternatives were extensively discussed and reviewed during the alternatives workshop conducted on site during May 2010 and are described in more detail below. During this time, transmission engineers visited all the proposed alternative sites where the potential routes would cross DEWA, MDSR, and APPA, photographed the crossing locations, and noted the condition of the existing corridors.

Once the alternatives were developed, visual split locations (VSLs) were determined by the parks. Outside the boundaries of the parks, the applicant exercises its own discretion to determine the route of the line, independent of any NPS permit or other action. The geographical point outside the parks at which it becomes physically possible for the applicant to route the line as it sees fit is called a VSL point, a term created by NPS to describe this point in this EIS. For most resources, the study area for an alternative is defined as the area between the VSLs for that alternative. However, it is important to note that for some resources, the size of the study area may vary depending on the resource being discussed. For example, the study area that would be considered for landscape connectivity or visual impacts of an alternative may not be the same area that would be considered for another resource, such as geologic resources or vegetation, due to the area impacted for that resource.

The determination of the VSLs is important because while NPS can require the applicant to follow a specific route inside the VSLs, the NPS cannot require the applicant to follow a certain route beyond these points. Therefore the applicant and state authorities would ultimately be responsible for the line routing from the Susquehanna Substation to the Roseland Substation, excluding where it crosses DEWA, MDSR, and APPA inside the VSLs. The NPS looked at corridors outside the VSLs only to determine whether a route could be found from the line's endpoints (Susquehanna and Roseland substations) to each crossing. This should not be interpreted as endorsing or recommending any route outside the park boundaries or being able to determine whether this possible route would be the one used by the applicant.

Alternatives 3 and 4 reenter and cross NPS lands outside the VSLs (figure 2). Secondary VSLs were assigned to these sections and they are included in the study area. Thus, all impacts on resources within the parks will be fully analyzed.

CRITERIA

The following route selection criteria were used to select and analyze potential routes:

- Minimize crossing of designated natural resource lands such as state forests, national and state parks, wildlife management areas, designated gamelands, wildlife areas, and conservation areas.
- Avoid new crossings of large lakes.
- Minimize impacts on the natural and human environment.
- Maximize the use or paralleling of existing, cleared power line ROWs.
- When not following existing ROWs, maximize the distances from residences, schools, cemeteries, historical resources, recreation sites, and other important cultural sites.
- Minimize the removal of existing residences, barns, garages, and other structures.
- Minimize route length, circuitry, and cost.

ALTERNATIVES WORKSHOPS

NPS staff conducted an internal alternatives workshop May 4–7, 2010, to discuss the feasibility of potential alternatives. All alternatives proposed by the applicant and the NPS were evaluated based on the potential impacts on resources and residents. The alternatives dismissed as a result of the internal alternatives workshop are discussed in detail in the "Alternatives Eliminated from Further Study" section of this chapter.

Seven alternatives, including the no-action alternative, were retained and presented to the public at the public alternatives meetings August 17–19, 2010. Comments received at the meetings and during the public comment period were compiled in a comment analysis report, which was made available to the public in November 2010 and can be found on the NPS Planning, Environment, and Public Comment (PEPC) website (NPS 2010f [http://parkplanning.nps.gov/]). An additional internal meeting was held on November 5, 2010, to discuss the comments. The NPS concluded that no comments had been submitted that would cause any of the action alternatives to be eliminated or new alternatives to be added; therefore, the no-action alternative (alternative 1) and action alternatives 2 through 7 were retained for analysis in this EIS. During analysis of the alternatives in preparing this EIS, the NPS determined that action alternatives 6 and 7 would be dismissed based on the criteria previously listed. The rationale for dismissal of these two alternatives is presented in the "Alternatives Eliminated from Further Study" section of this chapter.

DEVELOPMENT OF THE APPLICANT'S ALTERNATE PROPOSAL

During the development of alternatives, the applicant examined the possibility of constructing the proposed line within their existing ROW for the B-K Line (alternative 2b), a variant of the applicant's proposal. The NPS conducted a preliminary examination of the applicant's property rights and determined that the easements for the existing ROW range from 100 feet to 380 feet. The NPS expressed concern about the feasibility of constructing the proposed line within a 100-foot ROW. The 100-foot-wide portion of the ROW is in Pennsylvania and extends approximately 0.8 mile.

Discussions between the applicant and the NPS over an 8-month period resulted in a difference of opinion on this issue. During public review of the proposed alternatives, the applicant formally requested that the NPS include alternative 2b in its analysis. In a letter dated August 26, 2010, the applicant stated that the proposed double 500-kV transmission line could be safely constructed within their existing ROW. Constructing within the existing easement rights would eliminate the applicant's need for a ROW permit. The NPS agreed to add the analysis of alternative 2b, the applicant's alternate proposal, to the EIS. Correspondence regarding the development of alternative 2b is presented in appendix D.

DESCRIPTION OF THE ALTERNATIVES

This section describes the portions of the alternatives within the study area. Table 2 presents the general elements of the alternatives, and table 3 presents the construction-specific elements of the alternatives. Outside the study area, the NPS cannot require the applicant to follow a certain route; therefore, that portion of the route is not described in detail in this chapter. The alternatives, as developed for this EIS, have been created based on the methodologies and criteria described previously. Possible scenarios for routes for the alternatives for those segments outside NPS jurisdiction are described in appendix C. They are not prescribed or endorsed by the NPS. Their only purpose is to determine the feasibility of the crossings being analyzed in this EIS.

ALTERNATIVE 1: NO ACTION

Under the no-action alternative, the NPS would deny the special use and construction permits to expand the B-K Line to a new double-circuit line through NPS lands.

Under the no-action alternative, the NPS would deny the applications for ROW and construction permits to expand the B-K Line to a new double-circuit line through NPS lands. The existing B-K Line traverses approximately 4.3 miles of DEWA. The line initiates at the Susquehanna Substation and enters DEWA in Pennsylvania approximately 0.25 mile east of Big Bushkill Creek. The line then exits the park, connects to the Bushkill Substation, travels through developed areas, including Fernwood Golf Course, and reenters DEWA south of the South Zone Ranger Station and north of DEWA Headquarters, crossing MDSR just north of Depew Island. The line continues southeast past the Watergate Recreation Site and across APPA to the eastern DEWA boundary. There are 22 existing transmission towers located within DEWA boundaries for the existing B-K Line, and there are no existing access roads to the ROW.

This alternative assumes that the existing line within the parks would remain in place without expansion or replacement. In essence, it assumes that current conditions on the ground will continue indefinitely into the future. However, the applicant could seek to expand or replace the existing utility lines within the existing easements through the parks. There are no proposals to do so at this time.

Subject to the foregoing qualification, however, the no-action alternative assumes the following:

- No additional ROW would be granted to the applicant.
- No additional transmission lines or increased voltage would be added.
- No new construction activity would take place; therefore, activities would only include operation and maintenance of the existing line.
- The existing towers would remain in place.

This action would have no effect on the existing transmission line outside NPS property. Though future construction could potentially occur within the existing ROW, for the purposes of the analysis, this alternative assumes that current conditions continue into the future and that no further construction occurs beyond the existing transmission line.

ELEMENTS COMMON TO ALL ACTION ALTERNATIVES

The application is for replacement of the B-K Line with a new line, initially energized at 230 kV but built to carry 500 kV, co-located with a new 500-kV line connecting the Susquehanna and Roseland substations (PPL and PSE&G 2008). Action alternatives 2 through 5 have many common elements related to the construction of the S-R Line. All alternatives would include a double-circuit 500-kV transmission line (consisting of new towers and conductors) and associated telecommunications infrastructure. Two static lightning and communications fiber lines would be installed on top of the structures; these lines, respectively, would protect the transmission lines from electrical interruptions and would serve as a communication link between existing substations. This telecommunications infrastructure would not be highly visible, and would not include cell towers. Telecommunications infrastructure would only be used for electrical transmission purposes and would not be sold to a third party.

The application is for replacement of the B-K Line with a new line, initially energized at 230 kV but built to carry 500 kV, co-located with a new 500-kV line connecting the Susquehanna and Roseland substations (PPL and PSE&G 2008).

Each alternative would be built in accordance with the relevant codes (e.g., NESC Uniform Building Code). In addition, all alternatives would comply with the Avian Power Line Interaction Committee (APLIC) *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* (APLIC 2006) or subsequent updates. The APLIC standards are described in the "Mitigation and Compensation Measures" section later in this chapter.

Removal and Disposal of Existing Structures

Removal of the B-K Line under alternatives 3, 4, and 5 is a mitigation measure proposed by the NPS. If one of these alternatives were chosen, the NPS would be granting construction and ROW permits to the applicant. Because the NPS would not allow two crossings for the applicant's transmission lines, the NPS would require that the applicant surrender the rights to the existing ROW between the Bushkill Substation and the eastern boundary of DEWA. The NPS would permit the relocation of the B-K Line to a replacement setting co-located with the S-R Line within areas under NPS jurisdiction. Additionally, the NPS would develop one consistent and uniform deeded ROW for the applicant at the crossing selected.

TABLE 2: ELEMENTS OF THE ALTERNATIVES

Alternative Element	Alternative 1	Alternative 2	Alternative 2b	Alternative 3	Alternative 4	Alternative 5
Route description inside the study area	The NPS would deny the special use and construction permits to expand the B-K Line and construct a new double 500-kV line through NPS lands. The alternative assumes the following: • No additional ROW would be granted to applicant. • No additional lines or increased voltage would be added. • No new construction activity would take place; therefore, there would not be any construction activities or tree/vegetation removal, only maintenance of existing line. • The existing towers would remain in place. • The ROW would remain a noncritical element of the electrical transmission grid.	The alternative 2 alignment would cross a total of 4.3 miles of NPS lands. The route would enter DEWA from Pennsylvania approximately 0.25 mile east of Big Bushkill Creek. The alignment would exit the park, travel through a developed area including Fernwood Golf Course, and reenter DEWA south of the South Zone Ranger Station and north of DEWA Headquarters, crossing MDSR just north of Depew Island. The route would continue southeast past the Watergate Recreation Site and across APPA to the eastern DEWA boundary.	The alignment is the same as alternative 2 with the exception of two additional towers in the study area to carry the line through a 100-ft ROW section.	The alternative 3 alignment would cross a total of 5.4 miles of NPS lands. In Pennsylvania, the primary VSL is located in Monroe County outside DEWA boundaries. On the west side of the MDSR, the route would cross River Road and the McDade Trail about 1.0 mile south of the Smithfield Beach Picnic Area and 0.75 mile north of the Hialeah Picnic Area. The route would cross approximately 1.7 miles of Worthington State Forest; the alignment would perpendicularly cross APPA within Worthington State Forest and MDSR within DEWA. The alternative 3 alignment would also cross 0.6 mile of the park west of US Route 209 along the B-K Line ROW from the Bushkill Substation to the Susquehanna Substation. The alignment would parallel APPA for approximately 1.8 miles in New Jersey.	The alternative 4 alignment would cross a total of 1.5 miles of NPS lands. Inside the primary VSLs, upon entering DEWA, the alternative 4 alignment would cross about 0.9 mile of DEWA land near its southern extent, roughly following the DEWA boundary, and would perpendicularly cross APPA near Totts Gap Road. The alternative 4 alignment would also cross 0.6 mile of the park west of US Route 209 along the B-K Line ROW from the Bushkill Substation to the Susquehanna Substation. This alignment would not cross MDSR.	The alternative 5 alignment would cross a total of 0.9 mile of NPS lands. Inside the primary VSLs, upon entering DEWA, the alternative 5 alignment would cross about 0.9 mile of DEWA land near its southern extent, roughly following the DEWA boundary, and would perpendicularly cross APPA near Totts Gap Road. This alignment would not cross MDSR.
Total ROW expansion	None	50–200 feet	None	50–200 feet	100–200 feet	100–200 feet
New crossing at APPA?	No	No	No	No	No	No
New crossing at MDSR?	No	No	No	No	No	No
Total conductor capacity	230 kV	2 new 500 kV	2 new 500 kV	Existing plus 2 new 500 kV	Existing plus 2 new 500 kV	Existing plus 2 new 500 kV
Removal of B-K Line from the Bushkill Substation to the eastern boundary of DEWA	No	No, but existing infrastructure would in fact be removed and replaced by the new proposed double 500-kV towers	No, but existing infrastructure would in fact be removed and replaced by the new proposed double 500-kV towers	Yes	Yes	Yes
Construction schedule	N/A	approximately 8 months	approximately 8 months	<8 months	<8 months	<8 months
Construction cost	N/A	$2.17 billion	$2.17 billion	$2.22 billion	$2.36 billion	$1.42 billion
Additional staffing needs for the NPS	Same as current	2–3 new DEWA/MDSR staff members	2–3 new DEWA/MDSR staff members	2–3 new DEWA/MDSR staff members	1 new DEWA/MDSR staff member	1 new DEWA/MDSR staff member

N/A = not applicable.

TABLE 3: DESCRIPTION AND NUMBERS OF CONSTRUCTION ELEMENTS OF THE ALTERNATIVES

Construction Element	Description	Alternative 1	Alternative 2	Alternative 2b	Alternative 3	Alternative 4	Alternative 5
Total miles[a]	N/A	147 miles	147 miles	147 miles	157 miles	162 miles	110 miles
Miles within the study area	N/A	5.6 miles, 4.3 miles of which would be on NPS lands	5.6 miles, 4.3 miles of which would be on NPS lands	5.6 miles, 4.3 miles of which would be on NPS lands	6.9 miles, 5.4 miles of which would be on NPS lands	2.3 miles, 1.5 miles of which would be on NPS lands	1.7 miles, 0.9 mile of which would be on NPS lands
Numbers of towers and tower foundations inside the study area	**Typically, the foundation depth will range between 15 and 30 feet with a diameter of 6 to 9 feet.** *6 new towers/tower foundations per mile.*	N/A	26	28	43[d]	16	10
Crane pads inside the study area	**Crane pads would be 100 feet × 100 feet, and would be used to set up a crane to erect the structures.** *Crane pads would be required at each tower location.*	N/A	23	25	43	16	10
Wire pulls inside the study area[b]	*Wire pulling locations would be 200 feet × 200 feet and placed approximately every mile along the ROW.*	N/A	5–6	5–6	7	2–3	1–2
Pulling and splicing sites inside the study area	*On average, pulling and splicing equipment setups require an area of 400 feet × 600 feet outside the ROW where angles occur; two sites are needed per angle.*	N/A	2	2	9	5	5
Staging area for the entire line[a]	**Staging of all equipment and material for work in DEWA would be located on the currently cleared ROW.**[c]	N/A	70 acres	70 acres	50 acres	50 acres	50 acres
Access roads inside the study area	**Access roads would be 20 feet wide during construction and would be reduced to and maintained at 15 feet after construction. The 15-foot-wide access roads would be permanent.**	N/A	Total: 5.3 miles Inside ROW: 3.4 miles Outside ROW: 1.9 miles **Construction phase** Total: 12.8 acres Inside ROW: 8.3 acres Outside ROW: 4.5 acres **Postconstruction phase** Total: 9.6 acres Inside ROW: 6.2 acres Outside ROW: 3.4 acres Time to return to present conditions: 50 years or perhaps never	Total: 5.3 miles Inside ROW: 2.7 miles Outside ROW: 2.6 miles **Construction Phase** Total: 12.8 acres Inside ROW: 6.5 acres Outside ROW: 6.3 acres **Postconstruction Phase** Total: 9.6 acres Inside ROW: 4.9 acres Outside ROW: 4.7 acres Time to return to present conditions: 50 years or perhaps never	Total: 3.5 miles Inside ROW: 2.6 miles Outside ROW: 0.9 mile **Construction phase** Total: 8.5 acres Inside ROW: 6.3 acres Outside ROW: 2.2 acres **Postconstruction phase** Total: 6.4 acres Inside ROW: 4.7 acres Outside ROW: 1.6 acres Time to return to present conditions: 50 years or perhaps never	Total: 1.6 miles Inside ROW: 1.1 miles Outside ROW: 0.5 mile **Construction phase** Total: 3.9 acres Inside ROW: 2.7 acres Outside ROW: 1.2 acres **Postconstruction phase** Total: 2.9 acres Inside ROW: 2.0 acres Outside ROW: 0.9 acre Time to return to present conditions: 50 years or perhaps never	Total: 0.94 mile Inside ROW: 0.78 mile Outside ROW: 0.16 mile **Construction phase** Total: 2.3 acres Inside ROW: 1.9 acres Outside ROW: 0.4 acre **Postconstruction phase** Total: 1.7 acres Inside ROW: 1.4 acres Outside ROW: 0.3 acre Time to return to present conditions: 50 years or perhaps never

Note: Items in **bold** are conditions presented in the applicant's proposed plan (PPL and PSE&G 2008). Items in *italics* are presented in this chapter. These elements were provided where details were absent from the applicant's proposed plan (PPL and PSE&G 2008) and were based on industry standards.

N/A = not applicable.

a. Total mileage and staging areas of the alternatives are used for comparison only. The data presented in this table represent the alternatives as plotted for this EIS. The NPS cannot require the applicant to follow a certain route; therefore, the length of the alternatives cannot be determined.

b. The number of wire pulls was estimated based on the assumption that helicopters would not be used to string the conductor. This presents the most conservative estimate; however, impacts would be reduced if helicopters were used for stringing the conductors.

c. The applicant's proposed plan states that all equipment and materials would be staged within the currently cleared ROW. The NPS does not agree. Where staging areas extend beyond the cleared ROW, the NPS would require the applicant to construct the staging areas outside NPS lands.

d. Although 43 towers are proposed for alternative 3, some of these towers, while in the study area, would not be on NPS land.

Construction of alternatives 2 and 2b and restoration of habitat along the B-K Line for alternatives 3, 4, and 5 would require removal of existing structures in the B-K Line ROW between the Bushkill Substation and the eastern boundary of DEWA. Foundations would remain in place below ground level to avoid additional ground disturbance. Above ground level, foundations would be mechanically chipped and removed and the area would be backfilled, allowing the applicant to revegetate the area.

For alternatives 3, 4, and 5, structures for the power lines that currently exist on each of these routes would be removed to allow the applicant to safely site and construct new lines in the expanded ROW. Existing lines removed prior to construction would be replaced with new lines during construction of the proposed S-R Line. Replacement power lines would be placed on new structures separate from but parallel to the new structures for the S-R Line within the expanded ROW along the alternative alignments.

Removal of existing lines for all action alternatives would require the following:

- **Spur roads**: Existing vegetation would be cleared to permit the construction of spur roads to allow equipment access. Spur roads are temporary construction roads used to access towers; stringing, tensioning, and staging areas; and splicing sites. These spur roads are different than the access roads used for maintenance, which are discussed in the "Project Construction" section in this chapter. Spur roads would be 20 feet wide and would be surfaced with compacted dirt or gravel. The applicant would need lands beyond the ROW for construction of spur roads outside the transmission line ROW. The location of these roads outside the ROW would require NPS approval. The applicant would be responsible for the restoration of these spur roads immediately following the conclusion of removal activities. However, based on the time taken to reach those existing conditions since the creation of DEWA in 1965, return to existing conditions could take more than 50 years or perhaps complete restoration would never occur.
- **Grading activities**: Grading would occur to backfill over the existing tower foundations, which would be left in place after aboveground structure removal, to create a natural cover. Grading would also occur to backfill disturbance caused by the removal of towers, counterpoises, and ground wires. A counterpoise is a conductor or system of conductors arranged beneath the line; located on, above, or (most frequently) below the surface of the earth; and connected to the grounding systems of the towers or poles supporting the transmission lines (Institute of Electrical and Electronics Engineers Standard 100).
- **Crane pads**: Crane pads would be constructed to provide a safe, level pad for large cranes to mobilize, set outriggers, and aid in the removal of transmission line towers. Crane pads must be large enough to safely level and set outriggers for stability; a typical crane pad is 200 feet by 200 feet, placed 60 feet from the centerline of the ROW. The applicant would be responsible for leveling and revegetating the crane pad site after the crane pad is removed.
- **Wire pulling locations**: At wire pulling locations, all grounding, counterpoises, anchors, and associated equipment listed under "Construction Equipment," below, would be removed. Wire pulling locations would be 200 feet by 200 feet and placed approximately every 2.8 miles along the ROW. The applicant would cut the old conductors in short lengths and remove them with minimal damage to the ground. The wire pulling locations would be used for coiling the sections of conductors after they have been cut.
- **Breakaway reels**: Breakaway reels would be used to coil, remove, and store the decommissioned conductors.
- **Steel removal**: Lattice towers would be disassembled at each tower location in sections and placed on a tractor-trailer or hoisted by an air crane and shipped to a staging area for eventual recycling.

- **Conductor disposal**: The conductors would be transported to a material and equipment yard where they would be prepared for recycling.
- **Helicopter use**: Helicopters may be used to remove towers in three to four sections, depending on the size and weight of the towers. Additional permits could be required governing aircraft use.

Recyclable or salvageable items would be processed into roll-off boxes. Salvageable items (i.e., conductor, steel, and hardware) would be received, sorted, baled off site, and then sold on the open market. Items to be recycled include 100% of the steel from lattice steel towers (i.e., towers, nuts, bolts, and washers), conductor wire (i.e., all 4/0 copper, 336 ACSR [aluminum conductor steel reinforced] overhead wire), and hardware (e.g., shackles, clevises, yoke plates, links, and other connectors used to support conductor).

Vegetation Clearing

All action alternatives would require clearing vegetation inside the ROW. Within the ROW, low-impact tree clearing is the preferred method. Low-impact tree clearing involves directional tree felling, both mechanically and by hand. A professionally created harvesting contract would provide specific regulations for clearing, which would aid in protection of cultural resources, wetland and stream areas, and overall residual quality of the site. A professional forester would be hired to oversee the project. Tree-clearing contractors experienced in low-impact tree clearing would be used. Equipment used would include forwarders, feller bunchers, cable and grapple skidders, high-flotation tires, portable bridges, and temporary culverts. Skidding of trees along the ground would be limited to areas with low erosion potential, and a forwarder would be used in sensitive soil conditions. Days of operation would be limited to those days with suitable ground conditions. Additionally, trees would be cut close to the ground, and stumps and root systems would be left in place to provide additional soil stability. A 50-foot buffer would be used near intermittent streams and wetlands and a 100-foot buffer near perennial streams. All vegetation would be removed from access roads and in work areas (wire pulling locations, vegetation disposal areas, and structure erection areas).

Clearing would be selective, and efforts to preserve native or compatible species would be made to the greatest extent possible. Species of trees recognized as being fast-growing species would be cut to ground level. Additionally, trees within the ROW that would violate the wire security zone either would be removed or would be pruned to create additional space for growth until scheduled maintenance. Cleared salable timber would be removed from the ROW and placed in neat piles at an NPS-designated site to be determined before construction. Timber would be the property of the United States. Other timber would be placed in tree-length piles away from preserved compatible vegetation. These piles would not be placed on access roads, streams, or trails, or in areas where piles would be highly visible from an improved road. Interspersed with these timber piles, slash piles would be stacked in flattened mounds on the edge of the ROW. Slash piles would also not be built where highly visible from improved roads or other locations with high visibility. Slash piles would not be placed near tower or pole sites. Cleared vegetation could also be chipped and scattered on the ROW. The NPS would not allow vegetation burning within the boundaries of the parks. Additionally, no vegetation disposal would occur within known or suspected wetland areas, and all timber piles, slash piles, and other cleared vegetation would be hauled away from APPA.

Project Construction

Proposed Transmission Facilities

Each action alternative includes construction of one new double-circuit 500-kV transmission line across NPS lands. The S-R Line would be a three-phase, double-circuit, three-bundled 1594 ACSR facility (each of the three-phase circuits consists of three 1594 ACSR conductors connected together). One circuit would operate at 500 kV, and the second circuit would initially operate at 230 kV, with capacity for future energizing to 500 kV. Construction of the new 500-kV towers, including civil work, steel assembly, and erection, would be completed in four steps, as defined below.

Step 1: Access Road Creation: Where necessary, access roads would be created for access to the ROW. Access roads would initially be 20 feet wide to accommodate large construction vehicles. Following construction, access roads would be narrowed to 15 feet wide and would continue to be used for maintenance and vegetation management for the line. Access roads would be composed of gravel or compacted dirt. The lengths of access roads would range from approximately 0.9 to 5.4 miles, depending on the alternative. Wetlands and water crossings by access roads have been avoided to the extent possible. If additional access or spur roads are required beyond those analyzed in this final EIS, the roads will have to be constructed so as to avoid wetlands and water crossings. Access roads are depicted on alternative maps as appropriate.

The applicant would need additional rights beyond the ROW for construction of access roads outside the transmission line ROW. Locations of these roads outside the ROW would require NPS approval. The applicant would be responsible for the long-term maintenance of access roads and the restoration of spur roads immediately following the conclusion of construction activities until existing conditions are restored. Restoration of spur roads would include removing all gravel, disposing of geotextile fabric, and seeding the area with an NPS-approved conservation seed mix.

Step 2: Creation of Level Pads for Crane Pads: Crane pads would be used for assembly and erection at each new tower location. Crane pad size and placement are discussed in the "Removal and Disposal of Existing Structures" section of this chapter.

Crane pad sites would be graded or cleared to provide a reasonably level pad free of any vegetation that could hinder tower construction. Some tower sites would require grading either to widen the pads from the existing structures or to create new pads, while other sites would be on relatively level areas that would only require some vegetation removal. At locations with steep topography, extensive excavation may be required to create a level pad. The graded pad would be capable of supporting heavy vehicular traffic.

Step 3: Foundation Construction: The types of towers that would be used in the construction of the S-R Line would be determined during planning. New towers would be constructed on a concrete foundation. Foundation dimensions would depend on topography, tower height, span length, and soil properties; however, tower foundations would generally extend below grade for 15 to 30 feet or more, with a diameter of 6 to 9 feet. On average, a typical concrete foundation would extend approximately 3 feet above ground level.

In response to public comment, the NPS has altered the method by which the applicant would be allowed to install tower foundations. The draft EIS stated that foundations would be installed using a combination of blasting and drilling. Because the impacts from blasting are largely unknown, the applicant would be limited to drilling to excavate to the depth needed for the tower foundations. In order to install tower foundations, extensive drilling of overburden soil and underlying rock would occur. A drill rig with a

coring auger would be used to advance a borehole into the ground, followed by periodic removal of the cored materials until the terminal depth is reached. Reinforcement steel and anchor bolts would be installed inside the borehole and the hole would be filled with concrete. Prior to any drilling along the proposed ROW, a drilling work plan will be prepared and submitted to the NPS for review and approval.

At the time of construction, elevations would be established, rebar cages set, spur angles and concrete placed, and survey positioning verified. Concrete samples would be drawn at the time of pour and tested to ensure that specified strengths would be achieved.

Step 4: Steel Work for Tower Construction: Several tractors with 40-foot floats (or open-bed trailers) and an on-site loader would haul and stack bundles of steel at each tower location. A combined erection and torqueing crew with a lattice boom crane would perform the steel work for lattice towers, which would include assembly of leg extensions, body panels, boxed sections, and bridges. During the steel work, the construction crew may opt to install insulators and wire rollers.

The analysis assumes monopole towers would be used except in locations where it is not possible. For dead-end and tangent towers, if monopoles are feasible, they will be used. If monopoles are not feasible for these structures, it may be necessary to use lattice towers. The following specifications would apply to both lattice and tubular steel towers:

- six new tower structures per mile
- 195 feet tall
- 1,200-foot ruling span
- 1,800-foot weight span

The following additional information is specific to tubular steel towers:

- single-, double-, and triple-shafted, tapered tubular core consisting of 10 steel structures hermetically sealed with davit and cross arms
- up to 7 feet in diameter
- steel single-shafted tangent towers
- steel single-shafted dead-end (terminating) towers

Helicopters could be used in the construction of the S-R Line; however, helicopters can only be used for construction of lattice towers, because monopole towers are too heavy. Helicopters are often used for tower installation to eliminate the land disturbance associated with crane pads, structure laydown areas, and damage from heavy truck use. If helicopters were to be used for tower erection, methods would be similar to those detailed in Institute of Electrical and Electronics Engineers Standard 951-1996, *Guide to the Assembly and Erection of Metal Transmission Structures*, section 9, "Helicopter Methods of Construction." Helicopters can also be used to string the conductor; this process is described below.

The operations area of the helicopters would be limited to helicopter staging areas and positions along the ROW that have previously been disturbed for other purposes and are considered safe locations for landing. Support trips may also be required to transport material and workers to the material and equipment staging areas. Staging areas would be located as close as possible to the operation area, and would be sited through a screening process involving the helicopter contractor, private landowners, and land management agencies. The NPS would require that any staging areas that would extend beyond the currently cleared ROW be sited outside the boundaries of the parks. Staging areas are discussed in detail

below. Helicopter fueling would occur at staging areas or at a local airport using the helicopter contractor's fuel truck and would be supervised by the helicopter fuel service provider. The helicopters and fuel truck would remain overnight at a local airport or at a staging area if adequate security is in place. Safety plans meeting all OSHA standards would be required. It is not anticipated that helicopters would be parked overnight on NPS lands. The applicant's proposed plan states that all equipment and materials would be staged within the currently cleared B-K Line ROW (PPL and PSE&G 2008, 11). The NPS has concerns that this would be inadequate, especially where the staging areas would be used by helicopters. If staging areas extend beyond the currently cleared ROW, the NPS would require that the applicant construct these staging areas outside NPS lands. During helicopter operations, public access would be restricted. Temporary river, trail, and road closures, traffic detours, and posted notices and signs would be used to block public access to restricted areas. NPS review and approval of aviation plans would be required.

For the impact analysis of the action alternatives in this EIS, it is assumed that helicopters could be used for conductor stringing but would not be used for tower construction.

Wire Installation

Wire installation includes all activities associated with the installation of conductor wire onto the new towers, such as the installation of primary conductor and ground wire, vibration dampeners, weights, spacers, and suspension and dead-end hardware assemblies. Insulators and wire rollers either would be attached as part of the wire-stringing activity or would be attached during the steel erection process.

Any continuous wire installation process between two selected points along a transmission line is termed a "wire pull." Wire pulling locations would be selected based on availability of dead-end towers at the ends of each pull and on the geometry of the line; locations are affected by inflection points, terrain, and suitability of pulling and splicing equipment setups. Wire pulling locations generally occur every 2.8 miles on flat terrain and every 1.7 miles on mountainous terrain and would be 200 feet by 200 feet. For each wire pull, a puller would be positioned at one end, while a tensioner and wire reel stand truck would be positioned at the other. Specialized support equipment such as skidders and wire crimping equipment would be strategically positioned to support the operations.

Wire-stringing activities would be conducted as described in Institute of Electrical and Electronics Engineers Standard 524-1992, *Guide to the Installation of Overhead Transmission Line Conductors*. A standard wire-stringing plan would include a sequenced program of events, beginning with determination of wire pulls and wire pull equipment setup positions. Advance planning would determine circuit outages, pulling times, and safety protocols required to ensure that safe and quick installation of wire is accomplished.

The following steps describe the proposed wire installation activities:

Step 1: Threading: A helicopter would fly a sock line (a small lightweight cable) from tower to tower, which would pull a pilot line (heavier cable) through all the structures and into the tensioner, which would pull the conductor through.

Step 2: Pulling: The pilot line would be attached to the conductor using a special swivel joint to prevent damage to the wire and to allow the wire to rotate freely, which would prevent complications from twisting as the conductor unwinds from the reel.

Step 3: Clipping In: Conductor clamps would be installed to feed the conductor into the roller properly, completing the wire installation phase.

Step 4: Spacers: Spacers would be used to mitigate the potential for code clearance issues or for conductors to touch or flash over and cause an outage. Spacers would be attached between the bundled conductors of each phase. For this purpose, a lineman would ride a small spacer cart between the wires, periodically stopping to attach the spacers.

Pulling and Splicing Sites

New pulling and splicing sites would be needed for each action alternative. For stringing equipment that cannot be positioned at either side of a dead-end transmission tower, anchoring and dead-end hardware would be temporarily installed to sag conductor wire to the correct tension. The pulling and splicing setup locations would be sited where existing spur roads or level pads are available, either near or between the existing towers. A few locations may require minor grading and vegetation removal. The setup locations would be used to remove temporary pulling splices and install permanent splices once the conductor is strung through the rollers located on each tower. This step is necessary because the permanent splices that join the conductor together cannot travel through the rollers. These areas would be restored following construction.

A typical pulling and splicing location would be 400 feet by 600 feet and would be located and positioned for inline cable pulling.

Construction Staging

Construction of transmission facilities would also consist of the establishment of staging yards for construction materials and equipment, completion of any roadwork, and removal of the B-K Line that currently crosses the parks. Staging yards for materials and equipment would be approximately 3 to 4 acres each. Efforts would be made to locate staging areas on previously disturbed property, abandoned excavations, or abandoned parking areas. As previously stated, the NPS would require that any staging areas extending beyond the currently cleared ROW be sited outside the boundaries of the parks. Exact locations would be based on biological and cultural resource studies.

Materials and equipment that would be staged include steel bundles, spur angles, palletized bolts, rebar, insulators and hardware, heavy equipment, light trucks, construction trailers, portable sanitation facilities, and trash and recycling bins. Material that would be removed from the B-K Line that crosses the parks (e.g., conductor, steel, concrete, and other debris) would also be temporarily stored at these sites or other similar sites depending on the proximity of the chosen alternative alignment to the staging sites. Staging areas would also be used for helicopters and helicopter fuel trucks, as previously discussed. The staging areas may include a construction trailer and an access road to the trailer.

Preparation of the staging areas would include the application of road base, installation of perimeter fencing, and implementation of stormwater pollution prevention plan conditions. Following construction, disturbed areas would be restored to predisturbance conditions.

Public and Worker Safety

To ensure public and worker safety, safety devices such as traveling grounds, guard structures, and radio-equipped roving public-safety vehicles and linemen would be in place before the initiation of wire-stringing activities. Guard poles or guard structures would be installed at all transportation, flood control, and utility crossings, and might be installed in the parks or near residences. Guard structures are temporary installations designed to stop the travel of the conductor should it drop below a conventional stringing height. Typical guard structures are standard wood poles, 60 to 80 feet tall; in some cases, structures may consist of specially equipped boom-type trucks with heavy outriggers. Guard poles would

be installed only where needed, such as near roads, residences, other utility crossings, or waterways. If required, temporary netting would also be installed to protect some types of infrastructure. In addition, traffic control and safety inspectors would be on the haul routes and construction sites for the duration of the construction period.

Construction Schedule

Construction activities for alternatives 2 and 2b in NPS lands would be expected to last approximately 8 months. Alternative 3 construction activities would be expected to last approximately 8 months, or slightly longer, because the distance inside the park is slightly longer than under alternatives 2 and 2b. Construction for alternatives 4 and 5 would be expected to take less than 8 months because these alignments occupy less mileage within park lands. Activities such as surveys and geotechnical investigations would occur before mobilization for construction and are not included in the construction period. Construction activities would be expected to occur 12 hours a day, 6 days a week, with additional overtime if necessary (PPL and PSE&G 2008).

Construction Workforce

Depending on construction activities, the construction workforce could range from 20 to 120 workers, with an average workforce of 50. In addition to construction workforce, NPS monitoring staff would be required for the project. Construction labor force and machinery requirements typically include the following:

- **ROW clearing**: Three three-person crews with two D9 dozers and five dump trucks, and four tree-trimmer personnel with truck and grinder
- **Foundations**: Drill rig, mixer trucks (two per hour), one truck, one foundation foreman, and three laborers
- **Tower erection**: Five four-person crews with one line truck and one general foreman truck per crew, and two Condor 200-foot boom trucks

Construction Equipment

Construction activities may include the use of the following equipment types:

- **Anchor**: Drills into the ground to stabilize pulling/tensioning equipment
- **Belly dump**: Places roadbed material efficiently
- **Boom crane**: Sets towers; 125 feet to 200 feet tall
- **Bullwheel puller**: Generates pulling or braking tension; 17 inches deep, 5 feet wide, and 14 feet tall
- **Concrete mixer truck**: Hauls concrete to the foundation sites for pouring the tower foundations
- **Concrete pump truck**: Provides efficient delivery of concrete to foundation holes that are not easily accessed
- **Crawler dozer**: Pulls line, applies tension, and clears ROW (heavy civil equipment)

- **Drum puller**: Reels out two or more conductors; includes its own engine, hoist, winch, and trigger
- **Dump truck**: Hauls material to and from the site
- **Excavator**: Performs medium excavations (heavy civil equipment)
- **Foreman truck**: Carries tools, equipment, and fuel (flatbed pickup)
- **Ground grid**: Protects construction areas against a fault current (lightning strike)
- **Guard structure**: Keeps conductor away from energized equipment, roads, and other obstructions the transmission line construction may encounter
- **Line truck**: Houses all construction equipment used by the line mechanic
- **Miscellaneous tractor trailer (equipment)**: Hauls equipment, materials, and tools to and from the construction site
- **Pilot line puller**: Puts tension on pilot line
- **Pilot line**: Follows sock line through travelers, then attaches to conductor and pulls conductor back through travelers
- **Reel puller**: Pulls line and applies tension (shaft driven)
- **Reel stand**: Acts as mount for brakes, stand, jacks, reel transport, and payout (six-axle skid, truck, or trailer)
- **Reel winder**: Recovers conductors
- **Road grader**: Performs final grading of access roads, crane pads, and wire tension and pulling sites
- **Running board**: Pulls multiple conductors with one pilot line
- **Scraper**: Performs large excavations (heavy civil equipment)
- **Service truck**: Lubricates, fuels, and maintains heavy equipment
- **Splice grounding**: Protects workers from an electric shock from induced voltage on the conductor while splicing conductor ends
- **Tensioner with bullwheel**: Holds tension on the pull line, arranged in tandem; places friction and tension on the conductor by the grooves
- **Tractor with lowboy**: Hauls heavy civil equipment and materials to and from the site
- **Traveler ground**: Protects tower and travelers against fault current
- **Traveler**: Provides frictionless rotation for stringing pilot line and conductor
- **Water truck**: Provides dust and fire control
- **Woven wire grip**: Pulls continuous conductor and guys

Construction Vehicle Trips

Construction crews would use public roads and existing access roads to reach the sites. This would include trips to the construction site from homes, hotels, or meeting sites. In general, vehicle trips and miles traveled would include the following:

- **Estimated daily one-way vehicle trips**: 7 vehicles/hour/mile
- **Estimated vehicle miles traveled**: 140 miles/day

Land Disturbance

Land disturbance is generally estimated at 350 feet in width, which is the maximum expected ROW, multiplied by the length of the line. Determining the exact area of land disturbance for alternative 2b is problematic because the ROW width ranges from 100 to 380 feet, as noted in the previous section, "Development of the Applicant's Alternate Proposal." Therefore, an approximate ROW width of 150 feet is used to estimate land disturbance for alternative 2b. Land disturbance would result from vegetation clearing, tower grading, construction of tower foundations, and new access roads. In some instances, the access roads, both permanent and temporary, occur outside the 350-foot ROW; land disturbance would be greater in these areas. ROW boundaries would be surveyed and trees and shrubs would be marked for removal with green survey tape. Access roads in the ROW would be surveyed and staked to avoid additional disturbance. NPS monitoring staff would ensure adherence to all permit requirements.

Construction Waste

Construction of the transmission line under any action alternative would result in the generation of various waste materials and would require the use of hazardous materials, including fuel, lubricants, and cleaning solvents. All hazardous materials would be stored, handled, and used in accordance with applicable regulations. All waste materials would be stored outside of the parks and disposed of in off-site landfills. Site cleanup would involve the removal of staging area fencing, construction trailers, construction fencing, temporary erosion control measures, temporary culverts and drainage systems, grounding, counterpoises, portable toilets, spur roads, splice sites, crane pads, and foundation spoils.

Restoration

The applicant would restore all spur roads, crane pads, staging areas, and pulling sites as soon as possible once removal of existing structures or construction is complete. Restoration would include removing gravel surfaces and geotextile fabric, seeding disturbed areas with an NPS-approved conservation seed mix, treating noxious weeds, and implementing other best management practice (BMP) treatments. Some disturbed areas may require shallow surface scarifying of severely compacted soils or recontouring of cut and fill areas to help control erosion and promote revegetation. Temporary culverts would be removed and self-maintaining drainage would be restored. All reclaimed areas would be monitored for noxious weeds for at least two years after project completion. For alternatives 3 through 5, mechanical and chemical treatments of native vegetation within the ROW would no longer occur to allow for natural recovery of vegetation and wildlife habitat.

Proposed Information Technology Facilities

Telecommunication infrastructure would be installed under all action alternatives for operation of the existing substations and to protect the new transmission lines from electrical interruptions. The types of circuits to be installed would include fault protection and optical ground wire.

Fault protection would consist of 4/0 copper wire, directly embedded throughout the entire transmission line ROW. This ground wire would be attached to the counterpoises and every tower. The counterpoises would consist of three to four 8-foot ground rods placed strategically around each structure to divert potential fault currents from lightning strikes or line surges. Optical ground wire would provide grounding or lightning protection and communications for the facilities.

Facility and Construction Locations

The applicant included details about specific facility and construction locations for alternative 2 in the application for the permit. That information will be used to describe alternatives 2 and 2b. However, the locations of tower sites, pulling and splicing areas, and construction staging yards have not been defined for alternatives 3, 4, and 5. Therefore, alternatives 3 through 5 assume the following general guidelines:

- ROW width would be 350 feet along the entire length.
- Crane pads (one per tower location) would measure 200 feet by 200 feet.
- Wire pulling locations would measure 200 feet by 200 feet and be situated every 2.8 miles on flat terrain and every 1.7 miles on mountainous terrain.
- Pulling and splicing sites would measure 400 feet by 600 feet and would require additional land outside the ROW or an easement every 4 to 5 miles or where the transmission line turns.
- Construction staging yards would each measure 2 acres when helicopters would not be used and 3 to 4 acres with helicopter use.

Facility Operations and Maintenance

Operation and maintenance of the S-R Line under all alternatives would involve periodic inspection via helicopter and truck. Maintenance of the S-R Line would be performed on an as-needed basis, but is expected to occur at least once annually, and would include maintenance of access roads and erosion/drainage control structures. The applicant would operate and maintain the S-R Line under all the proposed alternatives in accordance with existing procedures and personnel.

All telecommunications equipment associated with the proposed transmission line would be operated and maintained by the applicant's technicians. Preventive maintenance of telecommunications infrastructure, which would be located on the transmission line, would typically be scheduled every 6 months to ensure system reliability and performance.

Vegetation Maintenance

PPL and Public Service Electric and Gas Company (PSE&G) have separate vegetation management plans because they are distinct utility companies working in two different states. However, both companies must comply with the new regulations issued in April 2006 in North American Electric Reliability Corporation (NERC) Standard FAC-003-01. The NPS considers the applicant's current vegetation management plans, as described in the following paragraphs, to be insufficient, and the NPS will require an NPS-specific, NPS-approved vegetation management plan.

PPL has produced guidelines for vegetation management techniques in Pennsylvania, *Specification for Initial Clearing and Control Maintenance of Vegetation on or adjacent to Electric Line Right-of-Way through Use of Herbicides, Mechanical, and Hand-clearing Techniques* (PPL 2010a), which specifies the wire zone–border zone technique of vegetation management. The wire zone is defined as 10 feet out from the centerline to the conductors. Vegetation that is near the wire zone presents a greater threat to the line;

vegetation that grows into or falls onto the transmission lines could cause an outage. Within this zone, all native shrubs, grasses, herbaceous species, and low-growing shrubs would be preserved to the greatest extent possible. The border zone stretches from the edge of the wire zone to the edge of the ROW. Vegetation allowed in the border zone is more varied but is limited to grass, ferns, seasonal agricultural crops, shrubs, and small trees. Maintenance would include removal by cutting, pruning, and herbicide use. All vegetation would be removed from access roads. In addition, danger trees outside the proposed ROW would also be pruned or removed. Danger trees are those that, in falling, would either strike the conductor or pass within the minimum conductor clearance, which is 10 feet for 500-kV transmission lines (PPL 2010a, 6). Under PPLs vegetation management guidelines, vegetation would also be cleared within a 15-foot perimeter of towers, or adjacent to any structure.

The vegetation management practices employed in New Jersey by PSE&G are described in *Transmission Rights-of-Way Vegetation Management* (PSE&G 2011). The minimum clearance required between conductors and the nearest tree is 30 feet. Vegetation maintenance would be achieved by ground line maintenance and selective tree removal. Ground line maintenance requires all trees and shrubs to be cut to ground level or no more than 3 inches above ground level. Selective tree removal requires that all fast-growing tree species be cut to ground level; these species include white pine and tulip poplar, as well as species of ash and birch. Additionally, all dead, decayed, or dying trees would be removed. Herbicides would be used in vegetation maintenance. Herbaceous plants and grasses and low-growing shrubs would be allowed to remain (PSE&G 2011, 1–6). Vegetation management under PSE&G guidelines requires a 50-foot buffer beyond the structure foundation perimeter.

PPL contends that clearing of danger trees outside of the ROW would be required for their proposal and alternative (PPL 2010a; 2010b) and that they would not be limited to the constraints of the easement rights. Danger trees would be identified and removed or pruned. A transmission line with a larger footprint would require a larger danger tree zone outside the ROW. It is assumed that larger individual trees outside the ROW would be removed periodically.

Outside the study area, the applicant should follow their respective management plans for maintenance of vegetation; therefore, the conditions of the ROW should be the same inside and outside the study area. However, public comments received during the alternatives workshop indicate that this is not standard practice. Citizens have reported complete clearing of vegetation within the existing ROW to the point of bare ground. Due to this discrepancy, the impacts on resources outside the study area will be presented as a range, where applicable, to encompass all potential effects from vegetation maintenance.

Bushkill Substation

The Bushkill Substation is an integral part of the power supply grid and would remain in use under all alternatives. For alternatives 2, 2b, 3, and 4, the use of the Bushkill Substation is included as part of the S-R Line, where the route from the Susquehanna Substation to the Bushkill Substation would use the existing alignment. Alternative 5 was created without the direct use of Bushkill Substation. Regardless of the alternative chosen, the Susquehanna and Bushkill substations would need to remain connected.

Replacement of Existing Lines for Alternatives 3 through 5

The alignments for alternatives 3 through 5 contain transmission or distribution lines that are not related to the S-R Line, but that would be affected by construction of the S-R Line. Implementation of alternatives 3 through 5 would require the removal of the existing structures in the same fashion as described for removal of the B-K Line earlier in this chapter. The transmission and distribution lines would be replaced during construction and would be placed parallel to the S-R Line within the expanded ROW. The new structures for transmission lines would require a tower foundation approximately 6 feet in

diameter, with approximately 16 towers per mile. The distribution lines would be strung on wood poles, which would not be set in concrete. Wood poles would be placed approximately every 200 feet, resulting in approximately 26 poles per mile.

Cost of Implementation

Implementation of the action alternatives would not create any changes to the parks' budgets.

Implementation of the action alternatives would not create any changes to the parks' budgets because the NPS would require the applicant to be responsible for costs associated with NPS managing the permit under 16 USC § 3a, "Recovery of Costs Associated with Special Use Permits." Due to the length of the transmission line through the parks and the extensive access roads, it is anticipated that two to three new DEWA staff members would be hired under alternatives 2, 2b, and 3 to assist in park responsibilities associated with construction and post construction monitoring; one new DEWA staff member would be hired under alternatives 4 and 5. Under alternatives 2, 2b, 3, 4, and 5 DEWA staff would be responsible for monitoring actions along APPA. For a more detailed explanation of personnel responsibilities under the action alternatives, see the "Park Operations" section in chapter 4.

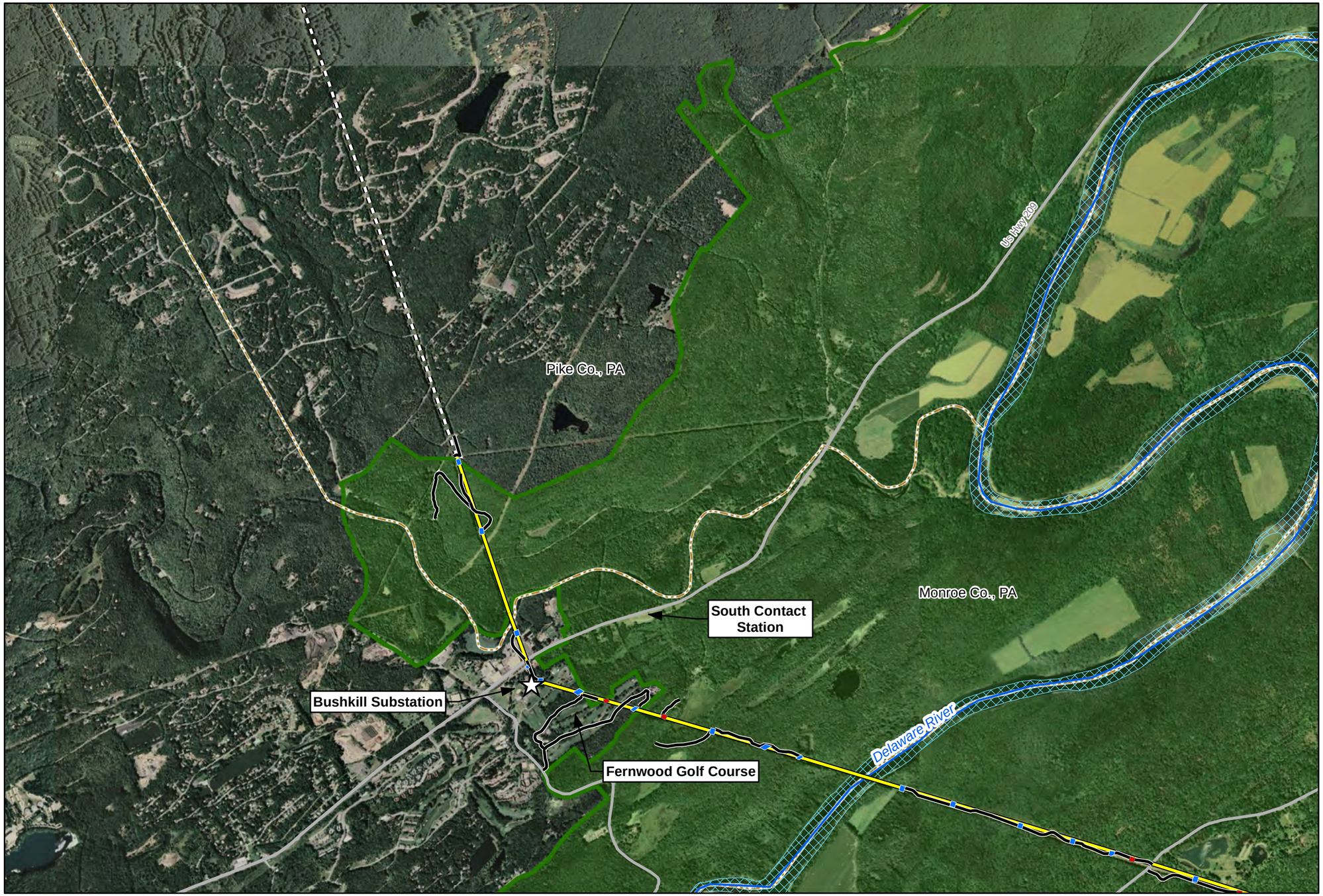
ALTERNATIVE 2: APPLICANT'S PROPOSED ROUTE

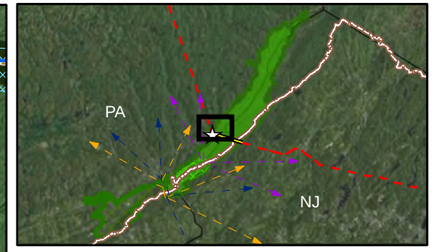
Route Description

The route identified by the applicant follows the corridor of the B-K Line that traverses approximately 4.3 miles of DEWA. This alternative would require clearing of vegetation for an additional 50 to 200 feet of ROW.

The route identified by the applicant follows the corridor of the B-K Line that traverses approximately 4.3 miles of DEWA. Within DEWA boundaries, the route crosses MDSR and APPA approximately perpendicularly. Figure 3 presents the location of the alternative 2 alignment inside DEWA, the access roads for alternative 2, and the study area and figure 4 presents the proposed tower locations for this alternative.

Within the study area, the alternative 2 alignment is approximately 5.6 miles long. The alignment would enter DEWA from the west at the VSL in Pennsylvania approximately 0.25 mile east of Big Bushkill Creek. The alignment would cross approximately 0.6 mile of DEWA land and then exit the park. In the next approximately 0.68-mile section of the study area, the alignment would travel to the Bushkill Substation, cross a small (0.06-mile) portion of DEWA, cross the Fernwood Golf Course, and then reenter DEWA south of the South Zone Ranger Station and north of DEWA Headquarters. The alignment would travel southeast within DEWA for approximately 0.85 mile, then cross 0.10 mile of MDSR just north of Depew Island. The route would continue southeast approximately 2.4 miles past the Watergate Recreation Site and cross APPA. The route would then traverse another 0.25 mile from APPA to the eastern DEWA boundary. Beyond the boundary, the alignment would travel southeast approximately 0.7 mile to the VSL. The width of the existing B-K Line ROW ranges from 100 to 380 feet in Pennsylvania and New Jersey; however, the ROW is only cleared to a width between approximately 80 and 150 feet. This alternative would require clearing of vegetation for an additional 50 to 200 feet of ROW.





Legend

- Substation
- Crane Pad for Proposed Tower*
- Crane Pad for Existing Tower Removal
- Inside Study Area
- Outside Study Area
- Delaware River
- Proposed Access Road
- Road
- Delaware Water Gap National Recreation Area
- Middle Delaware National Scenic and Recreational River
- County Line

** Crane pads for proposed towers will also be used for the removal of existing towers, where applicable*

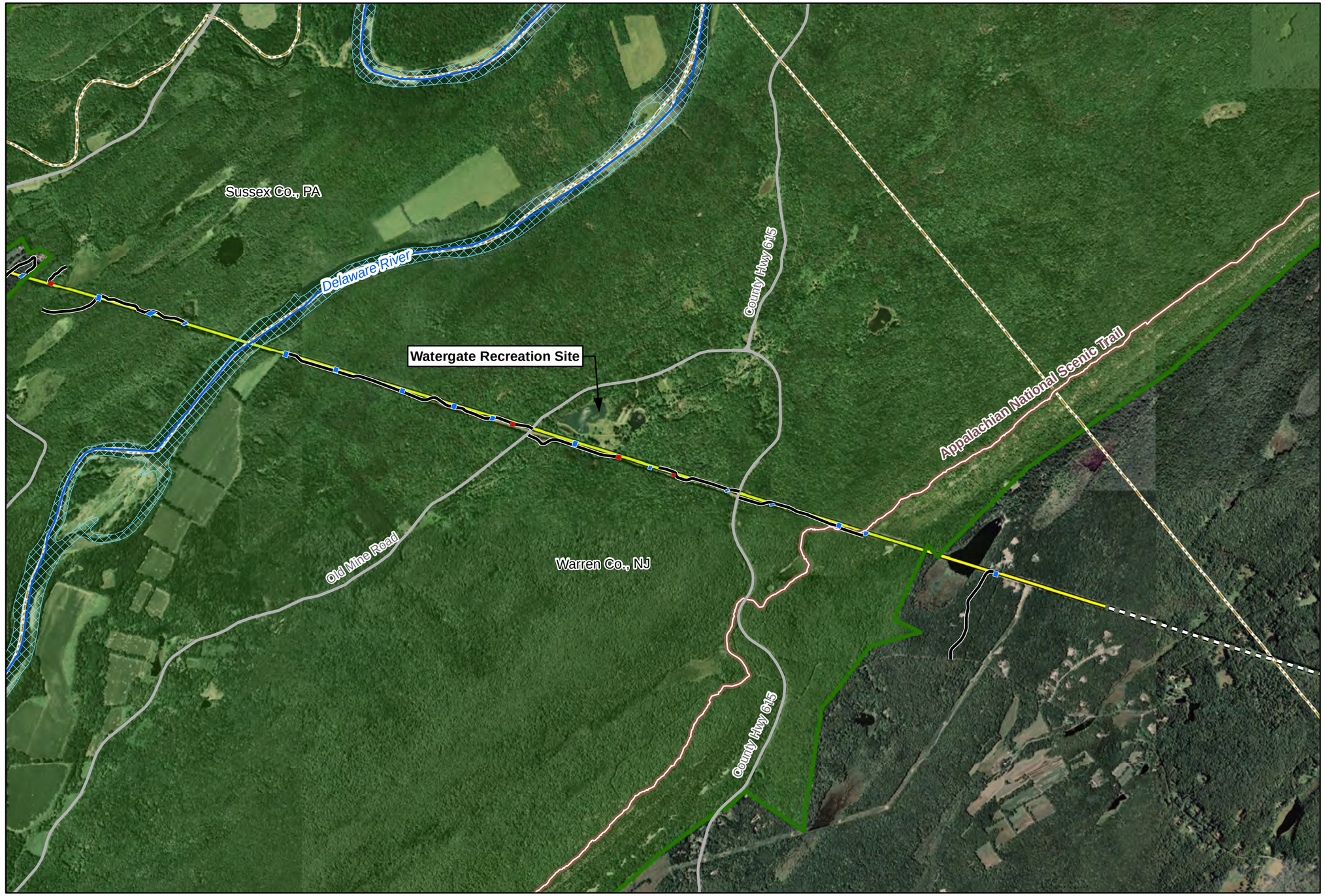
0 2,000 4,000
Feet

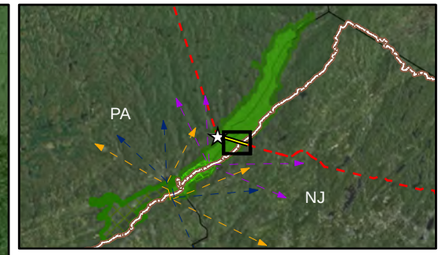
Susquehanna to Roseland Transmission Line Proposal and Right-of-Way Request EIS

Figure 3
Alternative 2 Pennsylvania
Towers and Proposed Access Roads within the Study Area

Source: ESRI Streetmap 2006, Penn State 2010, ESRI ArcGISonline Map Service 2010, PennDOT 2011, USGS 2006, NJ DEP 2008,

Projection: NAD 83 UTM Zone 18N
Date: July 2012





Legend

- Crane Pad for Proposed Tower*
- Crane Pad for Existing Tower Removal
- Inside Study Area
- Outside Study Area
- Appalachian National Scenic Trail
- Delaware River
- Proposed Access Road
- Road
- Delaware Water Gap National Recreation Area
- Middle Delaware National Scenic and Recreational River
- County Line

** Crane pads for proposed towers will also be used for the removal of existing towers, where applicable*

0 2,000 4,000
Feet

Susquehanna to Roseland Transmission Line Proposal and Right-of-Way Request EIS

Figure 4
Alternative 2 New Jersey
Towers and Proposed Access Roads within the Study Area

Source: ESRI Streetmap 2006, Penn State 2010, ESRI ArcGISonline Map Service 2010, NJOIT 2010, USGS 2006, NJ DEP 2008,

Projection: NAD 83 UTM Zone 18N
Date: July 2012

Access and Spur Roads

Alternative 2 would require new access roads, because old trails and roadbeds on which the access roads are based are overgrown and would not allow access by large vehicles. Old trails and roadbeds would be cleared of vegetation; blade-graded to remove potholes, ruts, and other surface irregularities; and recompacted to provide a smooth and dense surface capable of supporting heavy equipment. Generally, access roads would fall within the transmission line ROW, but in some instances, it would be necessary for access roads to extend outside the ROW. In response to public comment, the NPS has altered the access roads for alternative 2 slightly from the description presented in the draft EIS. The change in access roads would result in reduced impacts to natural resources. Figure 3 presents the updated access roads. Alternative 2 would require a total of 5.3 miles of access roads, 1.9 miles of which would be outside the ROW (1.5 miles in Pennsylvania and 0.4 mile in New Jersey). The applicant would need additional rights beyond the ROW for construction of access roads outside the transmission line ROW. Locations of these roads outside the ROW would require NPS approval.

Access roads would be constructed at 20 feet wide initially to accommodate large construction vehicles. After construction, the roads would be narrowed to 15 feet and maintained permanently for future maintenance and vegetation management. The disturbed areas would be seeded with an NPS-approved conservation seed mix. Acreages of disturbance due to access roads during and after construction are shown in table 3. Drainage structures (e.g., wet crossings, water bars, overside drains, pipe culverts, energy dissipaters) would be installed along spur and access roads to allow for construction equipment use, as well as to prevent erosion from uncontrolled water flow. Slides, washouts, and other slope failures would be repaired and stabilized along roads by installing retaining walls or other means to prevent future failures. The type of mechanically stabilized earth-retaining structure used would be based on site-specific conditions. The applicant would be responsible for the long-term maintenance of access roads within the road and transmission line ROWs. Proposed access road locations are shown in figure 4.

New spur roads may be required for pulling and splicing sites along the ROW. To minimize land disturbance, previously disturbed areas would be used where feasible. Locations of spur roads are currently unknown and would be placed according to the applicant's internal policy, subject to approval from the NPS. The applicant would be responsible for the restoration of spur roads immediately following the conclusion of construction activities. Restoration of spur roads would include removing all gravel, disposing of geotextile fabric, and seeding the area with an NPS-approved conservation seed mix.

Cost of Construction

The total cost of constructing the alternative 2 alignment from Susquehanna to Roseland is estimated to be $2.17 billion. This estimate is based on factors including prices of materials and equipment, purchase and clearing of access roads and ROW, and labor costs. Detailed construction cost estimates can be found in appendix E.

The total cost of constructing the alternative 2 alignment from Susquehanna to Roseland is estimated to be $2.17 billion.

ALTERNATIVE 2b: APPLICANT'S ALTERNATE PROPOSAL

Route Description

The alignment for the applicant's alternate proposal would follow the same route as described for alternative 2, but alternative 2b would be constructed within the existing ROW.

The alignment for the applicant's alternate proposal would follow the same route as described for alternative 2 (figure 5). The difference between alternative 2 and alternative 2b is that the former would require widening the existing ROW, while the latter would be constructed within the existing ROW. The towers for alternative 2b would be the same height as those described for alternative 2, but alternative 2b would require two additional towers within NPS lands compared to alternative 2 (figure 6). These towers would be constructed within the 100-foot-wide portion of the alignment. Because the ROW under alternative 2b is narrow, the applicant's plans require these additional towers to protect against fire hazards presented by the risk of conductor blowout. As noted in the "Development of the Applicant's Alternate Proposal" section of this chapter, the minimum horizontal clearance to the edge of the ROW under high wind conditions to prevent conductor blowout was determined to be greater than 100 feet, and the NPS has expressed concern about the safety of constructing within the existing ROW. The applicant's proposal is based upon the controversial assumption that they have a right to clear danger trees on NPS property outside any deeded ROW (PPL 2010b). It is assumed that larger individual trees outside the ROW would be removed periodically.

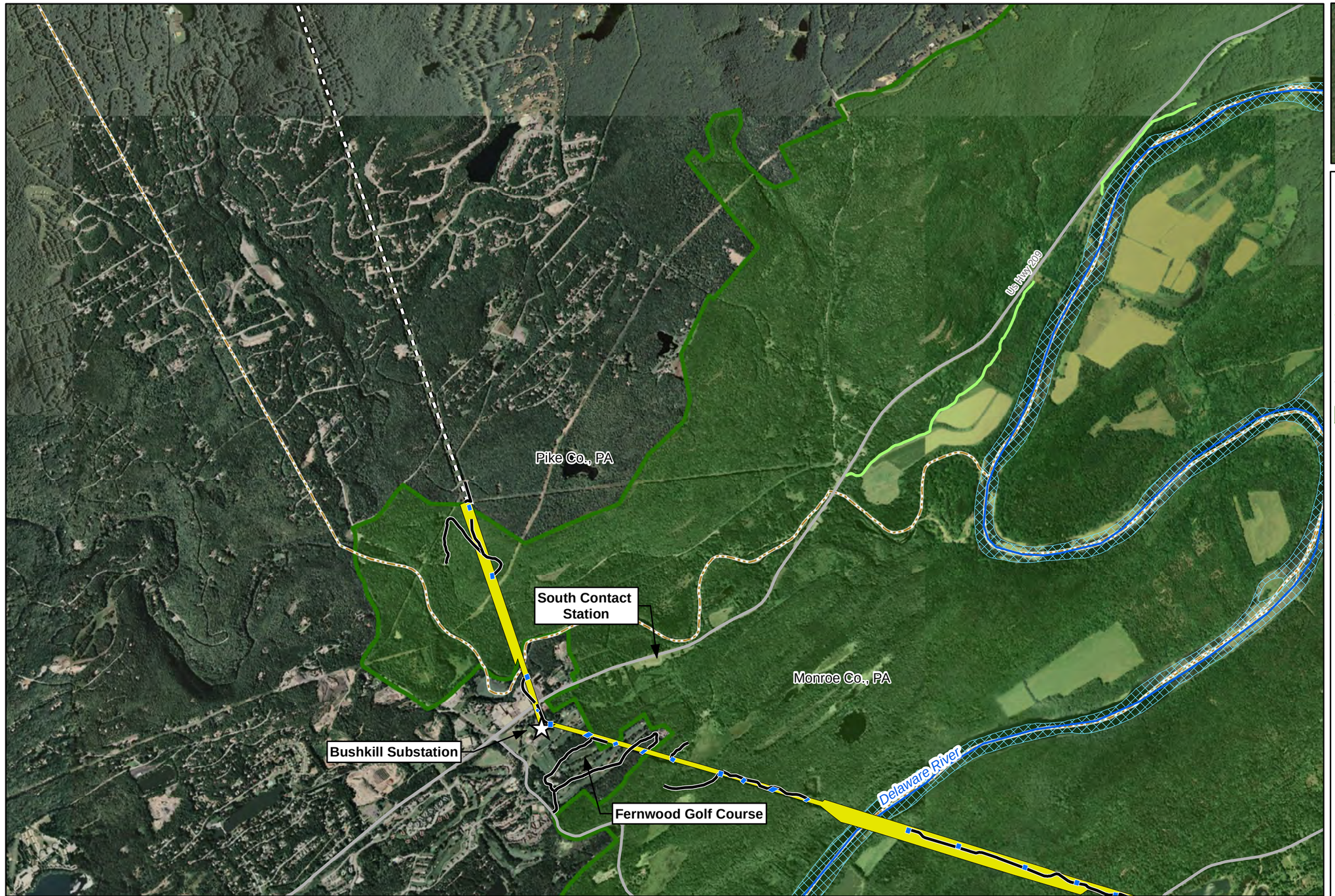
Access and Spur Roads

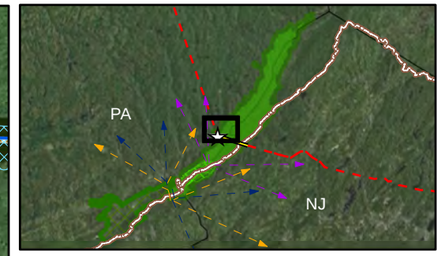
Access roads for alternative 2b are similar as those described for alternative 2, with a slight difference in Pennsylvania between the Bushkill Substation and the Delaware River (figure 5). Alternative 2b would require a total of 5.3 miles of access roads, of which 2.4 miles would occur outside the ROW. Roads would be used and maintained as described for alternative 2. The applicant would need additional rights beyond the ROW for construction of access roads outside the transmission line ROW. Locations of these roads outside the ROW would require NPS approval.

Cost of Construction

The total cost of constructing the alternative 2b alignment from Susquehanna to Roseland is estimated to be $2.17 billion. This estimate is based on factors including prices of materials and equipment, purchase and clearing of access roads and ROW, and labor costs. Detailed construction cost estimates can be found in appendix E.

The total cost of constructing the alternative 2b alignment from Susquehanna to Roseland is estimated to be $2.17 billion.





Legend

- Substation
- Crane Pad for Proposed Tower*
- Inside Study Area
- Outside Study Area
- McDadeTrail
- Delaware River
- Proposed Access Road
- Road
- Delaware Water Gap National Recreation Area
- Middle Delaware National Scenic and Recreational River
- County Line

** Crane pads for proposed towers will also be used for the removal of existing towers, where applicable*

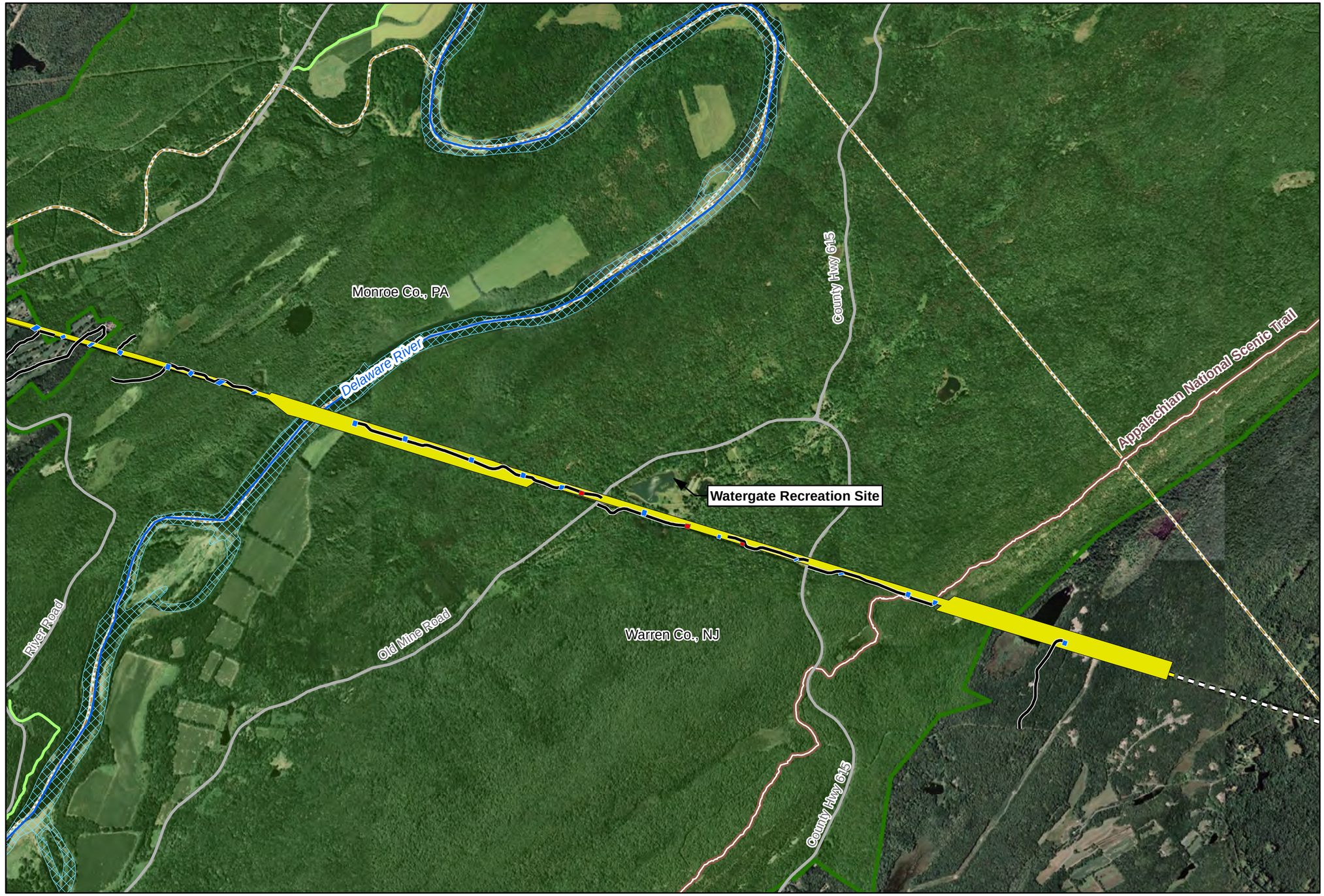
0 1,900 3,800
Feet

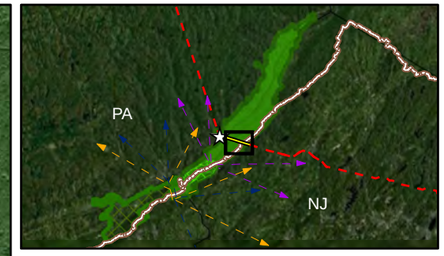
Susquehanna to Roseland
Transmission Line Proposal
and
Right-of-Way Request EIS

Figure 5
Alternative 2b Pennsylvania
Towers and Proposed Access Roads within the Study Area

Source: ESRI Streetmap 2006, Penn State 2010,
ESRI ArcGISonline Map Service 2010,
PennDOT 2011, USGS 2006,
NJ DEP 2008,

Projection: NAD 83 UTM Zone 18N
Date: July 2012





Legend

- Crane Pad for Proposed Tower*
- Crane Pad for Existing Tower Removal
- Inside Study Area
- Outside Study Area
- Appalachian National Scenic Trail
- Delaware River
- Proposed Access Road
- Road
- Delaware Water Gap National Recreation Area
- Middle Delaware National Scenic and Recreational River
- County Line

** Crane pads for proposed towers will also be used for the removal of existing towers, where applicable*

0 2,000 4,000
Feet

Susquehanna to Roseland
Transmission Line Proposal
and
Right-of-Way Request EIS

Figure 6
Alternative 2b New Jersey
Towers and Proposed Access Roads within the Study Area

Source: ESRI Streetmap 2006, Penn State 2010,
ESRI ArcGISonline Map Service 2010,
NJOIT 2010, USGS 2006,
NJ DEP 2008,

Projection: NAD 83 UTM Zone 18N
Date: July 2012

ALTERNATIVE 3

Route Description

The alternative 3 alignment would pass through DEWA along the right of way of existing transmission and distribution lines. This alternative would require clearing of vegetation for an additional 50 to 200 feet of ROW.

The alternative 3 alignment would pass through DEWA along the ROW of existing transmission and distribution lines (figure 7). The existing transmission and distribution lines would be removed prior to construction of the S-R Line. The existing transmission line ROW is 100 feet wide, and this alternative would require clearing of vegetation for an additional 50 to 200 feet of ROW. The structures of the transmission and distribution lines would be constructed so that these lines and the S-R Line would run parallel to one another within the expanded ROW. That is, two separate sets of structures would be constructed, one set for the proposed S-R Line and one set for the existing transmission and distribution lines along the alternative 3 alignment. Alternative 3 would cross a total of 5.4 miles within the DEWA boundary. The route would cross about 1.3 miles of DEWA within the study area and about 1.7 miles of the northern end of Worthington State Forest, which is located within DEWA's exterior boundaries. The alignment for this alternative also crosses MDSR within DEWA, and APPA within Worthington State Forest.

The alternative 3 alignment is approximately 6.9 miles long within the study area. The alternative 3 alignment would follow the alignment of the B-K Line for 0.6 mile from the western boundary of DEWA to the Bushkill Substation. The alignment would leave the study area and travel southwest to reenter the study area via the VSL point located in Monroe County, Pennsylvania, outside DEWA (figure 7). From the western VSL, the alignment would cross River Road and the McDade Trail about 1.0 mile southwest of the Smithfield Beach Picnic Area and 0.75 mile northeast of the Hialeah Picnic Area. The alignment would continue southeast within DEWA approximately 0.8 mile to MDSR. On the east side of MDSR, the route would travel northeast approximately 0.49 mile to the boundary of Worthington State Forest; the remainder of the alignment within DEWA boundaries would also be encompassed by Worthington State Forest's boundaries. The alignment would travel southeast approximately 1.69 miles to the eastern edge of DEWA, perpendicularly crossing APPA. The alignment would travel another 0.24 mile beyond the DEWA boundary to the VSL. The alternative 3 alignment would reenter DEWA beyond the eastern VSL as well. In the path to join the alignment of the B-K Line in New Jersey, alternative 3 could travel along the border of DEWA for 1.8 miles, paralleling APPA for this entire distance.

Access and Spur Roads

Alternative 3 would require new access roads. Access and spur roads would be cleared of vegetation; blade-graded to remove potholes, ruts, and other surface irregularities; and recompacted to provide a smooth and dense surface capable of supporting heavy equipment. Generally, access roads would fall within the transmission line ROW, but in some instances, it would be necessary for access roads to extend outside the ROW. Alternative 3 would require approximately 3.5 miles of access roads, of which 0.9 mile would occur outside the ROW. Acreages of disturbance due to access roads during and after construction are shown in table 3. Roads would be used and maintained as described for alternative 2. The applicant would need additional rights beyond the ROW for construction of access roads outside the transmission line ROW. Locations of these roads outside the ROW would require NPS approval.

Cost of Construction

The total cost of constructing the alternative 3 alignment from Susquehanna to Roseland is estimated to be $2.22 billion. This estimate is based on factors including prices of materials and equipment used; purchase and clearing of access roads and ROW; and labor costs. Detailed construction cost estimates can be found in appendix E.

The total cost of constructing the alternative 3 alignment from Susquehanna to Roseland is estimated to be $2.22 billion.

ALTERNATIVE 4

Route Description

Alternative 4 would pass through the southernmost portion of DEWA along the path of an existing distribution line right-of-way. The existing right of way is 100 feet wide, and this alternative would require permanent clearing and maintenance of vegetation for an additional 100 to 200 feet of ROW.

Alternative 4 would pass through three portions of DEWA; the section of the park from the western boundary along the B-K Line to the Bushkill substation; through the southwestern boundary of the park, where the alignment leaves the boundary of the park for 0.51 mile, then re-enters the park (figure 8). On the southernmost portion of DEWA, alternative 4 runs along the path of an existing distribution line ROW (figure 8), and would also pass through a section of the park along the alignment of the B-K Line. The existing ROW ranges from 100 to 200 feet wide, and this alternative would require permanent clearing of vegetation for an additional 100 to 200 feet of ROW. This line along alternative 4 would be removed prior to construction of the S-R Line. The structures of the existing distribution line would be replaced so that this line and the double-circuited S-R Line would run parallel to one another within the expanded ROW. The route would cross about 1.5 mile of NPS lands, including DEWA and APPA. This alternative would also cross the Lower Delaware River; however, the crossing of the Delaware River would occur outside DEWA and MDSR boundaries and outside the study area.

Alternative 4 would have a north–south orientation and would be approximately 2.3 miles long within the study area (figure 8). As with alternative 3, the alternative 4 alignment follows the alignment of the B-K Line for 0.6 mile from the western boundary of DEWA to the Bushkill Substation (figure 8, inset box 1). The alignment would leave the study area and travel southwest to reenter the study area via the VSL point at the edge of DEWA, near the southwestern boundary of the park. Upon entering DEWA from the north, the alternative 4 alignment would cross about 0.42 mile of DEWA land, roughly following the DEWA boundary, and would cross Mountain and Totts Gap roads. The alignment would then leave the boundary of DEWA for approximately 0.51 mile, before re-entering the park. Upon reentering DEWA, the alignment would immediately cross APPA, then extend approximately 0.50 mile south to the southern boundary of DEWA. South of DEWA, the alternative 4 alignment would extend another 0.24 mile before the southern VSL (figure 8). The designated boundary of Cherry Valley National Wildlife Refuge (NWR) borders the existing ROW of the alternative 4 alignment north of APPA for approximately 0.73 mile (figure 8). The alternative 4 alignment would also cross through portions of Cherry Valley NWR outside the study area; these portions of alternative 4 are discussed in appendix C.

Thus, under alternative 4 the applicant would have the option of a secondary crossing of NPS land west of Bushkill while under alternative 5 it would not. This is the only difference between 4 and 5 over which NPS exercises any discretion or control.

Monroe Co., PA

State Hwy 2023

Smithfield Beach

County Hwy 606

Delaware River

Warren Co., NJ

Hialeah Picnic Area

Appalachian National Scenic Trail

Inset Box 1

Pike Co., PA

Bushkill Substation

Monroe Co., PA

Inset Box 2: Eastern border of DEWA

Warren Co., NJ

Appalachian National Scenic Trail

PA

Box 1

Box 2

Main

NJ

Legend

- Substation
- Inside Study Area
- Outside Study Area
- Appalachian National Scenic Trail
- Delaware River
- Proposed Access Road
- Road
- Delaware Water Gap National Recreation Area
- Worthington State Forest
- Middle Delaware National Scenic and Recreational River
- County Line

0 2,000 4,000

Feet

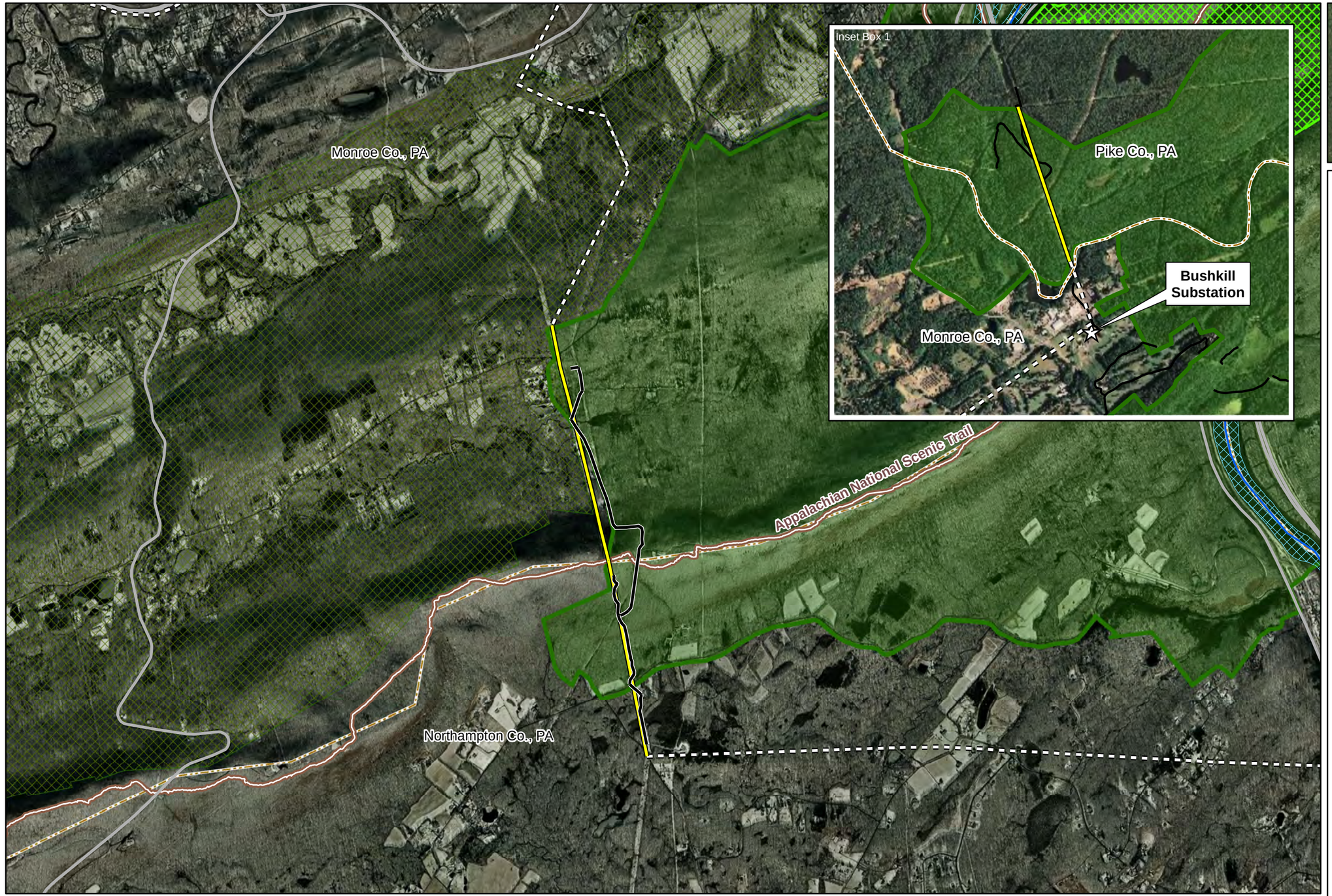
Scale applies to main frame and inset maps

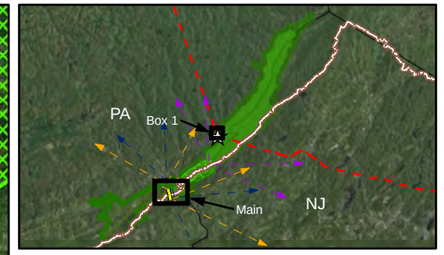
Susquehanna to Roseland Transmission Line Proposal and Right-of-Way Request EIS

Figure 7
Alternative 3
Proposed Access Roads within the Study Area

Source: ESRI Streetmap 2006, Penn State 2010, ESRI ArcGISonline Map Service 2010, PennDOT 2011, USGS 2006, NJ DEP 2008,

Projection: NAD 83 UTM Zone 18N
Date: July 2012





Legend

- Substation
- Inside Study Area
- Outside Study Area
- Appalachian National Scenic Trail
- Delaware River
- Proposed Access Road
- Road
- Delaware Water Gap National Recreation Area
- Worthington State Forest
- CVNWR Boundary
- Middle Delaware National Scenic and Recreational River
- County Line

Note:Designated boundary of CVNWR is depicted, not all property is owned within the boundary.

0 2,000 4,000
Feet

Scale applies to main frame and inset maps

Susquehanna to Roseland Transmission Line Proposal and Right-of-Way Request EIS

Figure 8
Alternative 4
Proposed Access Roads within the Study Area

Source: ESRI Streetmap 2006, Penn State 2010, ESRI ArcGISonline Map Service 2010, PennDOT 2011, USGS 2006, NJ DEP 2008,

Projection: NAD 83 UTM Zone 18N
Date: July 2012

Access and Spur Roads

Alternative 4 would require a total of approximately 2.5 miles of access roads, with approximately 1.6 miles within NPS boundaries. Alternative 4 would use 0.9 mile of existing roads as access roads and would require construction of 1.6 miles of new access roads, of which 0.5 mile would occur outside the ROW. Acreages of disturbance due to access roads during and after construction are shown in table 3. Roads would be created, used, and maintained as described for alternative 2. The access roads for alternative 4 would not enter Cherry Valley NWR. The applicant would need additional rights beyond the ROW for construction of access roads outside the transmission line ROW. Locations of these roads outside the ROW would require NPS approval.

Cost of Construction

The total cost of constructing the alternative 4 alignment from Susquehanna to Roseland is estimated to be $2.36 billion. This estimate is based on factors including prices of materials and equipment used, purchase and clearing of access roads and ROW, and labor costs. Detailed construction cost estimates can be found in appendix E.

The total cost of constructing the alternative 4 alignment from Susquehanna to Roseland is estimated to be $2.36 billion.

ALTERNATIVE 5

Route Description

At DEWA's southern border, alternatives 4 and 5 follow similar alignments. However, alternative 5 does not include the segment west of the Bushkill Substation, associated with the alternative 4 alignment.

Inside the study area, alternative 5 would follow a similar alignment as alternative 4 (described above); however, beyond the study area, alternatives 4 and 5 would split. The alternative 5 alignment would not cross the 0.6 mile portion west of the Bushkill Substation associated with alternative 4 (figure 9). Thus, under alternative 4 the applicant would have the option of a secondary crossing of NPS land west of Bushkill while under alternative 5 it would not. This is the only difference between 4 and 5 over which NPS exercises any discretion or control. Inside the study area, alternative 5 would be approximately 1.7 miles long, with approximately 0.9 mile within NPS lands. Appendix C contains descriptions of the alternatives outside the study area. Although not analyzed in the EIS, alternative 5 assumes a 230-kV transmission line will run from alternative 5 up to the Bushkill Substation on the west side of the park. In addition, alternative 5 also assumes that a 230-kV transmission line would run up to Kittatinny Substation on the east side of the park.

Access and Spur Roads

Alternative 5 would require a total of approximately 1.7 miles of access roads; however, 0.9 mile of existing road would be used. Alternative 5 would require construction of approximately 0.9 mile of new access roads, of which 0.16 mile would occur outside the ROW. Acreages of disturbance due to access roads during and after construction are shown in table 3. Roads would be created, used, and maintained as described for alternative 2. The applicant would need additional rights beyond the ROW for construction of access roads outside the transmission line ROW. Locations of these roads outside the ROW would require NPS approval.

Cost of Construction

The total cost of constructing the alternative 5 alignment from Susquehanna to Roseland is estimated to be $1.42 billion. This estimate is based on factors including prices of materials and equipment used, purchase and clearing of access roads and ROW, and labor costs. Detailed construction cost estimates can be found in appendix E.

ALTERNATIVES ELIMINATED FROM FURTHER STUDY

RATIONALE FOR DISMISSING ALTERNATIVES 6 AND 7

Alternatives 6 and 7, which would have crossed APPA well south of DEWA and MDSR, and for which comment from the public was invited, were dismissed from further analysis.

Both alternatives would unduly complicate and delay the relocation of the existing B-K Line. The permit application is for a double circuit configuration with capacity to carry two new 500-kV transmission lines, one of which would serve as a replacement for the B-K Line allowing that line to be moved to and collocated at a new permitted crossing of the S-R Line. However, the alternative 6 and 7 crossings are too distant from the existing B-K Line to allow for its relocation to either of those crossings at the same time that the new S-R Line would be constructed. Operational constraints would require that the existing B-K Line remain in place for an indefinite time until it could be relocated. This would also indefinitely delay the realization of a major beneficial effect that is integral to alternatives 3, 4, and 5.

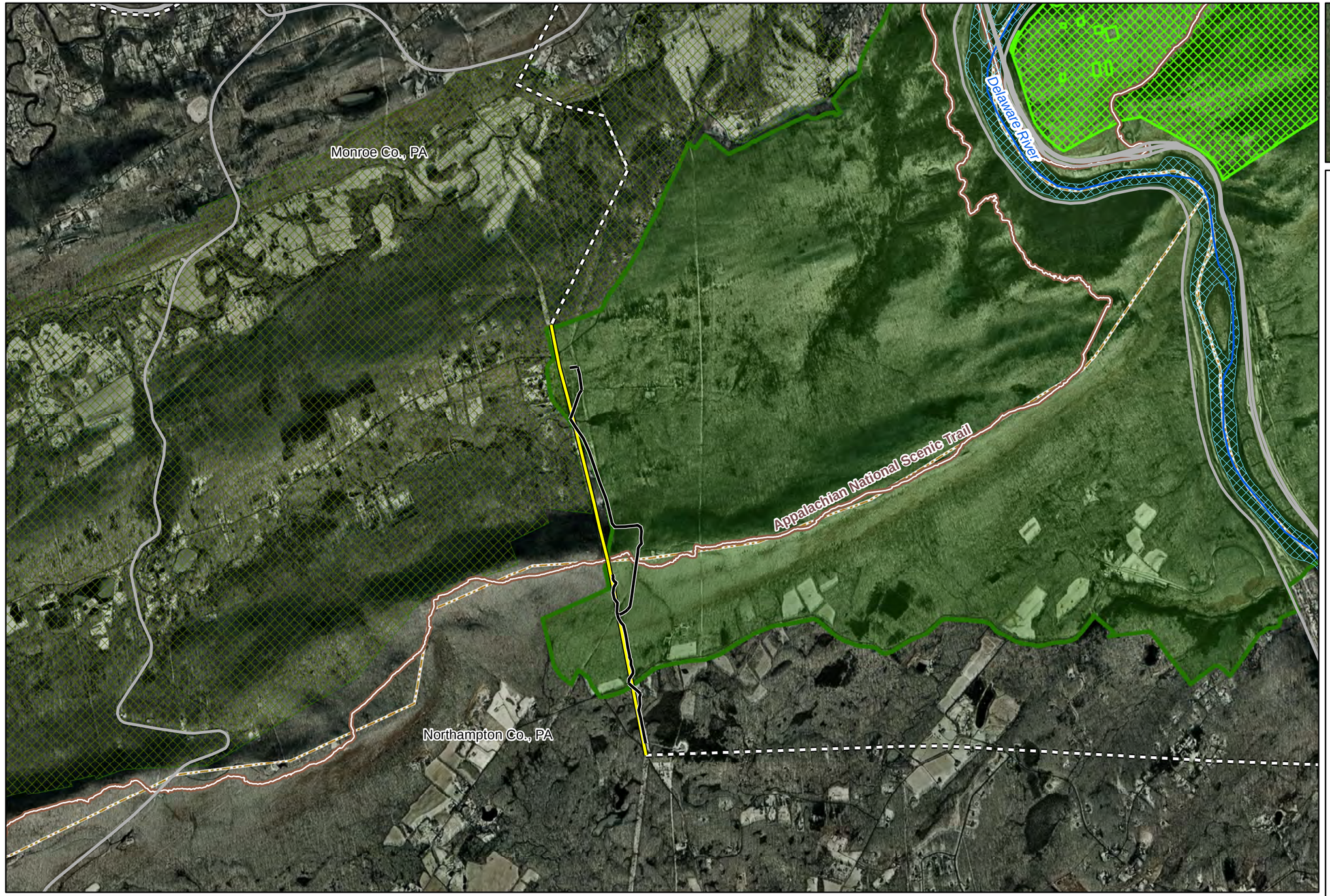
Each of these alternatives also suffers from its own unique flaws insofar as they do not sufficiently utilize existing, cleared power line ROWs—a critical criterion. Alternative 6 would require extensive new clearing across the middle of the Cherry Valley NWR, thus failing the "*cleared*" element of this criterion. The alternative 7 alignment follows a gas pipeline ROW, not a *power line* ROW, so it would effectively create a new power line crossing where none exists today (this is also contrary to APPA land management policy which discourages allowing a new type of impact where one does not currently exist). It would also require major additional clearing of vegetation to widen the ROW from 100 to 300 feet to safely accommodate both the gas pipeline and the high voltage electric transmission line within APPA and Cherry Valley NWR.

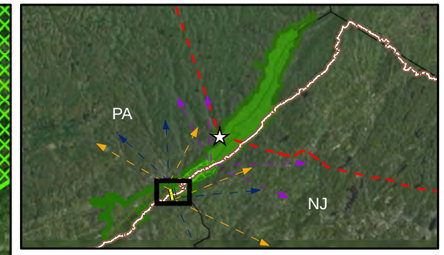
Because of these considerations, alternatives 6 and 7 were dismissed from further analysis in this EIS.

RATIONALE FOR DISMISSING OTHER POTENTIAL ALTERNATIVES

The following potential alternatives were also eliminated from full consideration in this EIS. A brief description of the alternatives and the reason for dismissal is provided.

- An underground 500-kV line was dismissed because its construction cost would be five to eight times the cost of conventional construction methods. Additionally, blasting the bedrock for an underground line could produce major irretrievable and irreversible impacts on geology.
- Superconductor lines (direct current) were dismissed because their construction would cost three to five times that of conventional transmission line construction. These lines would also require AC/DC (alternating current / direct current) converter stations at Susquehanna and Roseland, in addition to the existing substations at these locations.





Legend

- Substation
- Inside Study Area
- Outside Study Area
- Appalachian National Scenic Trail
- Delaware River
- Proposed Access Road
- Road
- Delaware Water Gap National Recreation Area
- Worthington State Forest
- CVNWR Boundary
- Middle Delaware National Scenic and Recreational River
- County Line

Note:Designated boundary of CVNWR is depicted, not all property is owned within the boundary.

0 2,000 4,000
Feet

Susquehanna to Roseland Transmission Line Proposal and Right-of-Way Request EIS

Figure 9
Alternative 5
Proposed Access Roads within the Study Area

Source: ESRI Streetmap 2006, Penn State 2010, ESRI ArcGISonline Map Service 2010, PennDOT 2011, USGS 2006, NJ DEP 2008,

Projection: NAD 83 UTM Zone 18N
Date: July 2012

- Aluminum conductor composite core (ACCC) is a high-temperature conductor that was dismissed because the existing 230-kV towers would still have to be replaced with 500-kV towers to meet clearances required by NESC. ACCC conductor is still a potential conductor for the project because of the reduced sag on the line, as compared to the standard ACSR conductor. However, ACCC conductor is not a separate alternative by itself.
- The use of a smart grid was dismissed because it does not meet the reliability requirements put forth by PJM Interconnection (PMJ). Smart grids provide automated switching for transmission lines but do not provide the redundancy required to meet improved reliability requirements for the transmission grid.
- The use of distributed energy generation sites and localized renewable energy were both dismissed because they do not meet the purpose and need for federal action or that of the applicant. The application is for a permit for a transmission line, driven by a need for transmission capacity. The purpose and need for federal action involves consideration of this application with regard to the purposes and policies governing the national park system. Use of distributed energy generation sites and localized renewable energy is one of a number of possible reactions of PJM and the applicant (and others) if the NPS selects the no-action alternative, but ordering the adoption of such systems is beyond the authority of the NPS.
- An effort to refurbish the existing 230-kV line to meet energy needs was dismissed because energy demand is higher than a 230-kV line can provide. Additionally, the existing structures are only rated at 230 kV and would have to be replaced with new structures that meet the NESC-required clearances for 500-kV transmission lines. This alternative cannot meet either the applicant's needs or the federal purpose and need.
- The alternative identified as alternative 8 in the "Alternatives Considered but Dismissed" handout from the Public Alternatives Workshop in August 2010 (formerly applicant's alternative A) was dismissed because of its socioeconomic and environmental impacts. The alternative alignment would have crossed near High Point State Park, would have been near a known bald eagle nest, and would have had visual impacts on several recreation areas, including the High Point Monument, which is a 220-foot tower affording a large viewshed and is a popular recreation site.
- The alternative identified as alternative 9 in the "Alternatives Considered but Dismissed" handout from the Public Alternatives Workshop in August 2010 (formerly applicant's alternative C) was similar to alternatives 4 and 5 outside the study area. It was dismissed mainly due to its visual impact on APPA, because the line would have paralleled the trail for an extended distance.
- The alternative identified as alternative 10 in the "Alternatives Considered but Dismissed" handout from the Public Alternatives Workshop in August 2010 (formerly River Road alternative) was dismissed because of its impact on the scenic viewshed and surrounding ecosystem. This alternative alignment would have paralleled the Delaware River within DEWA and was therefore determined to have the most impact on visitors that use the river, and it did not meet all NPS objectives for the project.
- The alternative identified as alternative 11 in the "Alternatives Considered but Dismissed" handout from the Public Alternatives Workshop in August 2010 (formerly NPS alternative 2) was dismissed based on its similarities to alternative 4 and because the alignment would have passed through the geologic formation of the Delaware Water Gap.
- The alternative identified as alternative 12 in the "Alternatives Considered but Dismissed" handout from the Public Alternatives Workshop in August 2010 (formerly NPS alternative 6) was dismissed because the use of this route would not be advantageous to APPA or the applicant in reducing the cost of construction. In addition, it was similar to alternative 5 in this EIS and had no additional benefits.

- Leaving in place the existing 230-kV B-K Line that the applicant proposes to parallel while permitting an alternative crossing for the new 500-kV line was rejected because it would result in two, rather than one, ROWs crossing the parks while leaving in place a line that the applicant states is becoming, if not already, obsolete.

MITIGATION AND COMPENSATION MEASURES

Mitigation and compensation measures would be required to minimize the impacts on resources from the construction, operation, and maintenance activities. Mitigation, according to NEPA regulations (40 CFR § 1508.20), includes the following:

Mitigation and compensation measures would be required to minimize the impacts on resources from the construction, operation, and maintenance activities described for the action alternatives.

- avoiding the impact altogether by not taking a certain action or parts of an action;
- minimizing impacts by limiting the degree or magnitude of the action and its implementation;
- rectifying the impact by repairing, rehabilitating, or restoring the affected environment;
- reducing or eliminating the impact over time by implementing preservation and maintenance operations during the period of analysis; and
- compensating for the impact by replacing or providing substitute resources or environments.

Mitigation according to National Historic Preservation Act of 1966 (NHPA) regulations (36 CFR Part 800) – Protection of Historic Properties includes a Resolution of Adverse Effects. If adverse effects of state or federal projects are identified or appear to be likely, consultation continues to identify ways to achieve the project purpose to avoid, minimize, or mitigate adverse effects, taking into consideration the values of the historic property or district, the parts of the undertaking that are essential to achieving the purpose of the project, and the adequacy of planning and of funding to achieve both the project objectives to a satisfactory resolution of adverse effects. Mitigation may include avoidance, alternative treatments, redesign, relocation, data recovery, documentation, and public education initiatives or interpretive measures.

The NPS expects to conclude consultation by including in any ROD a binding commitment to the mitigation measures disclosed in this EIS, as required by 36 CFR § 1508.8.

Mitigation measures specific to the impact topics, where applicable, are presented in appendix F.

The NPS would also establish mechanisms to ensure that all mitigation obligations are met, mitigation measures are monitored for effectiveness, and unsuccessful mitigation is quickly remedied.

In instances where impacts cannot be avoided and mitigation is not feasible, compensation for resources lost or degraded through project construction, operation, and maintenance would be required. Examples of items that cannot be remedied through mitigation include impacts that degrade the scenic and other intrinsic values of the parks or impacts that result in the loss of recreational use and visitor enjoyment. Compensation would be used to help ensure the stewardship of natural, cultural, scenic, and recreational resources, thus allowing for

- acquisition in fee or easement of lands within or adjacent to APPA and DEWA, which would protect resources and create natural connecting corridors to other protected areas, especially the

newly forming Cherry Valley NWR and existing state protected lands in both Pennsylvania and New Jersey;

- implementation of the parks' existing natural, historic and recreational plans;
- continuation of stewardship, restoration, and enhancement of the parks' natural, historic, scenic, and recreational resources; and
- continuation of the parks' involvement in ongoing landscape-scale conservation connectivity initiatives, strategies, and resource monitoring.

DEWA, MDSR, and APPA are not found in isolation; rather they are important anchors within a larger system of connected lands and waters in Pennsylvania, New Jersey, and New York and play a key role in sustaining the health and values of the local and regional natural environment and economy. While ongoing planning efforts and initiatives continue to protect the natural, historic, scenic, and recreational resources of the area, ensuring their perpetuation is paramount in maintaining the character and vitality of these resources in perpetuity. While the NPS cannot require the applicant to implement mitigation and compensation measures outside NPS jurisdiction, the NPS encourages the applicant to reduce or eliminate, to the greatest extent possible, all potential adverse impacts by looking beyond boundaries and contributing to conservation initiatives and strategies so that resources are protected at all affected scales.

The applicant submitted a draft Mitigation Concept S-R Line Project to the NPS in May 2011. This draft mitigation plan is included in appendix F.

SUMMARY OF IMPACTS

Chapter 4 of this document describes the effects of each alternative on each resource topic. These impacts are summarized in table 4 at the end of this chapter.

NPS PREFERRED ALTERNATIVE

The Council on Environmental Quality (CEQ) regulations for implementing NEPA require that an agency identify its preferred alternative or alternatives in a final EIS [1502.14(e)]. The preferred alternative is the alternative "which the agency believes would fulfill its statutory mission and responsibilities, giving consideration to economic, environmental, technical and other factors" (Question 4a of the CEQ's "Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations" (CEQ 1981).).

Having considered all of the available information, the NPS has identified its preferred alternative as alternative 2, which is the applicant's proposed route, utilizing the existing transmission alignment with the additional requested ROW. Alternative 2 was identified as the preferred alternative for the following reasons.

The NPS has a responsibility to manage and protect the resources within the units of the national park system. The NPS also has a duty to respect the property rights of those who own lands or other property interests within the boundaries of units of the national park system and not to interfere unreasonably with the legitimate exercise of those property rights. In considering the applicant's proposal, the group considered the nature and extent of the existing property rights that the applicant claims it could exercise with no additional rights granted by the NPS (alternative 2b) and the impacts to park resources that would result; in some cases, selection and implementation of that alternative would cause more impacts than if the NPS granted the additional ROW that the applicant has requested (alternative 2). Other alternatives evaluated would have fewer impacts on park resources (alternatives 4 and 5) as long as the applicants

voluntarily exchange their existing easements for new easements or rights-of-way granted by the NPS; to date, the applicant has shown no inclination to do so. Thus, while these scenarios meet the NEPA mandate to consider reasonable alternatives and mitigation measures that may be outside the agency's authority, the NPS ultimately made its decision based on what it may legally require and implement. Therefore, the NPS has identified alternative 2 as the preferred alternative, with the incorporation of mitigation as explained below.

The NPS's mission is to protect and conserve the resources of the units of the national park system in accordance with the enabling legislation, purpose, and significance of each unit. As shown in the impact analysis presented in the draft EIS, alternative 2 has the potential to result in a very high level of impact on a variety of important resources found along the existing transmission corridor, higher than some of the other action alternatives evaluated and much higher than the environmentally preferable alternative (Alternative 1: No Action, i.e., no change in existing on-the-ground conditions). Thus, the identification of alternative 2 as the NPS preferred alternative is contingent on several revised assumptions, as stated in the applicant's comments, and the implementation of mitigation measures, as explained below.

The most critical mitigation measures to the NPS are those that avoid and minimize adverse impacts to park resources. The draft EIS analyzed the impacts of alternative 2 based on the information provided by the applicant in their permit application package. In their comments on the draft EIS, the applicant outlined additional measures to avoid and minimize impacts to park resources, which were not identified in the draft EIS. The applicant indicated they would be willing to implement these measures, which the NPS would require, most notably:

- Most of the access roads would be temporary and would be revegetated and/or restored to natural conditions after construction, rather than be maintained as permanent roads as described in the draft EIS (page 8 of applicant's comments, included in appendix L).
- The applicant would be required to implement necessary measures designed to eliminate the potential for off-road vehicle (ORV) use on temporary and permanent access roads (page 8 of applicant's comments).
- The applicant has conducted additional consultation with the U.S. Fish and Wildlife Service (USFWS) and agreed to implement necessary measures to avoid and minimize adverse impacts to federally listed bog turtles (pages 8–9 of applicant's comments). These measures would be required by the NPS as part of the permit.
- Installation of foundations for towers would be limited to drilling rather than blasting, which would minimize the potential for fracturing limestone formations, and geotechnical investigations would be performed prior to finalizing specific foundation design (page 11 of applicant's comments).
- Different design options, structure types, and construction methods would be utilized that would reduce or eliminate the need for access road construction near sensitive resources, assuming these different options do not increase impacts elsewhere (page 11 of applicant's comments).
- The access road originally proposed through Arnott Fen would no longer be constructed. An alternative road has been identified and would be used instead (pages 46–47 of applicant's comments).
- No access roads would be constructed within 200 feet of MDSR, as stated in the draft EIS (page 47 of applicant's comments).

- Additional archeological studies have identified specific sites and all effects can be eliminated by implementing avoidance and non-ground-disturbing construction techniques (page 48 of the applicant's comments).

A copy of the applicant's comments may be found in appendix L of this final EIS.

These proposed changes in project design, construction, and maintenance, including required mitigation measures, have been incorporated into the alternative 2 description and are an integral component of the preferred alternative.

In addition, the applicant would cover the cost of hiring monitoring staff, either NPS or contractors, to monitor all construction activities.

The preferred alternative also includes mitigation in the form of compensation for unavoidable adverse impacts. However, the NPS approach would be to first work with the applicant to incorporate all practicable measures to avoid or minimize adverse impacts through changes in project design, construction techniques, and restoration of affected resources. Compensation would only be considered for adverse impacts that cannot be completely avoided.

ENVIRONMENTALLY PREFERABLE ALTERNATIVE

The NPS has determined that alternative 1 (no action) is the environmentally preferable alternative. The NPS made this determination based on the analysis of the scientific data about the proposal and included mitigation provided by the applicant and collected by NPS contractors. The environmentally preferable alternative is the alternative that would promote the requirements of the national environmental policy expressed in section 101(b) of NEPA. It is the alternative that causes the least damage to the biological and physical environment and that best protects, preserves, and enhances historic, cultural, and natural resources (CEQ 1981, Q6a). Under the present circumstances, the no-action alternative clearly best meets these requirements.

Alternative 1 would result in the least amount of damage to the biological and physical environment. As the data show, all the alternatives would have some degree of direct and indirect adverse impact on the resources identified within the study area. No alternative would produce a net benefit or even keep conditions completely neutral; they would all be negative from an environmental point of view. However, overall, alternative 1 would result in the least damage among the alternatives. Alternative 1 would leave the existing B-K Line ROW in place, essentially maintaining conditions at status quo, with the exception of increased vegetation management, which would be likely to occur along the corridor of all the alternatives due to implementation of the newest NERC safety standards. Nonetheless, the relatively minor impacts of additional cutting and clearing in the existing ROW are outweighed by the more significant environmental damage that would certainly occur with the construction and operation of a larger transmission line within the parks along any of the other proposed alternatives, including the two proposed by the applicant.

Some of the action alternatives would have modestly beneficial environmental impacts on certain resources, but they are insufficient to offset the considerable environmental harm these same actions would also produce. Benefits would be marginal, and is not apparent from the analysis that any of them would necessarily counterbalance or outweigh the environmental damages caused by the proposed project. The benefits are not so great or widespread that they eclipse or significantly diminish the adverse impacts described by the data. Thus, they are not sufficiently persuasive to overcome the abundant evidence of the environmental damage that would occur if the project were to move forward.

For these reasons, the NPS finds that alternative 1 would cause the least damage to the biological and physical environment and would best protect and preserve the scenic, historic, cultural, and natural resources of the parks involved. Therefore, alternative 1 would best promote the national environmental policy of NEPA and must be selected as the environmentally preferable alternative.

SUMMARY—CONSISTENCY WITH SECTIONS 101(B) AND 102(1) OF NEPA

The CEQ regulations require that the EIS include an analysis of how each alternative meets or achieves the purposes of NEPA, as stated in sections 101(b) and 102(1) [40 CFR § 1502.2(d))]. Each alternative analyzed in a NEPA document must be assessed as to how it meets the following purposes:

1. Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.
2. Ensure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings.
3. Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences.
4. Preserve important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice.
5. Achieve a balance between population and resource use that would permit high standards of living and a wide sharing of life's amenities.
6. Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

The CEQ regulations further establish policy for federal agency implementation of NEPA, stating "federal agencies shall to the fullest extent possible interpret and administer policies, regulations, and public laws of the United States in accordance with the policies set forth in the Act and these regulations" [40 CFR § 1502.2(a)]; therefore, other acts and NPS policies are referenced as applicable in the following discussion.

1. *Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations*.

   Alternative 1 would meet the purpose of fulfilling the responsibilities of each generation as trustee for the environment. Although some impacts would continue to occur to vegetation, wetlands, floodplains, landscape connectivity, special status species, rare and unique communities, cultural landscapes, and visual resources, none of the impacts would change the existing conditions of the resources. Impacts would not adversely affect population viability, overall habitat quality, or functions and values of unique communities.

   Alternative 2 would be less consistent than alternative 1 with the purpose of fulfilling the responsibilities of each generation as trustee for the environment due to the magnitude and severity of impacts to resources. Alternative 2 would result in permanent habitat loss and habitat fragmentation from the clearing and reduction of vegetation. Alternative 2 would also disturb or degrade habitat for wildlife and special status species including the federally endangered bog turtle and Indiana bat. Impacts to migratory birds would occur because alternative 2 bisects a major migratory bird flyway and an increase in bird collision is likely. In addition, the transmission line would be located next to one of only two known communal roosts for wintering

bald eagles and collision risk would be especially high as eagles move to and from the roost. Drilling activities associated with alternative 2 could damage or destroy unique geological formations. Overall, substantial impacts to geologic resources, wetlands, vegetation, landscape connectivity, wildlife, and rare and unique communities would occur.

Alternative 2b would be less consistent than alternative 1 with the purpose of fulfilling the responsibilities of each generation as trustee for the environment due to the magnitude and severity of impacts to resource. Alternative 2b would result in permanent habitat loss and habitat fragmentation from the clearing and reduction of vegetation. Alternative 2b would also disturb or degrade habitat for wildlife and special status species including the federally endangered bog turtle and Indiana bat. Impacts to migratory birds would occur because Alternative 2b bisects a major migratory bird flyway and an increase in bird collision is likely. In addition, the transmission line would be located next to one of only two known communal roosts for wintering bald eagles and collision risk would be especially high as eagles move to and from the roost. Drilling activities associated with alternative 2b would damage or destroy unique geological formations. Overall, substantial impacts to geologic resources, wetlands, vegetation, landscape connectivity, wildlife, and rare and unique communities would occur.

Alternative 3 would have substantial impacts on geologic resources, wetlands, vegetation, rare and unique communities, and special status species. Excavation and drilling activities would create impacts to geologic resources also affecting the function of wetlands and surface waters. Drilling and excavation also have the potential to destroy habitat for the state-listed timber rattlesnake. Vegetation clearing would impact mature forests, create additional edge habitat, and increase the risk of invasive species to establish. The transmission line would also bisect a major migratory flyway of the Kittatinny Ridge creating aerial hazards for migratory birds. The removal of the existing transmission line would create beneficial impacts through the rehabilitation of vegetation and reducing the risk of bald eagle collisions. For these reasons, alternative 3 would be less consistent than alternative 1 with the purpose of fulfilling the responsibilities of each generation as trustee to the environment.

Alternative 4 and 5 would have similar substantial impacts to special status species, wetlands, rare and unique communities, and landscape connectivity. A loss of wetlands would occur from the construction of permanent access roads. The clearing of vegetation would increase habitat fragmentation, impact wildlife, and rare and unique communities including Kittatinny Ridge and the Minsi Lake Corridor, which support migratory birds, and special status species. The removal of the existing transmission line would create beneficial impacts through the rehabilitation of vegetation and by reducing the risk of bald eagle collisions. For these reasons, alternatives 4 and 5 would be less consistent than alternative 1 with the purpose of fulfilling the responsibilities of each generation as trustee to the environment.

2. *Ensure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings.*

   Alternative 1 would meet the purpose of ensuring for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings. Alternative 1 would not affect public health and safety as operation and maintenance of the existing transmission line would continue. Although alternative 1 would have some impacts to the cultural landscape and visual resources, there would be no change to the baseline or existing conditions. The existing line has been present at the parks since the parks were established and were thus part of the existing conditions.

   Alternative 2 would create temporary impacts to public health and safety during the construction activities associated with the transmission line. The installation of taller towers would degrade the wilderness viewshed and cultural landscape and create adverse impacts to the visitor experience.

The transmission line would also distract from the scenic values along the Delaware River. These visual impacts would occur over a relatively large area and would impact a number of park users. Therefore, alternative 2 would be less consistent than alternative 1 with the purpose of ensuring all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings.

Alternative 2b would have similar impacts to alternative 2. In addition to the temporary impacts to public health and safety associated with construction activities, alternative 2b would have an increased risk of live wires contacting nearby trees. Because the existing ROW would not be expanded, alternative 2b would not meet NERC standards and the potential for forest fires exists which would create substantial public health and safety impacts. In addition to the public health and safety impacts, alternative 2b would have similar impacts to the viewshed and cultural landscape described above. For these reasons, alternative 2b would be less consistent than alternative 1 with the purpose of ensuring all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings.

Alternative 3 would create temporary impacts to public health and safety during the construction period. The visibility of the new towers along alternative 3 would adversely impact the scenic nature of the parks. The towers would be clearly visible along the Kittatinny Ridge from the Delaware River, McDade Trail, and other popular park sites by numerous park visitors. In addition, the construction of the transmission line would severely degrade the cultural landscape. Therefore, alternative 3 would be less consistent than alternative 1 with the purpose of ensuring all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings.

Alternatives 4 and 5 would have temporary impacts to public health and safety during construction activities. In addition to impacts within the park, impacts to public health and safety would also occur within other federal lands, trails, private properties, and local roads. Impacts to the visual resources would occur along the portion of APPA where the transmission line would cross. The presence of the large tower would diminish the integrity of the viewshed and cultural landscape; however the area impacted would be relatively small when compared to other alternatives. Therefore, alternatives 4 and 5 would be less consistent than alternative 1 with the purpose of ensuring all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings.

3. *Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences.*

Alternative 1 would meet the purpose of attaining the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequence. Although alternative 1 would have temporary impacts to public health and safety and visitor use and experience during the construction period, no changes to the visitor opportunities would occur in the long-term. The existing line has been present at the parks since the parks were established and were thus part of the existing conditions.

Alternatives 2, 2b, and 3 would be less consistent than alternative 1 with the purpose of attaining the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequence. As discussed above, temporary impacts to public health and safety would occur during construction activities. Additional impacts to public health and safety would occur under alternative 2b since the ROW would not comply with NERC standards. Although, the aesthetic resources and scenic vistas would be degraded, visitor opportunities throughout the park would continue to occur following the construction of the transmission line.

Alternatives 4 and 5 would meet the purpose of attaining the widest range of beneficial uses of the environment without degradation, risk of health and safety, or other undesirable and

unintended consequences. Temporary impacts to public health and safety would occur during the construction activities as discussed previously. The scenic viewshed would be impacted in the portion of APPA where the transmission line will cross; however, use of the trail would continue to occur. Other visitor activities within DEWA would not be impacted.

4. *Preserve important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice.*

   Alternative 1 would meet the purpose of preserving important historic, cultural, and natural aspects of our natural heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice. Alternative 1 would continue maintenance of the existing ROW corridor in addition to implementing the new vegetation management standards. Although some impacts would continue to occur to vegetation, wetlands, floodplains, landscape connectivity, special status species, rare and unique communities, cultural landscapes, and visual resources, none of the impacts would change the existing conditions of the resources. The existing line has been present at the parks since the parks were established and were thus part of the existing conditions.

   Alternatives 2 and 2b would cross through the APPA and the center of DEWA, including MDSR, which includes large areas of mature forests, rare and unique communities including Arnott Fen, Hogback Ridge, Kittatinny Ridge, and Van Campen Brook riparian area. In addition, the transmission line would be located next to one of only two known communal roosts for wintering bald eagles and collision risk would be especially high as eagles move to and from the roost. The transmission line would cross areas with high concentrations of cultural resources including pre-Columbian fishing camps and 36 historic structures. The implementation of alternatives 2 and 2b would have an adverse effect on at least 17 historic structures, 18 cultural landscapes and 1 archeological sites from physical disturbance or the visual intrusion of the transmission line. Therefore, alternatives 2 and 2b would be less consistent than alternative 1 with the purpose of preserving important historic, cultural, and natural aspects of our natural heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice.

   Alternative 3 would bisect large areas of riparian forests, eastern hemlock forests, unique ecosystems, and the Kittatinny Ridge that provide habitat for wildlife such as migratory birds and rare plant and animal communities. In addition, alternative 3 would have an adverse effect on at least 7 historic structures, 6 cultural landscapes, and 1 archeological site. The construction of the transmission line would create adverse effects from the visual intrusion of the line and through the alteration of character defining features of the landscapes. For these reasons, alternative 3 would be less consistent than alternative 1 with the purpose of preserving important historic, cultural, and natural aspects of our natural heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice.

   Alternatives 4 and 5 would be less consistent than alternative 1 with the purpose of preserving important historic, cultural, and natural aspects of our natural heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice. The transmission line under these alternatives would bisect two unique ecosystems, including Kittatinny Ridge and the Minsi Lake Corridor. These areas provide high quality habitat for a variety of wildlife including migratory birds, forest-dependent wildlife, and vernal pool-dependent wildlife. In addition, the transmission line would traverse through two cultural landscapes including the Appalachian Trail and Totts Gap Farm. In addition, alternatives 4 and 5 would have an adverse effect on at least 4 historic structures, 4 cultural landscapes, and 1 archeological site. The cultural landscapes would be adversely impacted under alternatives 4 and 5 through the alteration of character-defining features.

5. *Achieve a balance between population and resource use that would permit high standards of living and a wide sharing of life's amenities.*

   As discussed above, alternative 1 would continue maintenance of the existing ROW corridor in addition to implementing the new vegetation management standards. Although alternative 1 would have some impacts to the natural and physical resources of the park, there would be no change to the baseline or existing conditions. The existing line has been present at the parks since the parks were established and were thus part of the existing conditions. Therefore, the resources would remain unimpaired for the enjoyment of present and future generations. Alternative 1 would meet the purpose of achieving a balance between population and resource use that would permit high standards of living and a wide sharing of life's amenities.

   Alternatives 2 and 2b would result in substantial impacts to geologic resources; wetlands; vegetation; landscape connectivity, wildlife habitat, and wildlife; special-status species; rare and unique communities; archeological resources; historic structures; cultural landscapes; socioeconomics; infrastructure, access and circulation; visual resources; visitor use and experience; wild and scenic rivers; and park operations. Alternative 2b would also have substantial impacts to human health and safety. Under the enabling legislation and Organic Act, the NPS is charged with protecting the scenic, natural, cultural, and archeological resources at each park. In addition, the enabling legislation for all three parks specifically identifies scenery as a park key resource. The permanent removal of vegetation and installation of visibly apparent towers would degrade the integrity of resources and the scenic landscape. These impacts would be widely distributed across the parks wherever the line is visible to visitors and have the potential to violate the Organic Act. For these reasons, there is potential for the resources to become unavailable for the enjoyment of future generations. Therefore, alternatives 2 and 2b would be less consistent than alternative 1 with the purpose of achieving a balance between population and resource use that would permit high standards of living and a wide sharing of life's amenities.

   Alternative 3 would have substantial impacts to geologic resources; vegetation; landscape connectivity, wildlife habitat, and wildlife; special-status species; rare and unique communities; archeological resources; historic structures; cultural landscapes; socioeconomics; infrastructure, access, and circulation; visual resources; visitor use and experience; wild and scenic rivers; and park operations. The expansion of the ROW and installation of towers would visibly change the scenic landscape of a relatively large area and for a large number of park users. The impacts to migratory birds along Kittatinny Ridge would violate NPS policies and mandates and would counter one of the underlying purposes of the establishment of the parks. Alternative 3 also violates the purpose and significance of the parks to preserve the natural, cultural, and scenic resources within them. Therefore, alternative 3 would be less consistent than alternative 1 with the purpose of achieving a balance between population and resource use that would permit high standards of living and a wide sharing of life's amenities.

   Alternatives 4 and 5 would have substantial impacts to geologic resources; wetlands; rare and unique communities; archeological resources; historic structures; cultural landscapes; socioeconomics; infrastructure, access and circulation; visual resources; visitor use and experience; and wild and scenic rivers. The scenic landscape along portions of the Appalachian Trail would be diminished due to the construction of 200 foot towers. Impacts to cultural resources would also be attributed to the visual impacts from the construction of the towers and ROW clearing. Because the impacted area would be relatively small, park resources would likely remain unimpaired for the enjoyment of present and future generations, alternatives 4 and 5 would be less consistent than alternative 1 with the purpose of not meet the purpose of achieving a balance between population and resource use that would permit high standards of living and a wide sharing of life's amenities.

6. *Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.*

   None of the alternatives would meet the purpose of enhancing the quality of renewable resources and approach the maximum attainable recycling of depletable resources. Alternative 1 would continue to transport energy generated from fossil fuels. Alternatives 2, 2b, 3, 4, and 5 would include the construction of a double circuit 500-kV transmission line in order to transport more energy within the regional area. The action alternatives would result in the use and burning of additional non-renewable fossil fuels. In addition, the construction of the transmission line would require use and degradation of many non-renewable resources. During construction the use of fossil fuels for operation of construction equipment would be required. Some of the parks' natural, physical, and cultural resources impacted during construction are non-renewable which makes any impacts to them all the more serious as they cannot be replaced if lost.

TABLE 4: IMPACTS OF THE ALTERNATIVES

Resource	Alternative 1: No-Action Alternative	Alternative 2: The Applicant's Proposed Route	Alternative 2b	Alternative 3	Alternative 4	Alternative 5
Geologic Resources	No impacts from vegetation maintenance activities on geology and topography; vegetation maintenance could increase access to and visibility of paleontological specimens, particularly at previously identified sites. No significant impacts.	Impacts from tower construction and grading on geology, topography, and paleontology; the installation of **7 tower foundations/crane pads** in rare or unique features and in unstable geologic formations and **12** in areas with slopes greater than 10%, could impact geologic resources; drilling and excavation could disturb paleontological resources. Significant impacts.	Same as alternative 2.	Impacts on geology due to the drilling, and excavation activities; the installation of **at least 25 tower foundations/crane pads** in areas with slopes greater than 10% and **11 to 15 towers/crane pads** in unstable areas and in rare or unique geologic features; construction and clearing would impact paleontology through direct damage, collection, or vandalism of paleontological sites. Significant impacts.	Impacts from tower construction and grading on geology, topography, and paleontology; **the installation of 2 tower foundations/crane pads** in areas with slopes greater than 10% and in unstable areas; no towers would be constructed within rare or unique geology inside the study area; construction and clearing would impact paleontology through direct damage, collection, or vandalism of paleontological sites. Significant impacts.	Impacts from tower construction and grading on geology, topography, and paleontology; **the installation of 2 tower foundations/crane pads** in areas with unstable geologic formations and 1 in an area with slopes greater than 10%; no towers would be constructed within rare or unique geology inside the study area; construction and clearing would impact paleontology through direct damage, collection, or vandalism of paleontological sites. Significant impacts.
Floodplains	Impacts from vegetation maintenance in the floodplain; vegetation clearing would impact some floodplain functions and values, but is not likely to affect overall natural floodplain values. No significant impacts.	A maximum of **14.3 acres of vegetation in the floodplain** would be affected by vegetation management; access roads and crane pads would develop **0.14 acre of the floodplain**. No significant impacts.	A maximum of **8.4 acres of vegetation in the floodplain** would be affected by vegetation management; access roads and crane pads would develop **0.14 acre of the floodplain**. No significant impacts.	A maximum **of 7.9 acres of vegetation in the floodplain** would be affected by vegetation management; access roads and crane pads would develop **0.22 acre of the floodplain**. No significant impacts.	**No vegetation in the floodplain** would be cleared; access roads and crane pads would develop **0.16 acre of the floodplain**. No significant impacts.	**No vegetation in the floodplain** would be cleared and **no development in the floodplain** would occur. No significant impacts.
Wetlands	Impact from vegetation maintenance, resulting in **conversion of 8.64 acres of wetlands** to scrub shrub or emergent wetlands; 5.46 acres of rare and unique wetlands, which are also Exceptional Value Wetlands, would be affected. No significant impacts.	Impacts from clearing wetlands, resulting in **conversion of 20.28 acres of forested wetlands** to scrub shrub and/or emergent wetlands; construction of access roads and crane pads in wetlands (1.02 acres), and from drilling activities; **15.22 acres of Exceptional Value Wetlands and/or rare and unique wetlands** would be affected. Significant impacts.	Impacts from clearing wetlands, resulting in **conversion of 10.28 acres of forested wetlands** to scrub shrub and/or emergent wetlands; construction of access roads and crane pads in wetlands (1.01 acres), and from drilling activities; **6.35 acres of Exceptional Value Wetlands and/or rare and unique wetlands** would be affected. Significant impacts.	Impacts from clearing wetlands, resulting in **conversion of 1.93 acres of forested wetlands** to scrub shrub and/or emergent wetlands; construction of access roads in wetlands (0.02 acres) and from drilling activities; no permanent impacts on Exceptional Value Wetlands and/or rare and unique wetlands. No significant impacts.	Impacts from clearing wetlands, resulting in **conversion of 4.52 acres of forested wetlands** to scrub shrub and/or emergent wetlands; construction of access roads in wetlands (0.09 acres) and from drilling activities; no permanent impacts on Exceptional Value Wetlands and/or rare and unique wetlands. Significant impacts.	Impacts from clearing wetlands, resulting in **conversion of 4.31 acres of forested wetlands** to scrub shrub and/or emergent wetlands; construction of access roads in wetlands (0.09 acres) and from drilling activities; no permanent impacts on Exceptional Value Wetlands and/or rare and unique wetlands. Significant impacts.
Vegetation	Impacts would result from vegetation maintenance activities and maintenance of scrub shrub habitat in the ROW; functionality of the plant communities would not be affected. No significant impacts.	Approximately **240 acres of vegetation would be cleared** in the ROW, 129 acres of this which is mature forest; impacts would also result from spread of invasive species, vegetation maintenance activities, and vegetation clearing from other construction activities outside the ROW (25.4 acres); functionality of the plant communities would decline. Significant impacts.	Approximately **144 acres of vegetation would be cleared in the ROW**, 42 acres of this which is mature forest; impacts would also result from spread of invasive species, vegetation maintenance activities, and vegetation clearing from other construction activities outside the ROW (26.7 acres); functionality of the plant communities would decline. Significant impacts.	Approximately **313 acres of vegetation would be cleared in the ROW**, 204 acres of this which is mature forest; impacts would also result from spread of invasive species, vegetation maintenance activities, and vegetation clearing from other construction activities outside the ROW (100.6 acres); functionality of the plant communities would decline. Significant impacts.	Approximately **113 acres of vegetation would be cleared in the ROW**, 70 acres of this which is mature forest; impacts would also result from spread of invasive species, vegetation maintenance activities, and vegetation clearing from other construction activities outside the ROW (55.9 acres); functionality of the plant communities would decline. No significant impacts.	Approximately **74 acres of vegetation would be cleared in the ROW**, 44 acres of this which is mature forest; impacts would also result from spread of invasive species, vegetation maintenance activities, and vegetation clearing from other construction activities outside the ROW (55.3 acres); functionality of the plant communities would decline. No significant impacts.

Resource	Alternative 1: No-Action Alternative	Alternative 2: The Applicant's Proposed Route	Alternative 2b	Alternative 3	Alternative 4	Alternative 5
Landscape Connectivity, Wildlife Habitat, and Wildlife	Impacts would result from the continued maintenance of the ROW, loss of habitat from removal of danger trees outside the ROW, and disturbance and direct mortality of wildlife. No significant impacts.	Impacts would result from habitat loss, habitat alteration, the continued maintenance of the ROW, the isolation of habitat patches, increased edge habitat, the disturbance and direct mortality of wildlife, and the isolation of some species. Significant impacts.	Same as alternative 2.	Impacts would result from habitat loss, habitat alteration, the continued maintenance of the ROW, the isolation of habitat patches, increased edge habitat, the disturbance and direct mortality of wildlife, and the isolation of some species. Benefit from restoration of the B-K Line, resulting in larger patches of contiguous habitat. Significant impacts.	Impacts would result from habitat loss, habitat alteration, the continued maintenance of the ROW, the isolation of habitat patches, increased edge habitat, the disturbance and direct mortality of wildlife, and the isolation of some species. Benefit from restoration of the B-K Line, resulting in larger patches of contiguous habitat, and moving the infrastructure to the edge of DEWA. No significant impacts.	Impacts would result from habitat loss, habitat alteration, the continued maintenance of the ROW, the isolation of habitat patches, increased edge habitat, the disturbance and direct mortality of wildlife, and the isolation of some species. Benefit from restoration of the B-K Line, resulting in larger patches of contiguous habitat, and moving the infrastructure to the edge of DEWA. No significant impacts.
Special-status Species Overall*	No significant impacts.	Significant impacts.	Significant impacts.	Significant impacts.	No significant impacts.	No significant impacts.
Special-status Species: Aquatic Species	Impacts from temporary changes to water quality during maintenance activities.	Impacts from direct mortality, habitat loss, and some changes to habitat during construction and maintenance activities.	Same as alternative 2.	Impacts from changes to habitat during construction and maintenance activities.	No impact because no aquatic species are likely to exist in the ROW.	Same as alternative 4.
Special-status Species: Terrestrial Invertebrate Species	Vegetation maintenance activity would maintain and could expand suitable habitat (herbaceous).	Same as alternative 1.	Same as alternative 1.	N/A	N/A	N/A
Special-status Species: Birds	Impacts from maintenance activities could destroy nesting habitat and disturb breeding/nesting activities; conversely maintenance could create additional scrub shrub habitat in ROW; electrocution/collision potential.	Impacts from construction of line resulting in habitat loss, from presence of line resulting in collision or electrocution, and from disturbance during construction and maintenance activities; could create additional scrub shrub habitat in ROW; this alternative would not be consistent with the Bald Eagle Guidelines.	Same as alternative 2.	Same as alternative 2.	Impacts from construction of line resulting in habitat loss, from presence of line resulting in collision or electrocution, and from disturbance during construction and maintenance activities; could create additional scrub shrub habitat in ROW; this alternative would be consistent with the Bald Eagle Guidelines.	Same as alternative 4.
Special-status Species: Reptiles and Amphibians	Impacts from maintenance and human activities from disturbance of denning, basking, foraging, nesting, and breeding activities as well as introduction of invasive species.	Impacts from direct mortality, destruction of nests and/or overwintering areas; impacts on habitat used for foraging and basking; habitat loss / fragmentation / degradation during construction and maintenance activities. Potential for illegal collection of special-status reptiles due to easier access from maintained access roads.	Same as alternative 2.	Same as alternative 2.	Same as alternative 2.	Same as alternative 2.
Special-status Species: Mammals	Impacts from disturbance during maintenance activities and from tree removal in areas with potential habitat.	Impacts from noise and disturbance during construction; loss of potential habitat, including roosting sites or maternity colonies.	Same as alternative 2.	Same as alternative 2.	Same as alternative 2.	Same as alternative 2.
Special-status Species: Plants	Impacts from maintenance activities, including some wetland areas that support listed plants; disturbance as well as introduction of invasive species would occur.	Impacts from forest clearing, construction in wetland areas from access roads and crane pads, and drilling, as well as from vegetation maintenance.	Same as alternative 2.	Same as alternative 2.	Same as alternative 2.	Same as alternative 2.

Resource	Alternative 1: No-Action Alternative	Alternative 2: The Applicant's Proposed Route	Alternative 2b	Alternative 3	Alternative 4	Alternative 5
Rare and Unique Communities	Impacts from artificially maintaining scrub shrub habitat in the park artificially maintaining scrub shrub habitat in the parks; soils and wildlife would be affected. No significant impacts.	Impacts from vegetation clearing, line construction, deconstruction of the existing line, and potential spread of invasive species, as well as artificial maintenance of scrub shrub habitat; six communities would be affected (Arnott Fen, Delaware River Riparian Corridor, eastern hemlock forests, Hogback Ridge, Kittatinny Ridge, Van Campen). Significant impacts.	Same as alternative 2.	Impacts from vegetation clearing, line construction, deconstruction of the existing line, and potential spread of invasive species, as well as artificial maintenance of scrub shrub habitat; three communities would be affected (Delaware River Riparian Corridor, eastern hemlock forests, Kittatinny Ridge). Significant impacts.	Impacts from vegetation clearing, line construction, deconstruction of the existing line, and potential spread of invasive species, as well as artificial maintenance of scrub shrub habitat; for communities would be affected (eastern hemlock forests, Kittatinny Ridge, Minsi Lake / Bear Swamp, Totts Gap). Significant impacts.	Same as alternative 5 but would not impact eastern hemlock forests. Significant impacts.
Archeological Resources	Impacts on archeological sites due to physical impacts from the maintenance of vegetation along the existing ROW. No significant impacts.	Impacts from physical impacts of construction and disturbance of archeological resources; **2 known archeological sites** could be directly affected by construction activities; impacts would depend on the nature and extent of physical disturbance to the archeological resources. **Adverse effects on one site** with prehistoric components Significant impacts.	Same as alternative 2.	Possible impacts from physical impacts of construction and disturbance of archeological resources; **1 potential archeological site** exists along this alternative; impacts would depend on the nature and extent of physical disturbance to the potential archeological resources. **Adverse effects on one site** with historic components. Significant impacts.	Possible impacts from physical impacts of construction and disturbance of archeological resources; **1 potential archeological site** exists along this alternative; impacts would depend on the nature and extent of physical disturbance to the potential archeological resources. **Adverse effects on one site** with prehistoric components. Significant impacts.	Same as alternative 4.
Historic Structures	Impacts from the visual impact of vegetation removal during maintenance activities. No significant impacts.	Impacts on historic structures from physical destruction and removal of vegetation and the visual impact of larger towers and lines, which would diminish the integrity of the setting, feeling, and association of numerous historic structures. **Adverse effects on at least 17 identified historic structures**, one through physical destruction and at least 16 through visual effects. Significant impacts.	Same as alternative 2.	Impacts on historic structures from removal of vegetation and the visual impact of larger towers and lines, which would diminish the integrity of the setting, feeling, and association of numerous historic structures; physical destruction of the B-K Line, an historic structure. **Adverse effects on at least 7 identified historic structures** through visual effects. Significant impacts.	Impacts on historic structure from removal of vegetation and the visual impact of larger towers and lines, which would diminish the integrity of the setting, feeling, and association of numerous historic structures; physical destruction of the B-K Line, an historic structure. **Adverse effects on at least 4 identified historic structures** through visual effects. Significant impacts.	Same as alternative 4.
Cultural Landscapes	Physical and visual impacts of the existing line and vegetation maintenance; would diminish the integrity of setting, feeling, and association of numerous cultural landscapes. No significant impacts.	Impacts on cultural landscapes from vegetation clearing and construction of new towers, altering character-defining features and resulting in measurable changes, thus diminishing the overall integrity of the resources, or producing noticeable changes or alterations to the character-defining features of the cultural landscapes. **Adverse effects on 18 cultural landscapes** through visual intrusions and physical impacts. Significant impacts.	Same as alternative 2.	Impacts on cultural landscapes from vegetation clearing and construction of new towers, altering character-defining features and resulting in measurable changes, thus diminishing the overall integrity of the resources. **Adverse effects on 6 cultural landscapes** through visual intrusions and physical impacts. Significant impacts.	Impacts on cultural landscapes from vegetation clearing and construction of new towers, altering character-defining features and resulting in measurable changes, thus diminishing the overall integrity of the resources. **Adverse effects on 4 cultural landscapes** through visual intrusions and physical impacts. Significant impacts.	Same as alternative 4.

Resource	Alternative 1: No-Action Alternative	Alternative 2: The Applicant's Proposed Route	Alternative 2b	Alternative 3	Alternative 4	Alternative 5
Socioeconomics	No impact on socioeconomics. No significant impacts.	Impacts to the local and regional economy due to changes in recreation, visitation, tourism, and agricultural revenue. Opportunity for job placement during the construction period. Significant impacts.	Same as alternative 2.	Same as alternative 2.	Same as alternative 2.	Same as alternative 2.
Infrastructure, Access, and Circulation	Temporary, brief road closures or detours during the maintenance periods. Hamilton Trail in New Jersey, the McDade Trail near Community Drive, and part of the Van Campen Glen Trail would be used for maintenance activities. No significant impacts.	Use of heavy construction equipment on historic River Road and 1.5 miles of Old Mine Road would result in impacts on infrastructure. Impacts on access and circulation would occur at specific locations during the construction period. Significant impacts.	Same as alternative 2.	Use of heavy construction equipment on approximately 4.5 miles of River Road and 6.5 miles of Old Mine Road would result in impacts to infrastructure. Impacts on access and circulation would occur at specific locations during the construction period. Benefit from removal of large infrastructure along the B-K Line under alternative 3. Significant impacts.	The use of heavy equipment on NPS Drive, Totts Gap Road, and Mountain Road would result in impacts to infrastructure. Impacts on access and circulation would occur during the construction period at specific locations. Benefit from removal of large infrastructure along the B-K Line under alternative 4. Significant impacts.	Same as alternative 4.
Visual Resources	The presence of the existing alignment would affect visual intactness from continued operation of the existing transmission line. No significant impacts.	Changes to visual resources from the deconstruction and construction activities would be most apparent along Millbrook Flatbrook Road and Old Mine Road in New Jersey. Affected sites in Pennsylvania potentially include Fernwood Resort, Pennsylvania Hwy 209 near Bushkill, McDade Trail, the cultural landscape related to the Schoonover house, and Community Drive. Affected sites in New Jersey potentially include Van Campen Glen, Hamilton, and Pioneer trails, Watergate Recreation Site, and Millbrook Village. The higher towers would also impact the viewshed at Walpack Bend, and the Appalachian Trail. Significant impacts.	Changes to visual resources from the deconstruction and construction activities would be similar to alternative 2. The impacts would be most apparent along McDade Trail near the Schoonover House and Community Drive, and MDSR. There would be two additional nearly 200-foot towers. Significant impacts.	Changes to visual resources from the deconstruction and construction activities would be most apparent along McDade Trail, Old Mine Road, MDSR, and APPA. Improved visual cohesiveness and unity resulting from the unobstructed natural forest cover within due to the removal of the existing B-K Line, but there would be greater visual impact along the alternative 3 ROW from two sets of structures. Line would also be visible from popular recreation sites, including Smithfield Beach and Hialeah Air Park Significant impacts.	Changes to visual resources from the deconstruction and construction activities would be most apparent where the line would be in proximity to APPA, but would also occur at Mount Tammany summit and the Karamac Trail. Improved visual cohesiveness and unity resulting from the unobstructed natural forest cover within due to the removal of the existing B-K Line, but there would be greater visual impact along the alternative 4 ROW from two sets of structures. Significant impacts.	Changes to visual resources from the deconstruction and construction activities would be most apparent where the transmission line would cross APPA because it would also be intersected by an access road. Improved visual cohesiveness and unity resulting from the unobstructed natural forest cover within due to the removal of the existing B-K Line, but there would be greater visual impact along the alternative 5 ROW from two sets of structures. Significant impacts.
Soundscapes	Intermittent impacts on soundscapes due to maintenance activities associated with continued operation of the existing transmission line. No significant impacts.	Impacts would result from disturbance during decommissioning, construction, and maintenance activities. Some readily detectable impacts would be expected within 350 feet of the alignment centerline from the operation of the line. No significant impacts.	Same as alternative 2.	Impacts would result from disturbance during decommissioning, construction, and maintenance activities. Some readily detectable impacts would be expected within 300 feet of the alignment centerline during operation and maintenance. No significant impacts.	Same as alternative 2.	Same as alternative 2.

Resource	Alternative 1: No-Action Alternative	Alternative 2: The Applicant's Proposed Route	Alternative 2b	Alternative 3	Alternative 4	Alternative 5
Visitor Use and Experience	Impacts would result primarily from the continued visual impacts of the existing transmission line. Noise and visual intrusions would result in slight impacts during maintenance activities. No significant impacts.	Impacts to visitor use and experience with the most intense impacts at Watergate Recreation Site. Visitors would experience impacts where the transmission line crosses APPA. Impacts related to deconstruction and construction would be localized, particularly related to noise. Significant impacts.	Same as alternative 2.	The 90-degree bend of the line would affect views from several vantage points, affecting many visitors. New visual intrusions would be created at Raccoon Ridge along APPA, and would be seen from other vantage points along the trail. Impacts at APPA would occur for 2.5 miles. Construction-related impacts would occur from impacts on soundscapes based on location. Significant impacts.	Impacts would occur at the Red Dot (Tammany) Trail and Karamac Trail. Construction-related impacts would occur from impacts on soundscapes based on location. Significant impacts.	Same as alternative 4.
Wild and Scenic Rivers	**No additional impact** on the values on which the river was designated from any maintenance activities. No significant impacts.	Many of the values for which the river was designated would be perceptibly changed and would result in visual changes that would affect a relatively large area, a large number of users, and would exist for the period of analysis. Significant impacts.	Same as alternative 2.	Many of the values for which the river was designated would be perceptibly changed and would result in visual changes that would affect a relatively large area, a large number of users, and would exist for the period of analysis. Enhancement of MDSR values from the decommissioning and restoration of the B-K alignment. Significant impacts.	Enhancement of MDSR values from the decommissioning and restoration of the B-K Line. Significant impacts.	Same as alternative 4.
Park Operations	Some adverse impacts from continued operation and maintenance of the existing B-K Line. Park staff would monitor vegetation maintenance activities, but the maintenance would not be conducted on a regular basis; there would be **no change in the number of park staff** and no change to the parks' budgets because it is assumed that the applicant would be responsible for the costs associated with the NPS managing the permit. No significant impacts.	Adverse impacts from need for park staff for patrolling, monitoring, and enforcement; Impacts on park operations would result from construction-related activities and monitoring activities; 2 to 3 new employees would be hired; there would be no change to the parks' or divisions' budgets because the applicant would be responsible for the parks' costs associated with the NPS managing the permit. Significant impacts.	Same as alternative 2.	Same as alternative 2.	Adverse impacts, but moderated by shorter construction period, shorter crossing of NPS lands and fewer sensitive resources present. Impacts on park operations would result from construction-related activities and monitoring activities (including actions along APPA); 1 new employee would be hired; there would be no change to the parks' or divisions' budgets because the applicant would be responsible for the parks' costs associated with the NPS managing the permit. No significant impacts.	Same as alternative 4, but impacts may be even less as route does not include section of DEWA west of the Bushkill Substation. No significant impacts.
Health and Safety	Adverse impacts from continuing operation and maintenance of the existing B-K Line. No significant impacts.	Impacts on visitors/staff at DEWA, MDSR, and APPA from potential safety hazards associated with construction, equipment related hazards, and transportation of materials. Impacts to safety would be minimized and temporary. No significant impacts.	Impacts to visitors and staff from potential safety hazards associated with construction activities. Impacts to safety would be minimized and temporary. Additional impacts to health and safety due to fire risk and potential power outages from failure to meet NERC clearance standards. Significant impacts.	Impacts on visitors/staff at DEWA, MDSR, and APPA from potential safety hazards associated with construction, equipment related hazards, and transportation of materials. Impacts for park staff and visitors at APPA slightly less severe than alternative 2 due to a smaller area affected by construction. Impacts to safety would be minimized and temporary. No significant impacts.	Same as alternatives 2 and 3, but area affected is smaller. No significant impacts.	Same as alternative 4, but the area affected is slightly smaller. No significant impacts.

*Significance criteria only evaluated on a resource level, not species specific.