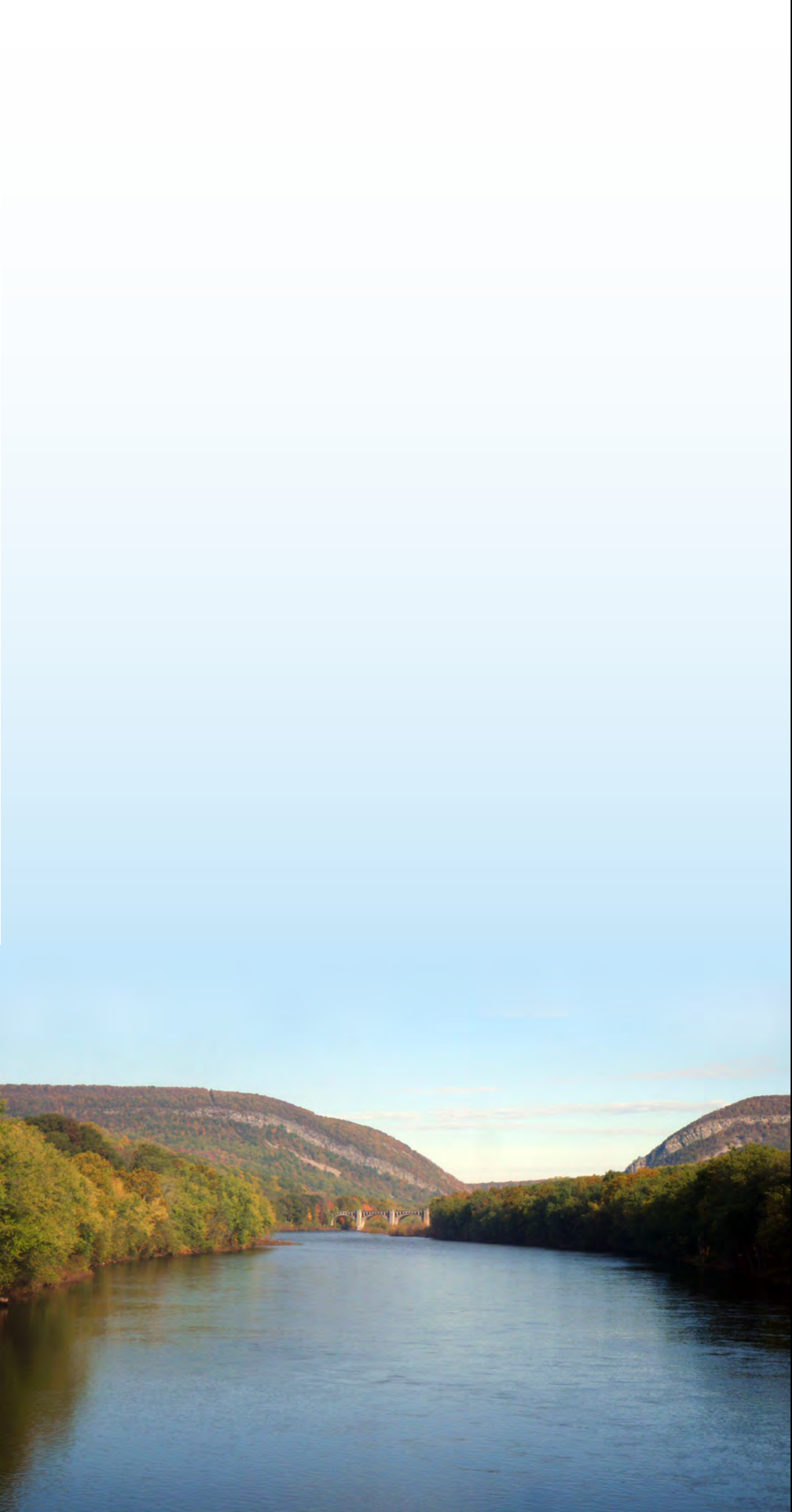


Chapter 4
Environmental Consequences

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This chapter describes the potential environmental consequences of implementing any of the alternatives being considered. It is organized by resource topic and provides a standardized comparison among alternatives based on topics discussed in chapter 1 and further described in chapter 3. In accordance with the CEQ regulations, direct, indirect, and cumulative impacts are described and significance of the impacts is assessed in terms of context, intensity, and duration (40 CFR 1502.16). Mitigating measures for adverse impacts are also described. The analysis for each impact topic includes the methods used to assess the type of impact. As required by the Council on Environmental Quality regulations implementing NEPA, a summary of the environmental consequences for each alternative is provided in table 4, which can be found at the end of chapter 2. Because this document is intended to comply with section 106 of the NHPA, the analysis of cultural resources also contains an assessment of effect.

GENERAL METHODOLOGY FOR MEASURING IMPACTS BY RESOURCE

General Analysis Methods

The analysis of impacts follows Council on Environmental Quality guidelines and Director's Order 12 procedures (NPS 2001a). The analysis incorporates the best available scientific literature applicable to the region and setting, the species and areas being evaluated, and the actions being considered in the alternatives. For each resource topic addressed in this chapter, the applicable analysis methods are discussed, including assumptions.

Assumptions

Several guiding assumptions were made to provide context for this analysis. These assumptions are described below. Additional assumptions about construction and mitigation can be found in chapter 2 and "Appendix F: Mitigation Measures."

Analysis Period

Goals, objectives, and specific implementation actions needed to manage the parks are established for the next 15 years. All actions would be assessed for impacts up to 15 years, the period of analysis for this EIS; however, impacts that are deemed permanent would be defined as such, and are expected to last the duration of the transmission line's existence.

Geographic Area Evaluated for Impacts

The geographic study area for this EIS is defined in terms of visual split locations (VSLs). VSLs are the points outside the parks' boundaries beyond which the route chosen by the applicant could vary, as described in chapter 2 in the "Alternatives Development Process" section. The study area includes the areas inside the VSLs for each alternative (see figure 2 in chapter 2). The VSLs include portions of DEWA, MDSR, and APPA in Pennsylvania and New Jersey. Areas inside the VSLs are evaluated for direct impacts.

Outside the study area, only indirect impacts are evaluated, because the impacts related to constructing and operating the S-R Line would not be caused by activities permitted by the NPS. This generally includes indirect impacts in the counties each alternative traverses, but may follow the specific alignment. But because the NPS cannot require the applicant to follow a certain route beyond the park boundary, the applicant would ultimately be responsible for the exact line routing from the Susquehanna Substation to the Roseland Substation. Specific impacts outside the study area generally cannot be determined because of the physical distance from NPS-authorized activities and the specific resources that would be affected by the transmission line outside the study area cannot be identified until the route is chosen by the applicant.

Study areas vary depending on the resource evaluated; therefore, the specific study area for each impact topic is defined at the beginning of each resource topic discussion.

Transmission Line Impacts

The following assumptions were factored into the impact analysis for the various transmission line alternatives.

- Construction staging locations would be located outside the study area. Therefore, no impacts would occur from staging areas inside the study area. Staging areas are only required during construction; therefore, impacts would be temporary. Staging areas would be located on existing developed or disturbed areas if possible, and if any undeveloped or undisturbed areas are used for staging areas they would be restored to original conditions following construction.
- While the initial construction would include one 230 –kV transmission line and one 500-kV transmission line, the analysis addresses the eventual potential for two 500 -kV lines, which would be hung on the proposed new towers.
- Pulling and splicing sites could be located inside or outside the study area and would require spur roads connecting to the associated tower inside the proposed ROW. These locations are considered temporary; therefore, most impacts would also be temporary. Impacts from tree clearing (loss of habitat) would be permanent. The pulling and splicing sites would be located on existing developed or disturbed areas if possible, and if any undeveloped or undisturbed areas are used they would be restored to original conditions following construction.
- Staging, tower, and pulling and splicing sites would be located to avoid wetlands and sensitive areas inside and outside the study area wherever possible. During planning, design engineers would work closely with park staff to avoid sensitive areas within park boundaries.
- New transmission towers would be permanent, resulting in impacts both inside and outside the study area.
- During construction, access roads would be 20 feet wide, located both inside and outside the study area, and composed of compacted dirt or gravel. Once construction is complete, the access roads would be narrowed to 15 feet wide. The wider width would be needed during construction to accommodate large construction vehicles. Access roads are considered permanent because they would be used for maintenance activities once construction is complete. Therefore, permanent impacts would occur from access roads inside and outside the study area.
- Spur roads (such as those for the pulling and splicing sites) would also be needed. These would be 20 feet wide and composed of compacted dirt or gravel. These roads are only needed during construction and would be restored to original conditions following construction.

- For alternatives 3 through 5, each ROW has an existing transmission line. The proposed alternatives would include existing facilities in addition to the proposed transmission towers and lines.
- Vegetation clearing for construction would comply with NERC standards (NERC 2009).

Duration and Type of Impacts

The following definitions are used for all impact topics unless otherwise noted:

Beneficial: An impact that would result in a positive change to the resource when compared to the existing conditions.

Adverse: An impact that causes an unfavorable result to the resource when compared to the existing conditions.

Direct: Impacts that would occur as a result of the proposed action at the same time and place of implementation (40 CFR 1508.8).

Indirect: Impacts that would occur as a result of the proposed action but later in time or farther in distance from the action (40 CFR 1508.8).

Future Trends

Visitor use and demand are anticipated to follow trends similar to recent years. DEWA has generally received more than 5 million visitors per year in the last few years (NPS 2010b). In the absence of notable anticipated changes in facilities or access, this average visitation is expected to continue and be reflected across user groups.

Cumulative Impact Analysis Method

The CEQ regulations that implement NEPA require the assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, or reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions" (40 CFR 1508.7). As stated in the CEQ handbook, *Considering Cumulative Effects under the National Environmental Policy Act* (CEQ 1997b), cumulative impacts need to be analyzed in terms of the specific resource, ecosystem, and human community being affected and should focus on impacts that are truly meaningful. Cumulative impacts are considered for all alternatives, including alternative 1, the no-action alternative.

Cumulative impacts were determined by combining the impacts of the proposed alternative being considered and other past, present, and reasonably foreseeable actions that would also result in beneficial or adverse impacts. If the impacts of the proposed alternative being considered are major, the relative contribution to the cumulative impact would be greater. Therefore, it was necessary to identify other ongoing or reasonably foreseeable projects and plans at DEWA, MDSR, and APPA as well as in the surrounding area. A complete list of past, present, and reasonably foreseeable actions is included in appendix H. The list is organized by type of project (e.g., infrastructure, restoration).

Adverse impacts from climate change may contribute to the adverse impacts expected from the proposed S-R Line on the different resources. Climate change may interact with and amplify the stress to resources from the construction and maintenance activities associated with the S-R Line. In addition, physical and natural resources are currently under pressure from a number of other stressors, including habitat loss and degradation, development, pollution, toxic chemicals, invasive species, pests, disease outbreaks, habitat fragmentation, and wildfires, making them highly vulnerable to additional impacts such as those from climate change (NABCI 2010, 44). Even though climate change may contribute to the adverse impacts from the proposed S-R Line, this increase would not be expected to change the intensity of the impact that was found for the various S-R Line alternatives presented in this chapter.

Assessing Significance of Impacts

The impacts of the alternatives are assessed using the CEQ definition of "significantly" (1508.27), which requires consideration of both context and intensity:

(a) Context – This means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole.

(b) Intensity – This refers to the severity of impact. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action. The following should be considered in evaluating intensity:

   (1) Impacts that may be both beneficial and adverse. A significant effect may exist even if the federal agency believes that on balance the effect would be beneficial.

   (2) The degree to which the proposed action affects public health or safety.

   (3) Unique characteristics of the geographic area such as proximity to historic or cultural resources, parklands, prime farmlands, wetland, wild and scenic rivers, or ecologically critical areas.

   (4) The degree to which the effects on the quality of the human environment are likely to be highly controversial.

   (5) The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.

   (6) The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.

   (7) Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.

   (8) The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.

(9) The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.

(10) Whether the action threatens a violation of federal, state, or local law or requirements imposed for the protection of the environment.

An assessment of significance of the impacts of each alternative is provided in a separate section following the analysis of impacts of the alternatives.

NPS will review the organization and presentation of the information regarding the context, intensity, and duration of impacts in this Environmental Consequences chapter and may make changes to it in the final EIS. NPS welcomes public comment on the manner in which this information is presented.

GEOLOGIC RESOURCES (GEOLOGY, PALEONTOLOGY, AND RARE AND UNIQUE GEOLOGIC FEATURES)

In this section, impacts on geologic resources are evaluated. Included in the overall analysis is an evaluation of the alternatives as they relate to impacts on geology in general, as well as potential impacts on topography, rare and unique geologic features, and paleontological resources.

METHODOLOGIES

Potential impacts on geologic resources are assessed based on the continued ability of natural geologic processes to proceed unimpeded, changes in the topography of the area, and disturbance to rare and unique geologic features such as karst, shale, and limestone. Impacts on paleontology were assessed based on the potential loss of this resource. Primary steps for assessing impacts on geologic resources include identifying

- potential changes in geology from construction activities, including geotechnical boring, drilling, and blasting for structures (towers), access roads, temporary staging areas, temporary splicing and pulling areas, and the ROW itself
- potential changes to the local topography that would occur beyond that which would result from natural erosion and deposition
- potential changes to unique geologic features containing limestone, shale, and karst during construction activities
- potential direct or indirect loss of paleontological resources

Geologic resources were identified based on available information and confirmed during geologic surveys. The alternatives were evaluated based on their potential to impact geologic resources.

STUDY AREA

The study area for geologic resources includes the ROWs for each alternative and any area outside the ROWs where necessary pulling and splicing sites, staging areas, and access road development are proposed or would be expected. Because the location of the S-R Line outside the study area cannot be determined at this time, the indirect impacts on geologic resources cannot be evaluated per alternative. The potential impacts outside the study area are generally addressed; however, further surveys by the applicant may be needed prior to construction of the S-R Line.

CUMULATIVE IMPACTS COMMON TO ALL ALTERNATIVES

Actions inside and outside the parks can affect the geologic resources of the parks, including geology, topography, rare and unique geologic features, and paleontology. Projects that cause disturbance of these resources would include activities such as excavation, grading, or construction below grade. Past, present, and reasonably foreseeable activities that would have beneficial or adverse impacts on geologic resources inside and outside the study area are listed below. These projects were taken from a list of potential cumulative projects developed for the S-R Line that can be found in appendix H. Cumulative impacts were then determined by combining the impacts of the alternative being considered with the impacts from the projects listed below. An overall cumulative impacts analysis was determined for each alternative and is presented at the end of the impacts analysis discussion for each alternative.

Projects Inside the Study Area

Inside the study area, cumulative projects that would result in adverse impacts on geologic resources include the following road and utility projects: the Pennsylvania Department of Transportation (PADOT) SR 2001 road project, the Tennessee Gas Line Proposal (addition to an existing gas pipeline), the Columbia Gas Transmission Company pipeline (replacement of an existing gas pipeline), and the Northeast Supply Link Expansion (Palmerton Loop gas pipeline). These projects would result in adverse impacts on geology from construction activities that would include the excavation of underlying geologic formations, the potential for fracturing, the grading of topography, and the potential disturbance of paleontological resources. The cumulative impacts on geologic resources inside the study area from these projects would be adverse. The cumulative impacts of these projects would depend on the extent of disturbance to geologic resources under these projects.

Projects Outside the Study Area

Outside the study area, cumulative projects that would result in adverse impacts on geologic resources include the following utility projects and wind projects: Marcellus shale natural gas drilling, the Tennessee Gas Line Proposal (addition to an existing gas pipeline), the Columbia Gas Transmission Company pipeline (replacement of an existing gas pipeline), the Dominion/Allegheny Power Transmission Line Project (reconfiguration of the existing line), Pennsylvania Fish and Boat Commission (PFBC) natural gas leasing and water access programs, Blue Mountain Ski Resort community-scale wind turbines, and wind turbines in northeastern Pennsylvania. Proposed residential and commercial developments in New Jersey and Pennsylvania would also cause adverse impacts on geology. Adverse impacts on geologic resources would result from construction activities including the excavation of underlying geologic formations, the potential for fracturing, the grading of topography, and the potential disturbance of paleontological resources. Several land protection programs could provide beneficial impacts on geologic resources. The beneficial effects of many of these programs are dependent on the availability of funding for specific projects, which is uncertain and could vary throughout the period of analysis: therefore, the level of benefit resulting from the implementation of any project is also variable. Although these projects could help conserve geologic resources, the beneficial impacts would not outweigh the adverse impacts from the above-mentioned projects. Cumulative impacts on geologic resources outside the study area would be adverse. The cumulative impacts of these projects would be dependent on the extent of disturbance to geologic resources under these projects.

IMPACTS OF THE ALTERNATIVES ON GEOLOGIC RESOURCES

Common to All Alternatives

Vegetation Maintenance: PPL and PSE&G, as separate utilities operating in different states, have separate vegetation management plans; however, vegetation management for both utilities would occur annually, at a minimum according to the new NERC standards. The details of vegetation management plans and techniques for clearing vegetation are explained in chapter 2. No impacts on geology or topography would be expected during maintenance activities because no excavation would be needed. Ground disturbance beyond the soil layer is unlikely.

Mitigation Measures: Mitigation measures would be implemented to reduce impacts on geologic resources and are taken into consideration in the impact analysis. Mitigation measures, such as an NPS-approved blasting plan, are described in appendix F.

Outside the Study Area: Outside the study area, regardless of which action alternative is selected, the transmission line could pass through Carbon, Lackawanna, Luzerne, Monroe, Northampton, Pike, and Wayne counties in Pennsylvania and Morris, Sussex, and Warren counties in New Jersey. Geologic formations underlying each county are described in appendix G-3.

Construction activities relating to the transmission line outside the study area would be consistent with those activities inside the study area. The direct impacts from the construction of the transmission line outside the study area cannot be determined, as described in the introduction of this chapter. Once a route is determined, a thorough subsurface investigation would be required before initiating construction activities. These investigations should include local geologic mapping, geotechnical test boring, and possible geophysical surveys to establish subsurface conditions. Impacts on geology and topography would be adverse. There is a potential for the siting of towers and associated crane pads, which would require excavation or blasting, that may be located in areas with slopes greater than 10% and may include unstable surfaces. Blasting would break bedrock into smaller pieces, and could have an effect on geologic resources on steep slopes, which are more prone to landslides. There would be no impact on geologic features under the no-action alternative because there would be no ground disturbance beyond the initial soil layer.

There would be no impact on geologic resources outside the study area under the no-action alternative because there would be no ground disturbance beyond the soil layer. Under all action alternatives, potential adverse impacts on geologic resources would be expected. Although the exact route for the transmission line has not been decided, it is likely that some towers would be sited in areas with steep slopes or in unstable, weathered areas. A thorough subsurface investigation would be required before initiating construction activities.

Cumulative projects outside the study area would result in adverse impacts on geologic resources as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the adverse impacts on geologic resources as a result of activities outside the study area are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected.

Alternative 1: No Action

Geologic formations along the existing line in the study area are described in chapter 3 and are depicted in figure 11 (in chapter 3). Of these formations, the Buttermilk Falls limestone through Esopus formation, undivided, and the Decker formation through Poxono Island formation, undivided, are considered rare or unique geologic features due to the presence of limestone and shale. The Ridgeley formation through Coeymans formation, undivided, is considered unique due to the presence of limestone. Vegetation would continue to be managed within the existing ROW and no measurable effects on the geologic resource would take place under alternative 1.

There are several paleontological sites near the existing line. Particularly fossil-rich geologic formations found along alternative 1 include the Martinsburg formation, the Bloomsburg formation, the Decker formation, the Coeymans formation, the Buttermilk Falls formation, and the Mahantango formation. Fossil resources associated with these formations in DEWA are described in chapter 3. Additionally, two recognized paleontological sites, which included specimens, are located partially or completely within the existing ROW. Both sites included several brachiopods. Specimens were from smaller individuals. It is possible that vegetation maintenance could increase access to and visibility of paleontological specimens, particularly at previously identified sites. This could result in increased collection or vandalism of resources; however, it is unlikely that this would result in a measurable change to the paleontological resources in the parks.

Overall, there would be no impact or adverse impacts on geologic resources under alternative 1. Because no excavation or grading would be required during the maintenance of the existing line, geologic formations and topography would not be affected. Adverse impacts could result at paleontological sites from an increase in accessibility and visibility following vegetation maintenance.

Cumulative Impacts

Cumulative impacts on geologic resources inside the study area from past, present, and reasonably foreseeable projects would be adverse, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When adverse impacts on paleontological resources as a result of alternative 1 are combined with other projects in the study area, an overall adverse cumulative impact would be expected. Alternative 1 would not alter the level of impact.

Conclusion

Under the no-action alternative, no impacts on geology and topography would be expected inside the study area; however, adverse impacts would be expected from increased accessibility and visibility following vegetation maintenance.

Common to All Action Alternatives

Removal of Existing Structures: All action alternatives (2, 2b, 3, 4, and 5) include the removal of all or a portion of the B-K Line as described in chapter 2.

The removal of the existing transmission line would result in adverse impacts on geology. occur. Some excavation would be required to remove the equipment associated with the transmission line, such as the counterpoise. Adverse impacts would result because the geologic formations were disturbed when the transmission lines and towers were installed. Impacts would be minimized because the foundations of the towers would remain underground to reduce the amount of ground disturbance along the existing ROW.

Topography would also be adversely impacted by removal of the existing structures. Grading would occur to backfill over the foundations (which would be left in place) to create a natural cover; backfill would also be used to cover areas of disturbance caused by the removal of the towers, the counterpoise, and the ground wire. Although grading would occur, the change in topography would be slight and relatively undetectable.

Vegetation Clearing: The ROWs would be cleared of vegetation for the construction of the new double 500-kV transmission line for alternatives 2 through 5. Alternatives 2, 3, 4, and 5 include clearing up to 350 feet; the ROW would be extended up to 175 feet from either side of the centerline of the existing ROW. Under alternative 2b, the applicant proposes to operate the S-R Line within the existing ROW. The NPS anticipates that the applicant would require additional area for construction; therefore, it is estimated that under alternative 2b, the applicant would expand the ROW to the extent of their deeded property rights, which ranges from 100 feet to 380 feet. The property rights are currently being researched through deed research and ground surveys and will be updated as applicable in the final EIS. For alternative 2b, the ROW would be cleared on either side of the centerline to an appropriate width based on the deeded property rights. Clearing would be complete for all action alternatives, with the exception of the 50-foot buffer near intermittent streams/wetlands and the 100-foot buffer near perennial waterways such as the Delaware River (PPL and PSE&G 2008, 7). During the clearing of vegetation, no impacts on geology or topography would be expected because no excavation would be needed. Ground disturbance beyond the soil layer would not be expected.

Following the construction of the transmission line, the vegetation along the proposed ROW would be maintained on an annual basis at minimum, according to the new NERC standards. No impacts on geology or topography would be expected during maintenance activities because no excavation would be needed. Ground disturbance beyond the soil layer is unlikely.

Construction Components: Construction activities are described in detail in chapter 2. Construction of features such as access roads, crane pads, tower foundations, wire pull locations, pulling and splicing sites, and staging areas would affect geologic resources. Access roads, wire pull locations, and pulling and splicing sites could impact paleontological resources, but geology and topography would not be altered. Staging areas would be located outside the study area on previously disturbed properties or abandoned parking lots. The construction staging areas would result in little to no ground disturbance and impacts would be undetectable. Construction of tower foundations and crane pads could result in adverse impacts to geology, topography, and paleontological resources due to blasting activities and leveling areas of steep slope. Blasting would break bedrock into smaller pieces. This could have an adverse impact on geologic resources on steep slopes or areas of glacial till, which are more prone to landslides. Additionally, blasting could have an irretrievable and irreversible impact on geologic resources.

Alternative 2: Applicant’s Proposed Route

The geologic formations that are considered rare and unique due to limestone and/or shale (the Buttermilk Falls limestone through Esopus formation, undivided, and the Decker formation through Poxono Island formation, undivided) and those considered rich in fossils (the Martinsburg formation, the Bloomsburg formation, the Decker formation, the Coeymans formation, the Buttermilk Falls formation, and the Mahantango formation) along alternative 2 would be the same as those described under alternative 1 and are described in detail in chapter 3. There are two recognized paleontological sites that are located in the corridor of alternative 2, as described for alternative 1. These sites include several brachiopod specimens. Additionally, the construction of new access roads under alternative 2 would affect a third site. Like the other two sites affected by alternative 2, brachiopods are present at the site.

The construction of transmission line components such as wire pulls and pulling and splicing sites would have adverse impacts on geology because a low risk of ground disturbance would be expected. It is unlikely that the removal of material extending deeper than the soil layer would be needed; therefore, the underlying bedrock and geologic formations would remain unaltered by the construction of wire pulls, pulling and splicing sites, and access roads. There would be a low risk of ground disturbance associated with these activities, and disturbance of geologic formations that are considered rich in fossils is unlikely. The disturbance of the soil layer and the creation of access roads could result in increased access to and/or visibility of paleontological resources, which may result in increased collection or vandalism of resources. Access road construction would include grading activities, the addition of a gravel layer, and compaction.

During excavation and blasting for the construction of the tower foundations, it is important that excavation occur in competent bedrock and/or sound material. Geotechnical boring would determine the depth to the competent bedrock. If blasting occurs in areas that are weathered or unstable, the formations would be more porous, which could lead to fracturing of rock. Additionally, the planned placement of tower foundations in unstable, weathered material could result in unacceptable design criteria and the applicant would need to resite tower locations or to provide alternative foundation designs. The following formations located along the alternative 2 alignment are considered to have fair to poor stability where weathered or deeply weathered material occurs: Buttermilk Falls limestone, Ridgeley formation, and the Decker formation (appendix G-1). These three formations are located adjacent to the Delaware River in Pennsylvania (see figure 11 in chapter 3). Seven towers are proposed in these unstable areas (table 45). Geotechnical boring would be required to determine the appropriate depth to which to remove soils and weathered bedrock to reach sound material where blasting would take place and the tower foundations would be installed.

TABLE 45: NUMBER OF TOWERS CONSTRUCTED IN RARE OR UNSTABLE FORMATIONS AND IN AREAS WITH SLOPES GREATER THAN 10%

Tower Location	Alternatives				
	2	2b	3	4	5
Rare or unique geologic features	7	7	11–15	0	0
Slope greater than 10%	12	12	25 or more	2	1
Unstable geologic formations	7	7	11–15	2	2

Several of the geologic formations crossed by alternative 2 are known for being rich in fossil resources. The discovery of highly sensitive paleontological sites has occurred in other areas near the parks in the same geologic formations as those found along alternative 2. Blasting would occur in these same formations during construction activities and could affect unknown paleontological resources. Blasting would also have impacts on a known paleontological site in the ROW for alternative 2. Additionally, increased soil erosion from ground disturbance associated with blasting and tower construction could result in increased access to and/or visibility of paleontological resources, which may result in increased collection or vandalism of resources.

The three unique geologic formations along the alternative 2 alignment belong to the Middle Devonian to Upper Silurian period and contain up to 1,500 feet of limestone, shale, siltstone, sandstone, and dolomite, with formations ranging from 3 to 180 feet in thickness (Epstein 2006, 3). The presence of limestone in an area creates unique habitat for both plants and wildlife. Limestone develops solution cavities that contain and yield groundwater for surface-water features such as streams and wetlands (PADCNR 2000, 2). Limestone creates potential construction problems (sinkhole and conduit development) due to the presence of solution cavities and bedrock irregularities (PADCNR 2000, 2). Sinkholes are subsidence features that are the result of water moving residual material and soil through subsurface pathways caused by the weathering process. The permeable nature of limestone also makes these formations natural conduits for conveying solid and liquid wastes, allowing contaminants to rapidly enter the groundwater system and travel underground (PADCNR 2000, 2).

Under alternative 2, seven towers would be constructed in rare or unique geologic features (table 45). The effects of blasting in limestone would create concern, especially the opportunity for ground vibrations to cause fracturing of the limestone. Fracturing of limestone from drilling and blasting could create additional solution cavities for surficial, or shallow, groundwater movement where none existed before construction. As underground flow paths enlarge from fracturing, conduits and sinkholes may form and surface streams and wetlands may lose water to the subsurface (USGS 2001, 4). The areal extent and intensity of vibrations caused by blasting depends on several factors, including rock type and blasting techniques. Blasting techniques have evolved for close spaces where it is necessary to minimize vibrations (Lucca 2003). Groundwater withdrawal and diversion of surface water may cause aboveground and underground hydrologic systems to dry up (USGS 2001, 13). Drilling and blasting also creates the possibility of groundwater contamination. Impacts from blasting in limestone could lead to a decrease in groundwater availability and quality, which could alter wetland habitats, particularly the Arnott Fen area.

Twelve of the proposed tower locations and associated crane pads are in areas with slopes ranging from 10% to 30% (table 45). Where slopes are greater than 10%, the areas would need to be leveled in order to provide a safe, level pad for large cranes to mobilize, set outriggers, and aid in the erection of transmission line towers. Additionally, leveled areas would be needed for the placement of the towers. Areas with higher slopes would require additional excavation of soil and bedrock because large cuts in the bench would be necessary for the level pads. Construction with large excavations and fill in mountainous areas creates the potential for landslides. Landslides occur primarily in areas with loose soil and debris on steep slopes. According to the USGS, glacial till is common throughout the area and landslides may be anticipated in areas where the bases of steep slopes are excavated (Epstein 2001). Following construction, excavated areas could not be restored to preconstruction conditions; therefore, the potential for landslides could exist because some slopes may be unstable. The remaining 14 towers and associated crane pads proposed under alternative 2 would be constructed in areas with a slope of less than 10%. Minor grading would be required in these areas for the placement of the crane pad. It is likely that excavation extending deeper than the soil layer would not be required.

After construction of the S-R Line, vegetation maintenance would occur annually, at minimum. Because no excavation or grading would be required during the maintenance of the existing line, geologic formations and topography would not be affected. Impacts on paleontological sites could result from an increase in accessibility and visibility following vegetation maintenance, potentially resulting in increased collection or vandalism of resources.

Overall, alternative 2 would result in adverse impacts on geology, topography, and paleontological resources.

Cumulative Impacts

Cumulative impacts on geologic resources inside the study area from past, present, and reasonably foreseeable projects would be adverse, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the adverse impacts on geologic resources as a result of alternative 2 are combined with other projects in the study area, an overall adverse cumulative impact would be expected. Alternative 2 would not alter the level of impact.

Conclusion

Inside the study area, there would be adverse impacts on geology. Impacts would result from the installation of towers in areas with a high slope, in unstable or weathered areas, and in rare or unique geologic features; the potential for nearby surface-water or groundwater features to be affected; changes to slope and grade; leveling areas with steep slopes that could not be restored; the potential for changes or disturbance of paleontological resources from blasting and excavation activities; and the installation of towers in fossil-rich geologic formations. The adverse impacts from alternative 2, combined with the adverse impacts from past, present, and reasonably foreseeable projects on geologic resources would result in adverse cumulative impacts.

Alternative 2b

The geologic formations, rare or unique geologic features, topography, and paleontological resources found along the alternative 2b alignment would be the same as those in alternative 2; these resources are described in detail in chapter 3.

The installation of temporary transmission line components (wire pulls, pulling and splicing sites, and spur roads) and access roads would result in the same impacts on geologic resources as under alternative 2. The underlying bedrock and geologic formations would remain unaltered. The disturbance of geologic formations that are considered rich in fossils is unlikely.

Although alternative 2b would require more towers than alternative 2, the same number would be required in rare or unique features, in areas with slopes greater than 10%, and in unstable geologic formations. Blasting under this alternative could have greater impacts from the need for a greater number of towers, which require the crushing and removal of more rock. The effects of blasting during the construction of tower foundations and associated crane pads could also result in a decrease in groundwater availability and quality, which could alter wetland habitats; an increased potential for landslides; an increased potential for changes to or disturbance of paleontological resources; and disturbance to areas that could not be restored to preconstruction conditions after excavation.

As stated under alternative 1, vegetation maintenance would not require excavation or grading and would not affect geologic formations or topography. Due to an increase in accessibility and visibility, the amount of collection or vandalism could increase following vegetation maintenance; however, it is unlikely that this would result in a measurable change to the paleontological resources in the parks.

Overall, impacts on geologic resources from construction activities under alternative 2b would be adverse.

Cumulative Impacts

Cumulative impacts on geologic resources inside the study area from past, present, and reasonably foreseeable projects would be adverse, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the adverse impacts on geologic resources as a result of alternative 2b are combined with other projects in the study area, an overall adverse cumulative impact would be expected. Alternative 2b would not alter the level of impact.

Conclusion

Inside the study area, impacts on geology would be the same as those under alternative 2: adverse. Impacts would result because alterations to geology from construction of towers and associated crane pads would occur in areas with a 10% to 30% slope and in areas that are weathered or unstable. Additionally, tower foundations would be constructed in rare geologic features containing limestone. Impacts on geology may include tower failure, landform destruction, creation of additional conduits, a decrease in groundwater availability and quality, and alteration of wetland habitats. Impacts on topography would be expected to occur because slopes greater than 10% would be leveled and graded for the installation of towers and associated crane pads. These areas could not be returned to preconstruction conditions. Paleontological sites could be changed or disturbed during blasting activities. When the adverse impacts from alternative 2b are combined with the adverse impacts from past, present, and reasonably foreseeable projects, adverse cumulative impacts on geologic resources would be expected.

Common to Action Alternatives 3, 4, and 5

Restoration of the B-K Line: For alternatives 3, 4, and 5, the portion of the B-K Line between the Bushkill Substation and the eastern boundary of DEWA would be permanently removed and the ROW would be restored, as described in chapter 2. Impacts on geologic resources from the removal of the existing structures would be the same as those described under Common to All Action Alternatives. Restoration of the ROW would not have an impact on geologic resources.

Alternative 3

Inside the study area, the geologic formations including rare or unique geologic features and those considered rich in paleontological resources underlying the proposed alternative 3 ROW are the same as those described for alternative 2. Therefore, the construction of wire pulls, pulling and splicing sites, and access roads would have impacts on geology similar to those described for alternative 2. It is unlikely that the removal of material extending deeper than the soil layer would be needed; therefore, the underlying bedrock and formations would remain undisturbed by the construction of these S-R Line components.

Under alternative 3, approximately 11 to 15 tower foundations would be constructed in unstable formations (table 45). If these areas are not excavated to competent bedrock, blasting could fracture the rock, resulting in additional solution cavities for surficial groundwater movement where none existed before construction and a change or loss of surface-water features (USGS 2001, 4). The same number of tower foundations would be installed in rare or unique geologic formations. Blasting would also have adverse impacts on paleontological resources, affecting unknown paleontological resources. Blasting would also have impacts on a known paleontological site in the ROW for alternative 3. Additionally, increased soil erosion from ground disturbance associated with blasting and tower construction could result in increased access to and/or visibility of paleontological resources, which may result in increased collection or vandalism of resources.

Most of the slopes along the alternative 3 corridor range from 10% to 30%; there are relatively few areas with a slope less than 10%. In addition, a few areas with a slope of 40% to 50% occur along the proposed transmission line route. More than 25 of the towers required for alternative 3 would be constructed in areas with a slope of greater than 10% (table 45). Excavation beyond the soil layer would be necessary to create level areas for these towers and associated crane pads. Impacts on geology and topography would be similar to those under alternative 2. Tower locations and associated crane pads must be located on level surfaces; therefore, additional excavation and grading would be needed in areas with slopes greater than 10%, which could result in unstable areas leading to landslides (PADCNR n.d., 1).

Vegetation maintenance would not affect geology, rare or unique geologic features, or topography; however, paleontological resources could be collected or vandalized due to increased visibility and ease of access after vegetation removal.

Overall, adverse impacts on geologic resources would result from the construction and maintenance of the S-R Line under alternative 3.

Cumulative Impacts

Cumulative impacts on geologic resources inside the study area from past, present, and reasonably foreseeable projects would be adverse, as described previously in the “Cumulative Impacts Common to

All Alternatives” section. When the adverse impacts on geologic resources as a result of alternative 3 are combined with other projects in the study area, an overall adverse cumulative impact would be expected. Alternative 3 would not alter the level of impact.

Conclusion

Alternative 3 would create adverse impacts on geology due to the drilling, blasting, and excavation activities associated with the installation of towers and associated crane pads. Impacts would occur because the construction of at least 25 towers and associated crane pads would occur in areas with slopes greater than 10% and because 11 to 15 towers would be sited in unstable areas. The same number of proposed towers would be constructed in rare or unique geologic features containing limestone. Impacts on geology may include tower failure, landform destruction, creation of additional conduits, a decrease in groundwater availability and quality, and the alteration of wetland habitats. The installation of wire pulls, pulling and splicing sites, and access roads would not require excavation deeper than the soil layer. Overall impacts on paleontology from construction and clearing inside the study area would be due to direct damage, collection, or vandalism of paleontological sites. When the adverse impacts from alternative 3 are combined with the adverse impacts from past, present, and reasonably foreseeable projects, adverse cumulative impacts on geologic resources would be expected.

Alternative 4

The alternative 4 alignment contains three formations that are considered rich in fossils (the Martinsburg formation, the Bloomsburg formation, and the Mahantango formation), but no rare or unique geologic features. The number of rare or unique and fossil-rich geologic features are fewer than those underlying alternatives 1 through 3, but the types of impacts that would result from the construction and vegetation maintenance activities under alternative 4 would be similar to those previously described.

The construction of temporary transmission line features and access roads would not affect geologic formations because there would be a low risk of ground disturbance. However, disturbance of the soil layer and the creation of access roads could result in increased access to and/or visibility of paleontological resources, which may result in increased collection or vandalism of resources.

The majority of the towers (14) required for alternative 4 would be constructed in areas where the stability of the underlying geology is rated good. The basal portion of the Martinsburg formation contains limestone, which may contain solution openings. Excavation and blasting for 2 towers would occur in the Martinsburg formation (table 45). In DEWA, the thickness of the Martinsburg formation is approximately 12,000 feet and includes thick sequences of slate and greywacke (Epstein 2006, 3). If blasting and excavation occurs in limestone with solution openings, fracturing and changes to groundwater availability may occur; however, this is unlikely under this alternative because excavation and blasting would not extend deeper than 30 feet and would occur in slate and greywacke layers.

Blasting and increased soil erosion from ground disturbance associated with blasting and construction of tower foundations could affect unknown paleontological resources and could result in increased access to and/or visibility of paleontological resources, which may result in increased collection or vandalism of resources.

The majority of the alternative 4 alignment is relatively flat with slopes of 0% to 10%. An increase in the slope (10% to 30%) occurs on the north and south side of APPA, which is located on Kittatinny Ridge. Of the 16 towers and associated crane pads proposed, 2 towers and associated crane pads would be installed in areas with slopes of greater than 10% (table 45). Additional excavation would occur to level and grade these areas for installation of the towers. Because few tower foundations would be constructed in areas with a slope of greater than 10%, the potential for landslides to occur would be low (PADCNR n.d., 1).

Similar to previous alternatives, vegetation maintenance would have a potential impact on paleontological resources due to collection and vandalism of sites; geology and topography would not be affected by vegetation maintenance.

Overall, adverse impacts on geologic resources would result under alternative 4.

Cumulative Impacts

Cumulative impacts on geologic resources inside the study area from past, present, and reasonably foreseeable projects would be adverse, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the adverse impacts on geologic resources as a result of alternative 4 are combined with other projects in the study area, an overall adverse cumulative impact would be expected. Alternative 4 would not alter the level of impact.

Conclusion

Inside the study area, impacts on geology under alternative 4 would be caused by the construction and installation of wire pulls, pulling and splicing sites, tower foundations and associated crane pads, and access roads. It is expected that approximately 2 towers would be sited in areas with a slope of greater than 10%; therefore, additional excavation to level the land would be necessary. The underlying formations for the tower locations are rated good for stability, and no towers would be constructed within rare or unique geology inside the study area. Impacts on paleontology from construction and clearing inside the study area would result from direct damage, collection, or vandalism of paleontological sites. When the adverse impacts from alternative 4 are combined with the adverse impacts from past, present, and reasonably foreseeable projects, adverse cumulative impacts on geologic resources would be expected.

Alternative 5

The alignment for alternative 5 would follow the same route through DEWA and APPA as alternative 4, with the exception of the portion of the B-K Line from the Bushkill Substation to the western boundary of DEWA. Like alternative 4, alternative 5 would not cross any rare or unique geologic features. Alternative 5 would cross two of the three fossil-rich formations discussed for alternative 4: the Martinsburg formation and the Bloomsburg formation. Therefore, impacts for alternative 5 would be nearly identical to those described for alternative 4.

The construction of wire pulls, pulling and splicing sites, and access roads would not require excavation extending deeper than the soil layer; therefore, the underlying bedrock and formations would remain undisturbed. This construction would disturb the soil layer, which could result in increased access to and/or visibility of paleontological resources, potentially increasing collection or vandalism of resources.

For alternative 5, 8 of the 10 required towers would be in areas where the stability of the underlying geology is rated good. Excavation and blasting for 2 towers would occur in the Martinsburg formation (table 45). No substantial changes in topography or grade would result from the construction and installation of the new transmission line except for two areas on slopes leading to APPA. These areas would be leveled and would not return to preconstruction conditions. Only 1 tower and associated crane pad would be installed in areas with slopes of greater than 10%; the potential for landslides to occur would be low.

Adverse impacts on geologic resources would result from the construction and maintenance of the S-R Line under alternative 5.

Cumulative Impacts

Cumulative impacts on geologic resources inside the study area from past, present, and reasonably foreseeable projects would be adverse, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the adverse impacts on geologic resources as a result of alternative 5 are combined with other projects in the study area, an overall adverse cumulative impact would be expected. Alternative 5 would not alter the level of impact.

Conclusion

Under alternative 5, adverse impacts on geologic resources at DEWA and APPA would result mainly from drilling, blasting, and excavation activities associated with the installation of tower foundations and associated crane pads. Under alternative 5, only two tower foundations would be constructed in unstable geologic formations, and only one would be constructed in an area with a slope greater than 10%. Impacts on paleontology from construction and clearing inside the study area would be due to direct damage, collection, or vandalism of paleontological sites. When the adverse impacts from alternative 5 are combined with the impacts from past, present, and reasonably foreseeable projects, adverse cumulative impacts on geologic resources would be expected.

FLOODPLAINS

METHODOLOGIES

The evaluation of impacts on floodplains was based on both a quantitative (acreage affected) and a qualitative assessment of how each proposed alternative would affect floodplain function. Primary steps for assessing impacts on the floodplain included identifying the floodplain in areas likely to be affected by the proposed alternatives. The Federal Emergency Management Agency normally maps floodplains, although not typically on federal land. The NPS provided GIS data and floodplains maps to use for impacts analysis calculations in this document, which is the best available data for the Delaware River within DEWA.

STUDY AREA

The study area for floodplains includes the ROW for each alternative and any area outside the ROWs where necessary pulling and splicing sites, staging areas, and access road development are proposed or would be expected. Because the location of the S-R Line outside the study area cannot be determined at this time, general impacts outside the study area are also addressed, which includes the counties and surface waters with associated floodplains that the alternative alignments could traverse.

CUMULATIVE IMPACTS COMMON TO ALL ALTERNATIVES

Actions inside and outside the parks can affect floodplains. Impacts on floodplains arise from development in the floodplain and actions that inhibit the natural flow of rivers and streams. Past, present, and reasonably foreseeable project activities that would have beneficial or adverse impacts on floodplains inside and outside the study area are listed below. These projects were taken from a list of potential cumulative projects developed for the S-R Line that can be found in appendix H. Cumulative impacts were then determined by combining the impacts of the alternative being considered with the impacts from the projects listed below. This cumulative impact analysis was completed for each alternative and is presented at the end of the impact analysis discussion for each alternative.

Projects Inside the Study Area

The study area is almost entirely within DEWA, and there would be few large development projects because the area is generally protected as part of the national park system, and floodplain mitigation is required by the NPS on NPS lands or through NPS-funded projects. As development continues outside the parks, a relatively undeveloped natural floodplain within NPS boundaries will become more important for maintaining river function as well as important habitat for native wildlife and vegetation. Inside the study area, cumulative projects that would result in adverse impacts on floodplains include the PADOT SR 2001 road project (road reconstruction), which may affect flood elevations as a result of increased pavement and bridges. The Kittatinny Point Visitor Center storm recovery (a project that involved removal of a building in the floodplain and construction of a new building on piers above flood elevation) would result in adverse impacts on floodplains. Beneficial impacts on floodplains are expected from the rehabilitation and repair of road bridges throughout the parks that specifically include the repair of failing Watergate Dam #10 and the US Route 209 rehabilitation and replacement of Toms Creek Bridge. These projects include elements to reduce flooding and erosion problems. The majority of these projects would protect floodplain functions, so the beneficial impacts are expected to outweigh the adverse impacts from the above-mentioned projects. Additionally, there are several land protection programs that could protect floodplain functions and values. The beneficial effects of many of these programs are dependent on the availability of funding for specific projects, which is uncertain and could vary throughout the period of analysis: therefore, the level of benefit resulting from the implementation of any project is also variable. Cumulative impacts on floodplains inside the study area would be beneficial.

Projects Outside the Study Area

Outside the study area, adverse cumulative impacts on floodplains would be expected from residential, commercial, and transportation development of the area. Adverse cumulative impacts would result from these projects due to the continued growth and urbanization in the area outside the parks, which may reduce natural floodplain functions through direct impacts, such as the placement of structures in the floodplain, or indirect impacts, such as increased runoff due to increased impervious surfaces. Several land protection programs could provide beneficial impacts on floodplain functions. As stated above, the funding for these programs is uncertain and could vary throughout the period of analysis: therefore, the level of benefit resulting from the implementation of any project is also variable. There would be adverse cumulative impacts on floodplains outside the study area.

IMPACTS OF THE ALTERNATIVES ON FLOODPLAINS

Common to All Alternatives

Vegetation Management: Vegetation would be cleared or managed in floodplain areas for all alternatives. PPL and PSE&G have separate vegetation management plans because they are distinct utility companies working in different states. The details of the applicant’s vegetation management plans and clearing techniques are explained in chapter 2.

Mitigation Measures: Mitigation measures would reduce impacts from construction, operation, and maintenance activities for all action alternatives (as described in chapter 2 and appendix F). None of the mitigation measures would eliminate impacts on floodplains; however, measures would minimize the potential of flooding or adverse impacts on floodplains.

Outside the Study Area: Alternative 1 would require occasional removal of vegetation during maintenance activities, which could impact natural floodplain values. For all action alternatives (2, 2b, 3, 4, and 5), efforts would be made to avoid construction, clearing, and development in the floodplain outside the study area. However, if the construction of towers (and associated crane pads), access roads, and pulling and splicing sites in floodplains outside the study area cannot be avoided, adverse impacts on floodplain function would result. The Pennsylvania counties outside the study area, Carbon, Lackawanna, Luzerne, Monroe, Northampton, Pike, and Wayne, are rich with surface waters and associated floodplains. Within these counties, the S-R Line could cross major tributaries of the Delaware River basin, the Susquehanna River basin, and the Lehigh River. Some of these tributaries include Bushkill Creek, Cherry Creek, Lackawaxen River, and Marshall Creek in the Delaware River basin; Big Wapwallopen Creek, Lackawanna River, and the mainstem Susquehanna River in the Susquehanna River basin; and Jonas Creek, Pond Creek, and Stony Creek in the Lehigh River basin. Outside the study area in New Jersey, the route could cross the major tributaries of the Delaware River basin, the Passaic River basin, and the Raritan River basin. Some of these tributaries include the mainstem of the Delaware River, Paulins Kill, Pohatcong Creek, and Martins Creek in the Delaware River basin; Rockaway River, Delawanna Creek, and Whippany River in the Passaic River basin; and South Branch Raritan River and Lamington River in the Raritan River basin. The majority of these surface waters have associated floodplains and could be adversely impacted by the project outside of the study area. Although the exact route outside of the study area cannot be determined at this time, indirect adverse impacts on floodplains are unknown. When the indirect adverse impacts outside the study area are combined with the adverse impacts of other past, present, and future projects outside the study area, adverse cumulative impacts would result.

Alternative 1: No Action

Inside the study area, no widening of the ROW would occur as part of the no-action alternative. The existing line and ROW span approximately 700 feet of the floodplain of the Delaware River in DEWA (MDSR) and of Bushkill Creek in DEWA. Overhead transmission line crossings such as this have no impact on the floodplain. Two existing transmission line structures (approximately 30 feet by 30 feet) are in the floodplain. No new development or new structures would be placed in the floodplain under alternative 1. The periodic maintenance of the transmission line, specifically the clearing of vegetation in the ROW in the floodplain, would adversely affect natural floodplain values (which include vegetation) that contribute to ecosystem quality (NPS 2002b). However, the periodic clearing of vegetation in the ROW in floodplain areas would not alter floodplain storage or obstruct floodwaters and no new development would occur in the floodplain under alternative 1.

Cumulative Impacts

Cumulative impacts on floodplains inside the study area from past, present, and reasonably foreseeable projects would be beneficial, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the adverse impacts on floodplains as a result of alternative 1 are combined with the other projects in the study area, an overall beneficial cumulative impact would be expected. Alternative 1 would not alter the level of impact.

Conclusion

Adverse impacts on the floodplains of water bodies in the study area would occur under the no-action alternative from vegetation maintenance. Cumulative impacts inside the study area would be beneficial when combined with other past, present, and future projects.

Common to All Action Alternatives

Removal of Existing Structures: All action alternatives (2, 2b, 3, 4, and 5) would involve the removal of the B-K Line from the Bushkill Substation to the eastern boundary of DEWA, as discussed in chapter 2. This would include removal of the B-K Line structures, but the foundations for these structures would remain in place. For alternatives 2 and 2b, the S-R Line would be constructed along the same alignment. The removal of the structures would require the construction of access roads (either permanent or temporary, depending on the alternative) along the B-K Line to allow access to and removal of the structures. The impacts of removing the structures are discussed under each alternative.

Vegetation Clearing: The ROWs would be cleared of vegetation for the construction of the new double 500-kV transmission line for alternatives 2 through 5, which could affect floodplains. Alternatives 2, 3, 4, and 5 include clearing up to 350 feet; the ROW would be extended up to 175 feet from either side of the centerline of the existing ROW. Under alternative 2b, the applicant proposes to operate the S-R Line within the existing ROW. The NPS anticipates that the applicant would require additional area for construction; therefore, it is estimated that under alternative 2b, the applicant would expand the ROW to the extent of their deeded property rights, which ranges from 100 feet to 380 feet. The property rights are currently being researched through deed research and ground surveys and will be updated as applicable in the final EIS. For alternative 2b, the ROW would be cleared on either side of the centerline to an appropriate width based on the deeded property rights. Clearing would be complete for all action alternatives, with the exception of the 50-foot buffer near intermittent streams/wetlands and the 100-foot buffer near perennial waterways such as the Delaware River (PPL and PSE&G 2008, 7).

Construction Components: Construction activities are described in detail in chapter 2; the activities that would affect floodplains include the construction of access roads, tower foundations, crane pads, wire pull locations, pulling and splicing sites, and staging areas.

Alternative 2

Under alternative 2, vegetation clearing would be nearly complete in the 350-foot corridor. Vegetation clearing would be avoided in sensitive areas such as riparian corridors along the Delaware River (PPL and PSE&G 2008, 7), which support floodplain vegetation. Specifically, vegetation would not be cleared in the floodplain in the 50-foot buffer near intermittent streams/wetlands or in the 100-foot buffer near perennial waterways such as the Delaware River (PPL and PSE&G 2008, 7). Even so, some vegetation beyond the buffer areas would be cleared in the floodplain and would affect natural floodplain values (which include vegetation) that contribute to ecosystem quality (NPS 2002b). A maximum of 14.3 acres of vegetation in the floodplain would potentially be maintained and could be removed if incompatible plant species exist.

The overhead transmission line for alternative 2 would cross approximately 700 feet of the floodplain of the Delaware River in DEWA (MDSR) and Bushkill Creek in DEWA. The overhead transmission line crossing would have no impact on the floodplain, but associated activities may adversely affect floodplains. An existing tower is partially located in the floodplain of Bushkill Creek and a second existing tower is partially located in the floodplain of Sand Hill Creek. The applicant would place two new, larger towers (including associated crane pads) in the same locations, over an area of approximately 0.002 acre. The construction of these support structures for the transmission line would not result in any increase in flood hazard either as a result of increased flood elevations or changes in flow carrying capacity of any of the streams being crossed by the overhead lines. However, portions of the access roads required for maintenance and construction purposes would be located in some floodplain areas. Access roads would affect 0.2 acre of the floodplain. Once the transmission line is operational, vegetation maintenance would be required in the new ROW, including floodplains as described for alternative 1.

Overall, adverse impacts on floodplains would result from access roads, new crane pads, and vegetation clearing within floodplains. To minimize adverse impacts on natural and beneficial floodplain values, mitigation measures would be implemented as discussed previously, BMPs would be used during construction activities, and certain areas would be revegetated per the vegetation plans developed by the applicant and approved by the NPS to reduce erosion into streams, wetlands, and floodplains.

Cumulative Impacts

Cumulative impacts on floodplains inside the study area from other past, present, and reasonably foreseeable projects would be beneficial, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the adverse impacts on floodplains as a result of alternative 2 are combined with the other projects in the study area, an overall adverse cumulative impact would be expected. Alternative 2 would contribute an appreciable adverse impact to the overall cumulative impact level.

Conclusion

Adverse impacts on the floodplains of water bodies inside the study area would occur from the construction of the S-R Line under alternative 2. Cumulative impacts inside the study area would be adverse.

Alternative 2b

Under alternative 2b, vegetation would be cleared in the corridor of the proposed ROW under alternative 2b, except in sensitive areas such as the riparian buffer along the Delaware River (PPL and PSE&G 2008, 9) and buffers as described for alternative 2. However, some vegetation beyond the buffer areas would be cleared in the floodplain, which would affect natural floodplain values (which include vegetation) that contribute to ecosystem quality (NPS 2002b). A maximum of 8.35 acres of vegetation in the floodplain would potentially be maintained and could be removed if incompatible plant species are present.

The overhead transmission line for alternative 2b would cross approximately 700 feet of the floodplain of the Delaware River in DEWA (MDSR) and the floodplain of Bushkill Creek in DEWA. Overhead transmission line crossings would have no impact on floodplains; however, structures, clearing, and access roads may adversely affect floodplains. An existing tower is partially located in the floodplain of Bushkill Creek and a second existing tower is partially located in the floodplain of Sand Hill Creek. Similar to alternative 2, the applicant would place two new, larger towers (including associated crane pads) in the same locations, over an area of approximately 0.002 acre. Additionally, the construction of access roads would affect approximately 0.14 acre of the floodplain under alternative 2b.

Floodplains would be adversely impacted as a result of construction of access roads, crane pads, and new tower foundations and vegetation clearing in floodplains under alternative 2b. To minimize adverse impacts on natural and beneficial floodplain values, BMPs would be used during construction activities as described for alternative 2.

Cumulative Impacts

Cumulative impacts on floodplains inside the study area from other past, present, and reasonably foreseeable projects would be beneficial, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the adverse impacts on floodplains as a result of alternative 2b are combined with the other projects in the study area, an overall adverse cumulative impact would be expected. Alternative 2b would contribute an appreciable adverse increment to the overall cumulative impact.

Conclusion

Due to construction and vegetation maintenance activities, adverse impacts on the floodplains of water bodies inside the study area would occur from the construction of the S-R Line under alternative 2b. Cumulative impacts inside the study area would be adverse.

Common to Action Alternatives 3 through 5

Restoration of the B-K Line: Under alternatives 3, 4, and 5, the portion of the B-K Line between the Bushkill Substation and the eastern boundary of DEWA would be permanently removed and the ROW would be restored, as described in chapter 2. The removal of this portion of the B-K Line would not be conducted in floodplain areas. The ROW (approximately 53 acres within NPS boundaries) would be allowed to ultimately return to forested habitat over the long term. While natural communities would not return to mature conditions in the period of analysis of this EIS, the process would begin and would create a beneficial impact on floodplains.

Alternative 3

Construction and vegetation clearing would occur in floodplain zones under alternative 3. Vegetation would be cleared in the 350-foot corridor, except in sensitive areas such as riparian corridors along the Delaware River (PPL and PSE&G 2008, 9) as described for alternative 2. However, some vegetation would be cleared in the floodplain, which would affect natural floodplain values (which include vegetation) that contribute to ecosystem quality (NPS 2002b). A maximum of 7.93 acres of vegetation in the floodplain would be cleared if incompatible plant species are present. Overhead transmission line crossings would have no impact on the floodplain, but associated activities may adversely affect floodplains. Approximately 0.06 acre within the floodplain would be cleared and adversely affected by proposed access roads in the study area for alternative 3. For alternative 3, tower foundations, crane pads, and pulling and splicing sites are unknown at this time.

In addition to the paragraph above, alternative 3 would also include the removal and upgrade of the B-K Line from the Bushkill Substation to the western boundary of DEWA would adversely affect floodplains. The applicant would place two tower foundations, and associated crane pads within floodplains, totaling approximately 0.002 acre. The construction of these support structures for the transmission line would not result in any increase in flood hazard either as a result of increased flood elevations or changes in flow carrying capacity of any of the streams being crossed by overhead lines. Portions of access roads required for maintenance and construction purposes would be located in floodplain areas. Specifically, alternative 3 would require the development of two access roads by Bushkill Creek to remove and upgrade the B-K Line; these access roads would impact 0.16 acre in the floodplain.

Overall, a total of 0.222 acre of the floodplain (0.06 acre + 0.16 acre + 0.002 acre) would be affected by permanent access roads and new tower foundations and (crane pads); vegetation would be cleared in the floodplain under alternative 3. These activities would adversely impact floodplains, but BMPs would be used during construction activities as described in appendix F to minimize impacts on natural and beneficial floodplain values.

Cumulative Impacts

Cumulative impacts on floodplains inside the study area from other past, present, and reasonably foreseeable projects would be beneficial, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the adverse impacts on floodplains as a result of alternative 3 are combined with the other projects in the study area, an overall adverse cumulative impact would be expected. Alternative 3 would contribute an appreciable adverse increment to the overall cumulative impact.

Conclusion

Adverse impacts on the floodplains of water bodies inside the study area would occur under alternative 3 as a result of access road and tower and crane pad construction. When the impacts of alternative 3 are combined with other past, present, and future projects, cumulative impacts inside the study area would be adverse.

Alternative 4

No construction or vegetation clearing would occur in any floodplain zones within the boundaries of DEWA, APPA, or MDSR under alternative 4. Therefore, no access roads would be constructed in the floodplain, although tower foundation, crane pad, and pulling and splicing sites are unknown at this time.

Similar to alternative 3, the removal and upgrade of the B-K Line from the Bushkill Substation to the western boundary of DEWA would adversely affect floodplains. The placement of the tower foundations, crane pads, and access roads would be the same as described for alternative 3, resulting in impacts to approximately 0.162 acre of floodplains.

Overall, approximately 0.162 acre of the floodplain (0.16 acre + 0.002 acre) would be affected by construction of access roads, tower foundations, and crane pads. To minimize adverse impacts on natural and beneficial floodplain values, BMPs would be used during construction activities as described in appendix F.

Cumulative Impacts

Cumulative impacts on floodplains inside the study area from other past, present, and reasonably foreseeable projects would be beneficial, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the adverse impacts on floodplains as a result of alternative 4 are combined with the other projects in the study area, an overall adverse cumulative impact would be expected. Alternative 4 would contribute an appreciable adverse increment to the overall cumulative impact.

Conclusion

Alternative 4 would adversely impact floodplains within the boundaries of DEWA. Cumulative impacts inside the study area would be adverse when the impacts of alternative 4 are combined with other past, present, and future projects.

Alternative 5

No construction or vegetation clearing would occur in any floodplain zones within the boundaries of DEWA, APPA, or MDSR under alternative 5. The B-K Line from the Bushkill Substation to the western boundary of DEWA would be maintained periodically as described for alternative 1, but would not be part of the S-R Line. Specifically, clearing vegetation in the ROW in the floodplain would adversely affect natural floodplain values (which include vegetation) that contribute to ecosystem quality (NPS 2002b). However, the periodic clearing of vegetation in the ROW would not alter floodplain storage or obstruct floodwaters, and there would be no development in the floodplain.

Cumulative Impacts

Cumulative impacts on floodplains inside the study area from other past, present, and reasonably foreseeable projects would be beneficial, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the adverse impacts on floodplains as a result of alternative 5 are combined with the other projects in the study area, an overall beneficial cumulative impact would be expected. Alternative 5 would not alter the level of impact.

Conclusion

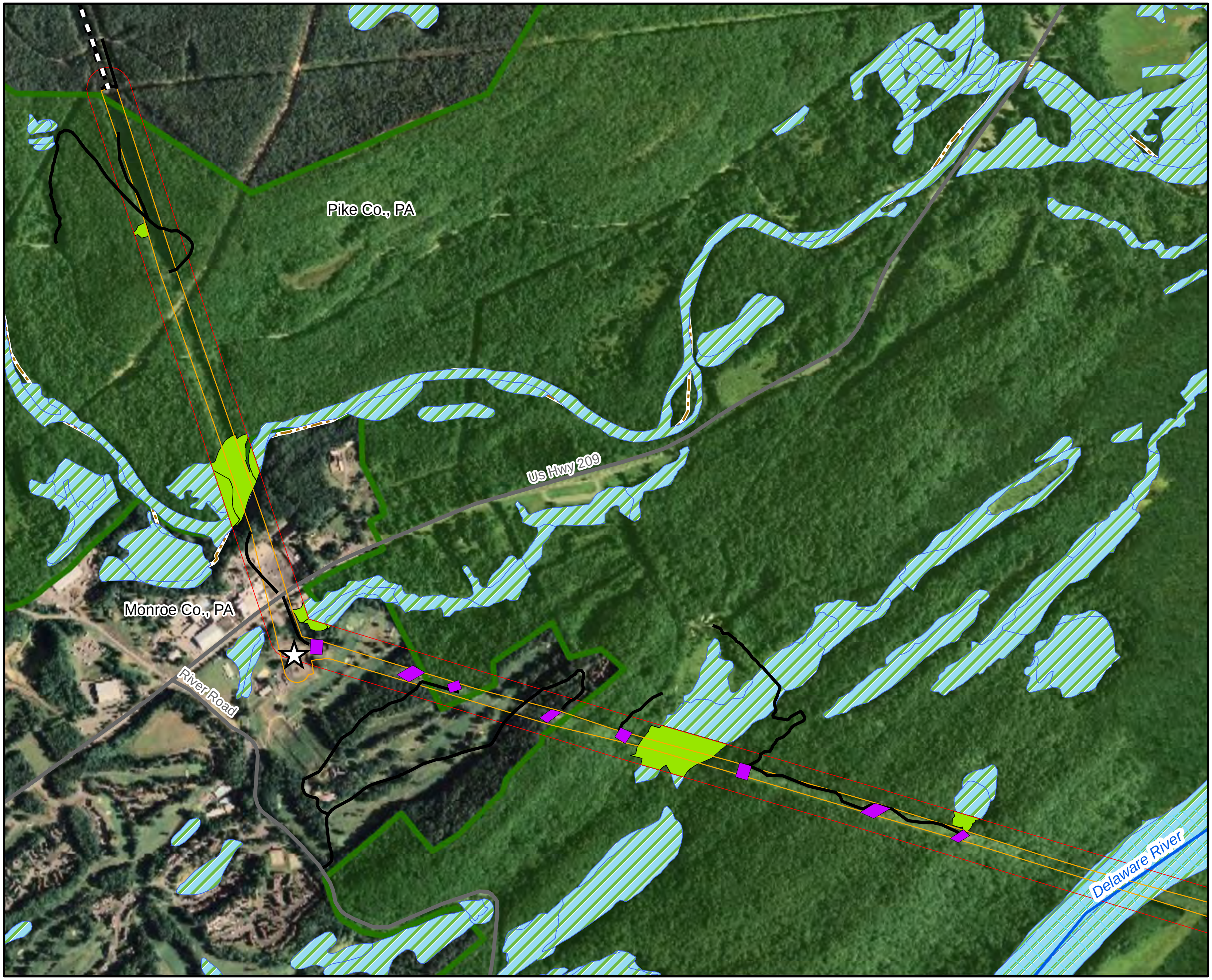
Adverse impacts would occur on the floodplains of water bodies in the study area under alternative 5 from vegetation maintenance. Cumulative impacts inside the study area would be beneficial when the impacts from alternative 5 are combined with other past, present, and future projects.

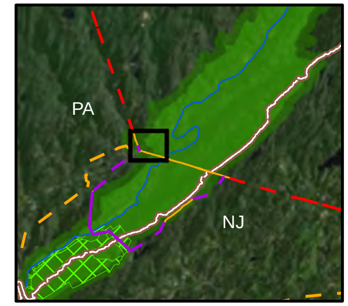
WETLANDS

METHODOLOGIES

The evaluation of impacts on wetlands was based on both a quantitative (acreage affected) and a qualitative assessment of how each proposed alternative would affect wetland functions. A detailed discussion of wetlands and descriptions of wetland types is included in chapter 3. Impacts were determined based on changes to wetland functions and values, including the ability of the wetland to support vegetation and wildlife. In addition, impacts were based on the quality of the existing wetland, including impacts on rare and unique wetland communities; changes to hydrology; impacts on water quality from runoff and sedimentation; stormwater impacts; changes to the abundance and diversity of wetland plant species and wildlife use; the size and type of wetland affected; the area of disturbance; and wetland connectivity to adjacent habitats.

All available information regarding wetland resources was reviewed, including previous reports and data, field surveys that were conducted along the alternative routes, and wetland resources mapped by the NWI. The naming conventions used for wetlands correspond with either the names used to identify these wetlands in the Louis Berger report (2010a) or the names used previously by PSE&G (2009c). Detailed wetland delineation methodologies are included in chapter 3. The impact analysis included a quantification of wetland habitat loss based on the Cowardin method (Cowardin et al. 1979) for impacts on wetlands and a determination of other potential direct and indirect effects. Maps of all wetland resources were overlaid with the alternative routes, and the area (acreage) of wetlands affected by each alternative was estimated and evaluated for the appropriate impact threshold (figures 64 through 69). In this section, permanent and direct impacts on wetlands are quantified by acre, whereas indirect impacts are described as part of the narrative. It should be noted that impacts include direct and indirect impacts on wetlands and wetland buffers (50 feet). Wetlands that are also considered rare and unique communities are analyzed under both resource topics.





Legend

- Substation
- Crane Pad/ Tower Location
- Outside Study Area
- Existing ROW in Study Area
- 350 ft Corridor
- Appalachian National Scenic Trail
- Delaware River
- Proposed Access Road
- Road
- Delaware Water Gap National Recreation Area
- Wetlands within 350ft buffer
- Wetlands
- County Line

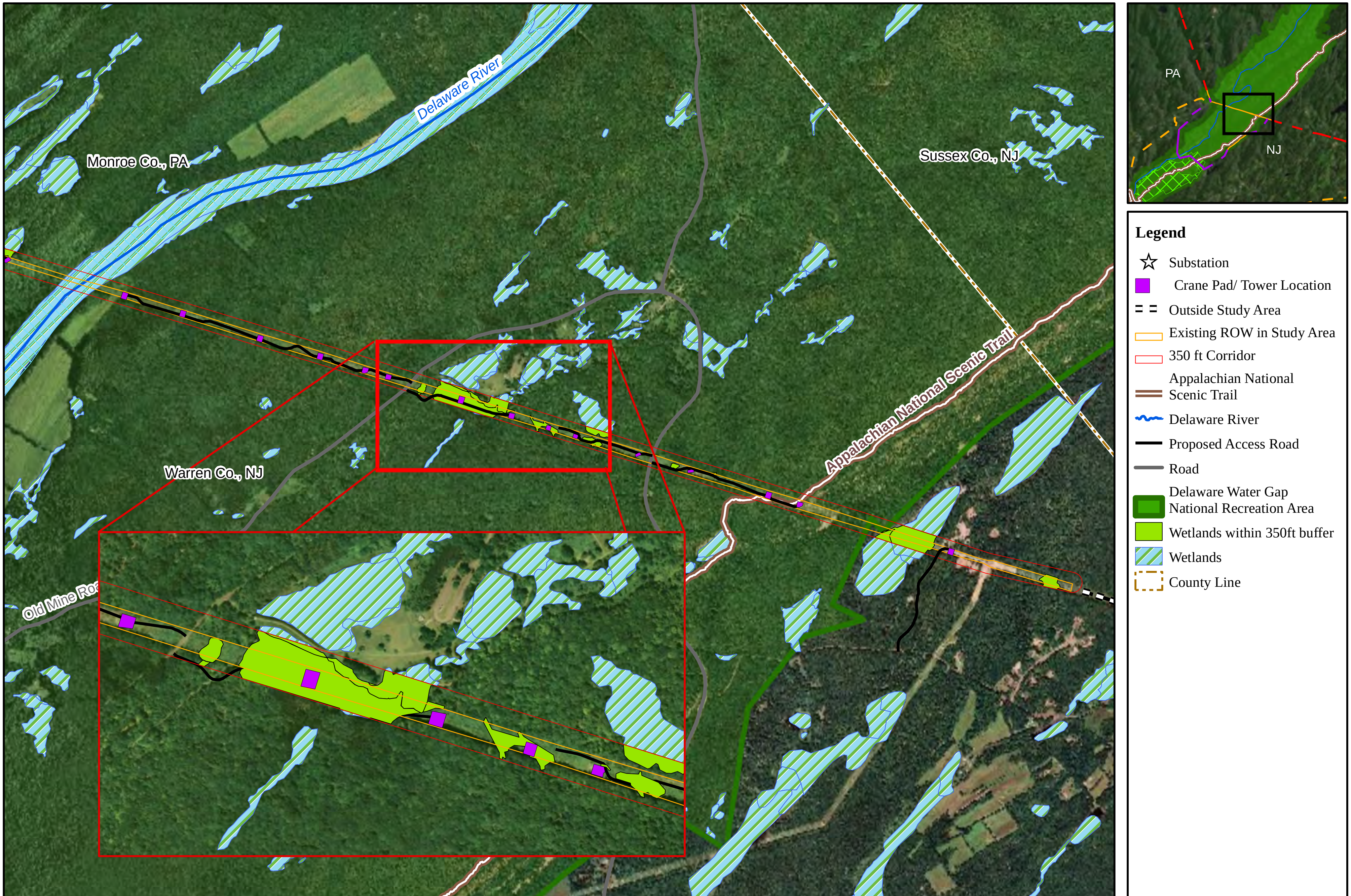
0 500 1,000
Feet

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

Figure 64
Alternative 2 Wetlands in Pennsylvania

Source: ESRI Streetmap 2006, Penn State 2010,
ESRI ArcGISonline Map Service 2010,
PennDOT 2011, USGS 2006,
NJ DEP 2008, NWI 1977

Projection: NAD 83 UTM Zone 18N
Date: October, 2011



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

Figure 65
Alternative 2 Wetlands in New Jersey

Source: ESRI Streetmap 2006, Penn State 2010, ESRI ArcGISonline Map Service 2010, PennDOT 2011, USGS 2006, NJ DEP 2008, NWI 1977

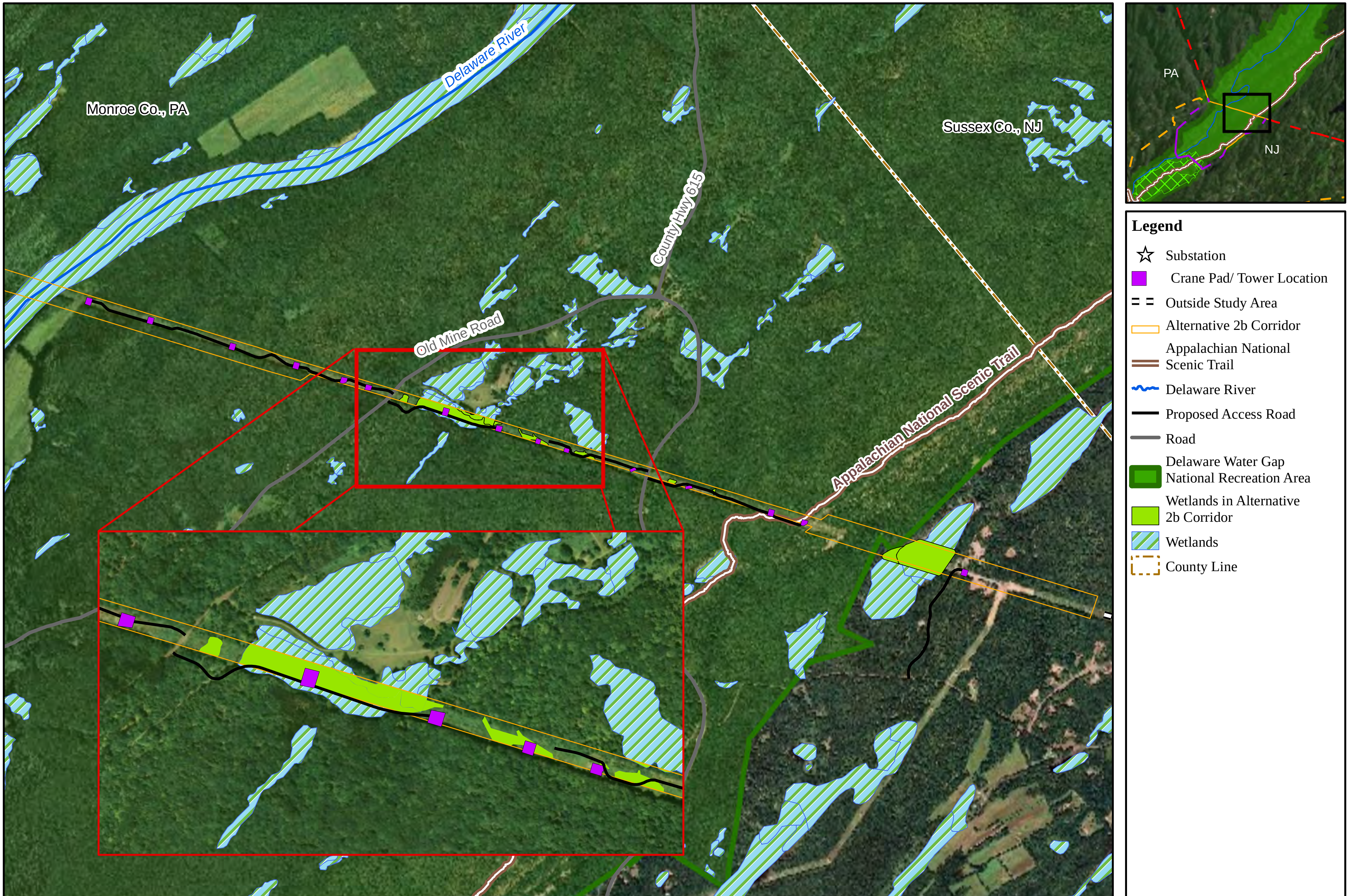
Projection: NAD 83 UTM Zone 18N
Date: October, 2011

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

Figure 66
Alternative 2b Wetlands in Pennsylvania

Source: ESRI Streetmap 2006, Penn State 2010, ESRI ArcGISonline Map Service 2010, PennDOT 2011, USGS 2006, NJ DEP 2008, NWI 1977

Projection: NAD 83 UTM Zone 18N
Date: October, 2011

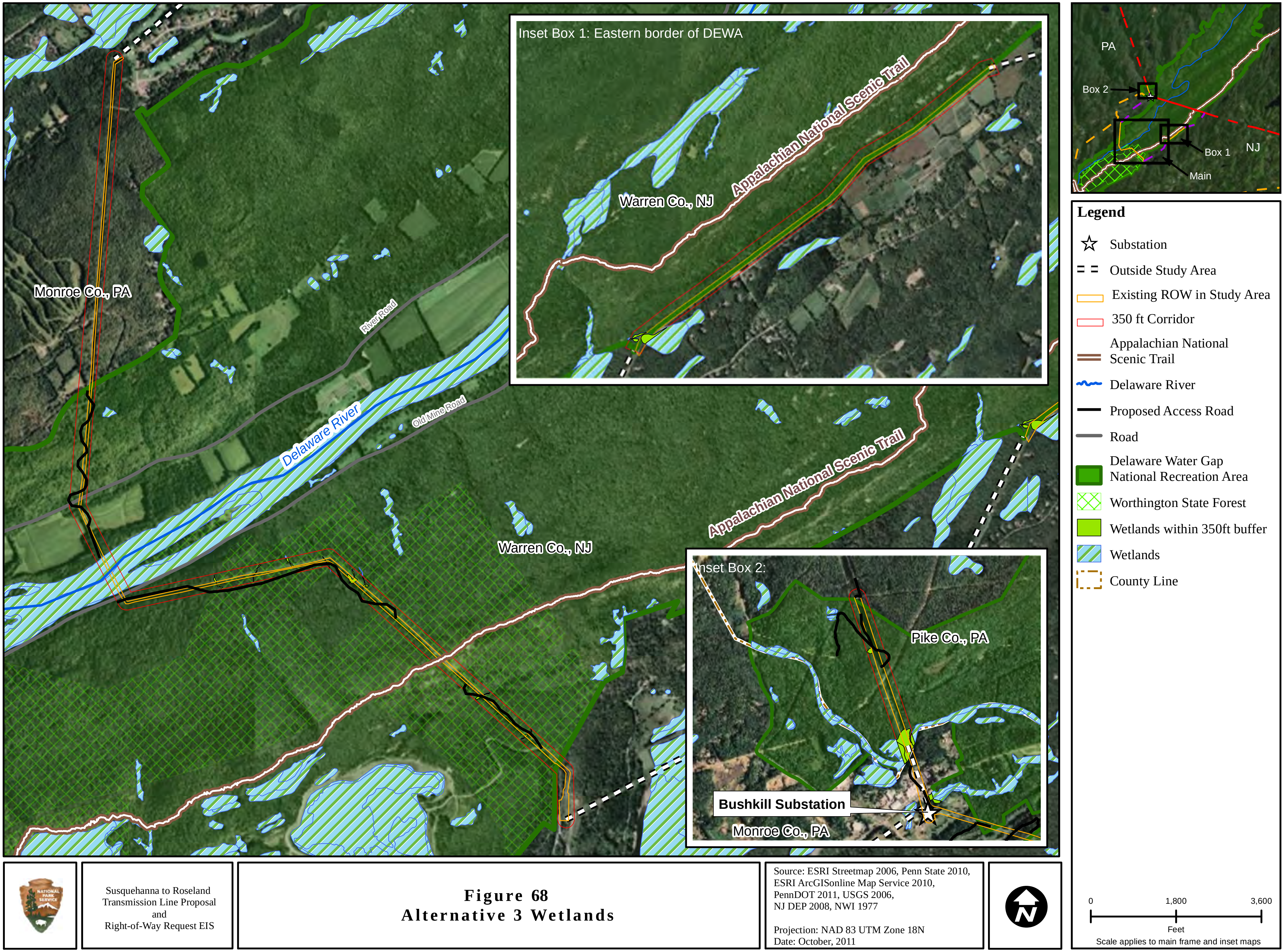


Susquehanna to Roseland Transmission Line Proposal and Right-of-Way Request EIS

Figure 67
Alternative 2b Wetlands in New Jersey

Source: ESRI Streetmap 2006, Penn State 2010, ESRI ArcGISonline Map Service 2010, PennDOT 2011, USGS 2006, NJ DEP 2008, NWI 1977

Projection: NAD 83 UTM Zone 18N
Date: October, 2011

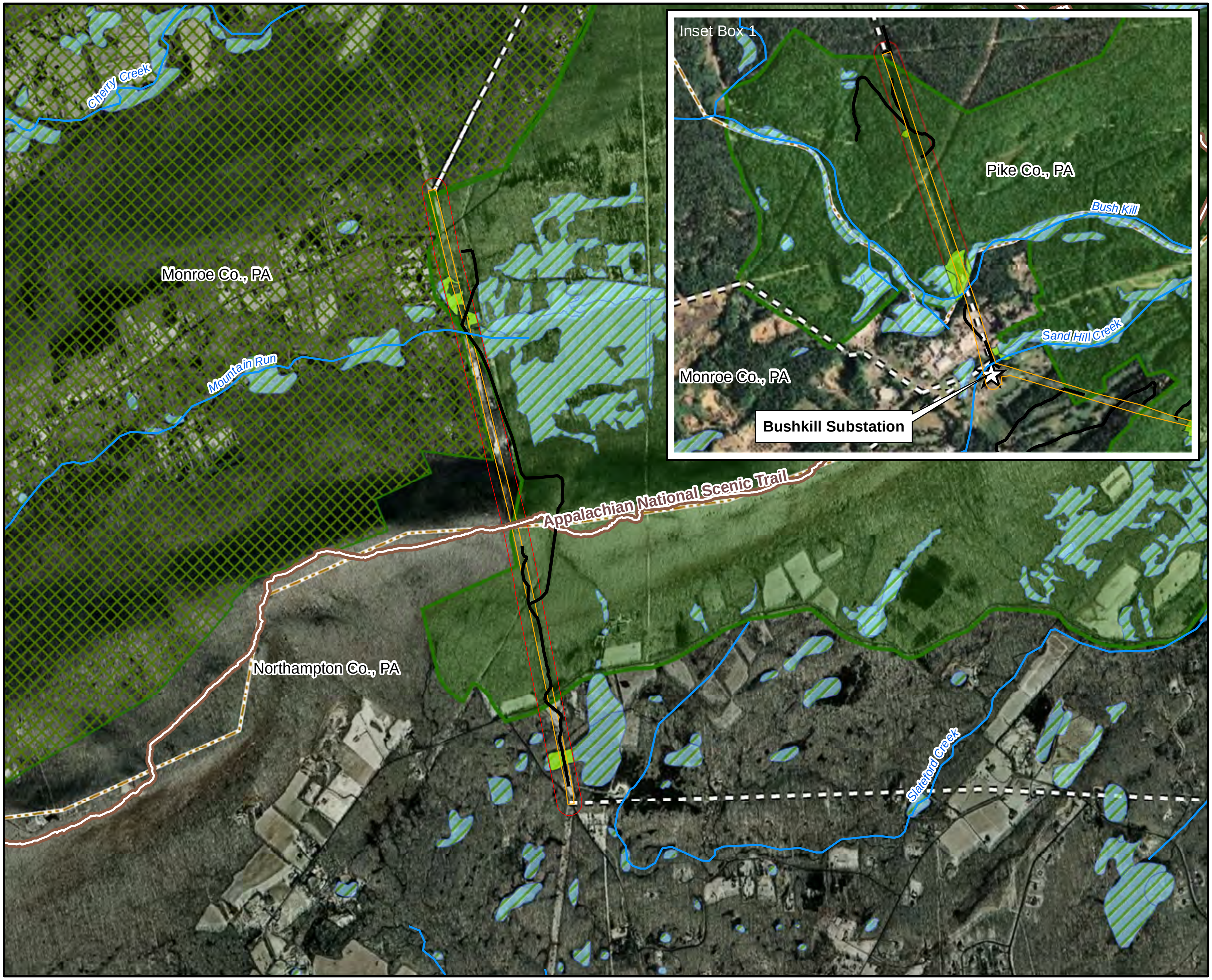


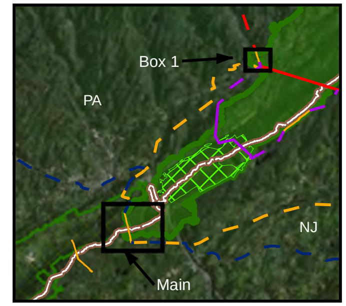
Susquehanna to Roseland Transmission Line Proposal and Right-of-Way Request EIS

Figure 68
Alternative 3 Wetlands

Source: ESRI Streetmap 2006, Penn State 2010, ESRI ArcGISonline Map Service 2010, PennDOT 2011, USGS 2006, NJ DEP 2008, NWI 1977

Projection: NAD 83 UTM Zone 18N
Date: October, 2011





Legend

- Substation
- Outside Study Area
- Existing ROW in Study Area
- 350 ft Corridor
- Appalachian National Scenic Trail
- River/Stream
- Proposed Access Road
- Delaware Water Gap National Recreation Area
- CVNWR Boundary
- Wetlands within 350ft buffer
- Wetlands
- County Line

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

0 1,000 2,000
Feet
Scale applies to main frame and inset maps

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

Figure 69
Alternative 4/5 Wetlands

Source: ESRI Streetmap 2006, Penn State 2010, ESRI ArcGISonline Map Service 2010, PennDOT 2011, USGS 2006, NJ DEP 2008, NWI 1977

Projection: NAD 83 UTM Zone 18N
Date: October, 2011

Consistent with Executive Order 11990 and Director's Order 77-1: *Wetland Protection* (NPS 2011a), the NPS has adopted a goal of "no net loss of wetlands." Director's Order 77-1 states that for new actions where impacts on wetlands cannot be avoided, proposals must include plans for compensatory mitigation that restores wetlands on NPS lands, where possible, at a minimum acreage ratio of 1:1. Therefore, any adverse impacts on wetlands described in this section require mitigation that would assure no net loss of wetlands. The exact ratio for compensation is determined on a project-specific basis in consultation with the NPS Water Resources Division. The U.S. Army Corps of Engineers (USACE) may require higher mitigation ratios, which would be determined at a later date following consultation and coordination as part of the permitting process. Whenever possible, every effort is made to assure that the same wetland restoration proposal meets the compensation requirements of both the NPS and the USACE processes to avoid any duplication of effort.

STUDY AREA

The study area for wetlands includes the ROW for each alternative and any area outside the ROWs where necessary pulling and splicing sites, staging areas, and access road development are proposed or would be expected. Because the location of the S-R Line outside the study area cannot be determined at this time, the indirect impacts on wetlands cannot be evaluated per alternative. The potential impacts outside the study area are generally addressed; however, further surveys would be required prior to construction of the S-R Line.

CUMULATIVE IMPACTS COMMON TO ALL ALTERNATIVES

Actions inside and outside the parks can affect wetlands. Wetland ecosystems are threatened by alterations and permanent loss from development and other habitat pressures. Wetlands provide crucial habitat for many plant and wildlife species and other key ecosystem functions. The establishment of nonnative invasive species that compete with or prey on native species is also a concern in wetland ecosystems. These pressures can alter species diversity and abundance as well type of wetland communities, sometimes resulting in the loss of wetland functions or values. Past, present, and reasonably foreseeable activities that would have beneficial or adverse impacts on wetland communities inside and outside the study area are included below. These projects were taken from a list of projects that could contribute to cumulative impacts developed for the S-R Line (appendix H). An overall cumulative impacts analysis was performed by combining the impacts from the projects below with the potential impacts of each alternative.

In DEWA, there are approximately 1,000 individually mapped wetlands (NPS 2008a). Cumulative impacts on wetlands, specifically forested wetlands, are a concern due to the historically high rate of forested wetland losses and the long period necessary to restore forested wetlands and their functions. Although the annual rate of forested wetland loss has declined since the 1970s, due in part to federal agriculture programs, the loss of forested wetland acreage continues; almost 300,000 acres of forested wetland were lost between 1998 and 2004 (Dahl 2006, 70). Freshwater forested wetlands have recently been affected by two processes: the conversion of forested wetland to and from other wetland types through cutting or maturation of trees, and the loss of forested wetlands where wetland hydrology has been destroyed (Dahl 2006, 70). Because forested wetlands function at different levels, functional losses in individual areas may not be great when viewed as separate and single events. However, the cumulative loss of functions on a regional basis and the continued loss of forested wetland acreage in the United States could have greater overall impacts even as a result of the loss or conversion of small individual areas.

Projects Inside the Study Area

Inside the study area, the following road and utility projects would result in adverse cumulative impacts on wetlands: the PADOT SR 2001 road project (road reconstruction), the Tennessee Gas Line Proposal (addition to an existing gas pipeline), the Columbia Gas Transmission Company pipeline (replacement of an existing gas pipeline), and the Northeast Supply Link Expansion (Palmerton Loop gas pipeline). These projects would result in adverse impacts on wetlands from vegetation clearing and trimming activities as well as disturbance of wetland areas. The parkwide invasive species control program for DEWA would have a beneficial impact on wetlands. This project would aid in the protection of threatened open-canopy wetlands that support rare plant communities along with marsh birds, small mammals, and special-status species. Additionally, there are several land protection programs that could protect wetlands functions and values. The beneficial effects of many of these programs are dependent on the availability of funding for specific projects, which is uncertain and could vary throughout the period of analysis: therefore, the level of benefit resulting from the implementation of any project is also variable. Although these programs would protect wetland functions and values, the beneficial impacts would not outweigh the adverse impacts from the above-mentioned projects. Cumulative impacts on wetlands inside the study area from these projects would be adverse.

Projects Outside the Study Area

Outside the study area, the following road and utility projects would result in cumulative adverse impacts on wetlands: Marcellus shale natural gas drilling, the Columbia Gas Transmission Company pipeline (new gas pipeline), the PPL proposal for a 138/12-kV substation (which opens up additional areas to electric transmission), and transportation improvement and replacement projects in Pennsylvania and New Jersey. Proposed residential and commercial developments in New Jersey and Pennsylvania would also cause adverse impacts on wetlands. Adverse impacts on wetlands would result from vegetation clearing and trimming activities as well as the disturbance of wetland hydrology through impacts on groundwater quality and supply (specifically from gas drilling). Several land protection programs could provide beneficial impacts on wetlands functions and values. As stated above, these programs are dependent on the funding, which is uncertain and could vary throughout the period of analysis: therefore, the level of benefit resulting from the implementation of any project is also variable. Although these programs would protect wetland functions and values, the beneficial impacts would not outweigh the adverse impacts from the above-mentioned projects. Cumulative impacts on wetlands outside the study area from these projects would be adverse.

IMPACTS OF THE ALTERNATIVES ON WETLANDS

Common to All Alternatives

Vegetation Maintenance: Vegetation would be cleared and managed in wetland areas for all alternatives. PPL and PSE&G have separate vegetation management plans because they are distinct utility companies working in different states. In general, all compatible plant species as well as all native grasses, ferns, and herbaceous plants would be preserved to the greatest extent possible (PPL 2010a, 8). However, incompatible trees and shrubs, trees that violate the wire zone, or trees that are considered danger trees would be removed from wetland areas. Trees and small shrubs to be removed in wetland areas would not be removed by heavy equipment, but would be cleared using low-impact tree-clearing methods and would be felled by hand, which would require a chainsaw and operator (PPL and PSE&G 2008, 7–8). Trees would be cut close to the ground and stumps and root systems would be left in the ground to naturally decompose over time, which would provide soil stability (PPL and PSE&G 2008, 7–8). If trees are removed in wetland areas, all associated organic materials (with the exception of stumps) from tree cutting would be removed from the wetlands, wetland buffers, or water-body buffer areas and stored in upland areas. The details of the vegetation management plans as well as clearing techniques are explained in chapter 2.

Mitigation Measures: If there are unavoidable impacts on wetlands, mitigation measures would be required to minimize impacts on wetlands both inside and outside the study area. To minimize adverse impacts, a park-specific plan would be developed by the applicant for review and approval by the NPS in consultation with the USFWS to protect listed species and sensitive habitats at the park (wetlands, rare and unique communities). Numerous wetland mitigation practices have already been considered for the S-R Line and have been incorporated into the alternatives. None of these mitigation measures would eliminate impacts on wetlands; however, they would reduce the impacts on wetlands by decreasing the total loss of vegetation and diversity, controlling the spread of invasive species, and protecting native and sensitive wetland communities. Wetland mitigation measures for this project also include avoidance and minimization measures for bog turtles and their wetland habitat and/or in upland areas adjacent to bog turtle habitat as suggested in the *Bog Turtle (*Clemmys muhlenbergii*) Northern Population Recovery Plan* (USFWS 2001, 51). Specifically, the recommended conservation zones (Zones 1, 2, and 3) as described in chapter 3 and USFWS (2001, appendix A of the recovery plan) are based on the best scientific information available and are used as a template throughout the northern range of the bog turtle to ensure consistent and vigorous protection of extant bog turtle sites. More details concerning wetland mitigation measure are discussed in chapter 2 and appendix F as well as the BA for the bog turtle.

Outside the Study Area: Regardless of which alternative is selected, the line could pass through Carbon, Luzerne, Monroe, Northampton, Pike, and Wayne counties in Pennsylvania and Morris, Sussex, and Warren counties in New Jersey. These counties are largely undeveloped and contain a variety of plant communities as well as developed areas, and could include wetland areas such as forested wetlands, riparian wetlands, bogs/fens, freshwater scrub shrub wetlands, and freshwater herbaceous wetlands. Impacts on wetlands as a result of clearing, construction, and vegetation maintenance activities outside the study area would be consistent with those described for inside the study area; however, because the NPS cannot dictate where the line would actually go, the exact nature of direct impacts from the construction and maintenance of the transmission line outside the study area cannot be determined. Additionally, the specific wetland resources that would be affected by the transmission line outside the study area cannot be identified until the route is chosen by the applicant. Upon this decision, wetland delineation surveys would be required to determine the wetland type and acreage that would be affected along the selected route. Wherever possible, staging areas would be placed outside wetland areas. Impacts on wetland areas outside the study area would generally be adverse because the majority of these impacts would be associated with periodic maintenance, including tree removal, similar to the impacts discussed for inside the study area. However, if wetland impacts are unavoidable, such as impacts from constructing access roads in wetland areas, adverse impacts could arise from a permanent loss in wetland functions or values. In particular, if rare or unique communities that support wetlands and/or Exceptional Value Wetlands are affected outside the study area, indirect impacts could result due to the sensitivity of these wetland resources. When the adverse impacts on wetlands outside the study area are combined with the adverse impacts from other past, present, and reasonably foreseeable projects outside the study area, overall adverse cumulative impacts would be expected.

Alternative 1: No Action

All adverse impacts on wetlands under alternative 1 are associated with vegetation management activities in existing wetland areas, which result in wetland habitat conversion as discussed in more detail in the paragraphs that follow and in table 46. Emergent wetlands (PEM) would not be affected under alternative 1 because they consist of low, herbaceous vegetation. Scrub shrub wetlands (PSS) with plant species not compatible with vegetation maintenance programs described in chapter 2 would be affected by vegetation management, and forested wetlands (PFO) would be affected by tree removal in the ROW under alternative 1. Herbicides would not be used in wetland areas in the parks. The only exception to herbicide use would be for stem-treating nonnative invasive plants. Appropriate herbicides would be approved for specific treatment use.

TABLE 46: WETLAND IMPACTS BY TYPE AND ALTERNATIVE

Wetland Name	Type of Impact: Vegetation Removal — Shrubs/Trees (Acreage)	Permanent Road Impacts (Acreage)	Crane Pad Impacts[a] (Acreage)	Wetland Buffer Impacts (Acreage)[c]	Temporary Road Impacts (Acreage)
Alternative 1					
Wetland AA (PFO)	—	N/A			
Wetland BB (PFO)[EV]	1.47				
Wetland CC (PEM/PSS)	0.02				
Arnott Fen (PEM/PSS) [EV]	0.99[b]				
Hogback Ridge (PSS) [EV]	0.02[b]				
Van Campen (PEM/PSS) [EV]	4.45[b]				
Wetland 42 (PFO)	0.69[b]				
Wetland 45 (PSS)	0.86[b]				
Wetland 46 (PEM/PSS)	0.24[b]				
Wetland 47 (PEM/PSS)	0.05[b]				
Wetland 49 (PEM/PSS)	0.9[b]				
NWI-1 (PEM/PSS)	0.23[b]				
Alternative 1 Total	**9.92**	**N/A**	**N/A**	**N/A**	**N/A**
Alternative 2					
Wetland AA (PFO)	0.52	—	—	0.06	—
Wetland BB (PFO) [EV]	3.86	—	—	—	—
Wetland CC (PEM/PSS)	0.22	—	—	0.03	—
Arnott Fen (PEM/PSS) [EV]	4.1	0.14	—	—	—
Hogback Ridge (PSS) [EV]	0.47	—	—	—	—
Van Campen (PEM/PSS) [EV]	9.6	0.44	0.23	—	—
Wetland 42 (PFO)	1.63	0.08	—	—	—
Wetland 45 (PSS)	1.09	—	0.12	—	—
Wetland 46 (PEM/PSS)	0.24	—	—	0.08	—
Wetland 47 (PEM/PSS)	0.08	0.01	—	—	—
Wetland 49 (PEM/PSS)	1.34	—	—	—	—
NWI-1 (PEM/PSS)	0.79	—	—	—	—
Alternative 2 Total	**23.94**	**0.67**	**0.35**	**0.17**	**—**
Alternative 2b					
Wetland AA (PFO)	—	—	—	—	—
Wetland BB (PFO) [EV]	2.06	—	—	—	—

Wetland Name	Type of Impact				
	Vegetation Removal — Shrubs/Trees (Acreage)	Permanent Road Impacts (Acreage)	Crane Pad Impacts[a] (Acreage)	Wetland Buffer Impacts (Acreage)[c]	Temporary Road Impacts (Acreage)
Wetland CC (PEM/PSS)	0.19	—	—	0.03	—
Arnott Fen (PEM/PSS) [EV]	1.30	—	—	—	—
Hogback Ridge (PSS) [EV]	0.02	—	0.01	0.01	—
Van Campen (PEM/PSS) [EV]	4.82	0.16	0.23	—	—
Wetland 42 (PFO)	0.58	0.05	—	—	—
Wetland 45 (PSS)	0.75	—	0.10	0.01	—
Wetland 46 (PEM/PSS)	0.20	—	—	—	—
Wetland 47 (PEM/PSS)	0.08	0.01	—	—	—
Wetland 49 (PEM/PSS)	1.34	—	—	—	—
NWI-1 (PEM/PSS)	0.79	—	—	—	—
Alternative 2b Total	**12.13**	**0.22**	**0.34**	**0.05**	—
Alternative 3					
Wetland 8 (PEM)	—	0.02	—	—	—
Wetland 10 (PSS)	0.29	—	—	—	—
NWI-3 (PFO)	1.43	—	—	—	—
AA, BB [EV], CC (B-K Line)	1.49	—	—	0.09	—
Arnott Fen, Van Campen, 42, 47 (B-K Line removal)	—	—	—	—	0.67
Alternative 3 Total	**3.21**	**0.02**	**—**	**0.09**	**0.67**
Alternative 4					
Wetland 1 (PFO)	1.77	—	—	—	—
Wetland 2(PFO)	0.71	0.01	—	—	—
NWI-4 (PFO/PSS)	1.83	0.08	—	—	—
AA, BB [EV], CC (B-K Line)	1.49	—	—	0.09	—
Arnott Fen, Van Campen, 42, 47 (B-K Line removal)	—	—	—	—	0.67
Alternative 4 Total	**5.8**	**0.09**	**—**	**0.09**	**0.67**
Alternative 5					
Wetland 1 (PFO)	1.77	—	—	—	—
Wetland 2(PFO)	0.71	0.01	—	—	—
NWI-4 (PFO/PSS)	1.83	0.08	—	—	—
Arnott Fen, Van Campen, 42, 47 (B-K Line removal)	—	—	—	—	0.67
Alternative 5 Total	**4.31**	**0.09**	**—**	**—**	**0.67**

a. Unknown for alternatives 3, 4, and 5.
b. These wetland areas total 8.43 acres and would be allowed to recover under alternatives 3, 4, and 5.
c. Buffer impacts are a result of permanent road impacts to the 50-foot wetland buffer only.
EV = Exceptional value wetland

In Pennsylvania, two PEM wetlands and five PFO wetlands were found along the current ROW for alternative 1. Additionally, the Hogback Ridge wetlands (PSS) as well as Arnott Fen and the surrounding wetland complex (PEM/PSS wetland) are in the corridor for alternative 1 and are characterized as rare or unique communities. Along the ROW in New Jersey there is a PEM/PSS wetland surrounding Sand Pond, which is characterized as a PUBH wetland; the Van Campen wetland complex (PEM/PSS), also characterized as a rare and unique community; and other small wetland areas characterized as PFO, PSS, and/or PEM. The paragraphs below describe impacts on individual wetland areas under alternative 1. Arnott Fen, Hogback Ridge, Van Campens wetland, and wetland BB are all considered *Exceptional Value Wetlands* by both PA and NJ State Codes because they support special-status species; all other wetlands along alternative 1 are considered *Ordinary Value Wetlands*.

Approximately 0.99 acre of the Arnott Fen wetland complex (a PEM/PSS wetland) is within the B-K Line ROW under alternative 1. In the existing ROW, Arnott Fen contains a diverse emergent vegetation community, including numerous special-status wetland plant species that are not found anywhere else in the study area (impacts are discussed in the “Special-status Species” section of this chapter) and is therefore considered an *Exceptional Value Wetland*. Vegetation control measures such as mowing and herbicide use are not currently employed in Arnott Fen and would not be necessary for maintenance under alternative 1. Many of the plant species in the fen in the ROW are herbaceous and compatible with the vegetation maintenance programs described in chapter 2, although incompatible shrubs / small trees such as red maple are also present in the fen and would be hand cleared as part of vegetation management.

Approximately 0.02 acre of the Hogback Ridge wetland (a PSS wetland) is in the B-K Line ROW under alternative 1. The wetland contains deciduous scrub shrub wetland vegetation and is considered an *Exceptional Value Wetland*. Some of the plant species in the wetland are compatible with the applicant’s specifications for vegetation clearing and control; however, incompatible shrub and small tree species such as red maple would be removed by hand clearing.

Approximately 4.45 acres of the Van Campen wetland complex (a PEM/PSS wetland) is in the B-K Line ROW under alternative 1. The wetland contains emergent and scrub shrub wetland vegetation and is considered an *Exceptional Value Wetland*. Some of the plant species in the wetland are compatible with the applicant’s specifications for vegetation clearing and control; however, incompatible shrub and any small tree species would be removed by hand clearing.

In addition to the three wetland areas described above, a total of approximately 4.46 acres of forested or scrub shrub wetlands (wetlands BB, CC, 42, 45, 46, 47, 49, and NWI-1) are located within the B-K Line ROW and would be affected by vegetation maintenance activities; wetland BB is considered an *Exceptional Value Wetland*. Individual trees in these wetland areas that violate the wire security zone would be cut down, leaving stumps in place. Incompatible shrubs and trees would be removed from these wetland areas as well. The removal or felling of trees in forested wetland areas would increase the amount of open canopy in the wetland areas. Open canopy facilitates the growth and spread of nonnative invasive plants, which spread into forested areas. In addition to creating more open canopy, the increased potential for blowdowns or windthrow in forested wetlands also exists when trees are removed from forested wetlands. In forested wetlands, shallow-rooted species protect each other from potential wind damage; whenever trees are removed from a forested wetland, the possibility of blowdowns or windthrow (trees uprooted or broken by wind) increases (MIDNR 1992, LC-3). Edge trees also protect shallow-rooted species by shielding them from the prevailing wind; it is suggested that as many edge trees as possible be left on the prevailing wind side of the cleared area (MIDNR 1992, LC-3). Therefore, the removal of trees in the wetland and along the forested wetland edge would increase the open canopy and could cause an increased potential for blowdowns to occur, which could further adversely affect the wetlands where trees have been removed.

Tree removal in forested wetlands would result in the conversion of wetland habitat type from a forested wetland to an emergent or scrub shrub wetland. The removal of incompatible shrubs or small trees from scrub shrub wetlands would result in their conversion to emergent wetlands; vegetation would be removed from *Exceptional Value Wetlands* under alternative 1. Even though fill would not be placed in wetland areas, habitat conversion is considered a wetland impact because some of the wetland functions and values would change (including fish and wildlife productivity and habitat, threatened and endangered species habitat, vegetation habitat, water purification, and streamflow). It has been demonstrated that removing trees from a forested wetland does not interrupt the prevailing hydrology of the site (Cutlip 1986). However, tree removal in the B-K Line corridor and in forested wetlands would change functions and values by reducing the vegetation canopy over these wetlands, which would reduce the biomass and change the species composition of the wetland (Cutlip 1986). The reduction in biomass would potentially alter the vegetation and wildlife species that use that wetland. This shift in the vegetation type could lessen available resources for wildlife species that depend on the conditions currently found in the wetland. Therefore, measurable changes to the abundance and diversity of wetland vegetation would occur. These areas would continue to function as wetlands, but there would be changes in the abundance and diversity of wetland vegetation, which could directly affect the use of the area by wildlife and listed species and could allow invasive plant species to colonize wetland areas. Managed ROW corridors do not return to the original species composition or structure and succeed to different wetland types (Jordan et al. n.d., 154). Because northern forested wetlands may take 50 years to reach maturity (Kusler 2006, iii) and because trees in the ROW under alternative 1 would continue to be maintained/removed, wetland areas within the ROW would not recover during the period of analysis to become fully functioning forested wetlands.

The regular maintenance and vegetation management in the ROW would cause disturbance to wetlands, including *Exceptional Value Wetlands* under alternative 1 throughout the period of analysis. Wetland functions and values that would change as a result of vegetation management include fish and wildlife productivity and habitat, threatened and endangered species habitat, vegetation habitat, water quality, and streamflow. Other wetland functions and values are unlikely to change as a result of alternative 1. The no-action alternative would result in impacts on a total of 9.92 acres of wetlands as a result of conversion to either emergent or scrub shrub wetlands (this total includes impacts on 5.46 acres of rare and unique wetland communities at Arnott Fen, Hogback Ridge, and Van Campen wetland). Although vegetation removal and maintenance efforts would continue in rare and unique wetland communities, no new development, construction, or blasting would be allowed under alternative 1. Overall, alternative 1 would result in adverse impacts on wetlands.

Cumulative Impacts

Cumulative impacts on wetlands inside the study area from other past, present, and reasonably foreseeable projects would be adverse, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the adverse impacts on wetlands as a result of alternative 1 are combined with the other projects in the study area, overall adverse cumulative impacts would be expected. Alternative 1 would not alter the level of impact.

Conclusion

The no-action alternative would result in impacts on a total of 9.92 acres of wetlands as a result of conversion to either emergent or scrub shrub wetlands, including 5.46 acres of rare and unique wetland communities. Although vegetation removal and maintenance efforts would continue in rare and unique wetland communities, no new development, construction or blasting would be allowed under alternative 1. Overall, alternative 1 would result in adverse impacts on wetlands. When the adverse impacts wetlands as a result of alternative 1 are combined with other past, present, and reasonably foreseeable projects in the study area, overall adverse cumulative impacts would be expected.

Common to All Action Alternatives

Removal of Existing Structures: All action alternatives (2, 2b, 3, 4, and 5) would involve the removal of all or a portion of the B-K Line, as discussed in chapter 2. For all action alternatives, the B-K Line structures would be removed but the foundations for these structures would remain in place. For alternatives 2 and 2b, the S-R Line would be constructed along the same alignment. The removal of the structures would require constructing access roads (either permanent or temporary, depending on the alternative). Under alternatives 2 and 2b, the removal of the B-K Line would require constructing access roads, wire pull sites, and the removal of the line as described in chapter 2; wire pull sites would not be located in wetland areas. Because access roads would also be required for the construction and long-term maintenance of the new line, adverse impacts from removing the line would be the same (or less than) the impacts discussed for construction of the S-R Line.

Vegetation Clearing: The ROWs would be cleared of vegetation for the construction of the new double 500-kV transmission line for alternatives 2 through 5, which would affect wetlands. For the analysis of impacts on wetlands, it was assumed that a 350-foot corridor would be cleared of vegetation for the construction of the new double 500-kV transmission line for alternatives 2, 3, 4, and 5. For alternatives 2, 3, 4, and 5, the corridor would be cleared 175 feet from the centerline of the existing ROW to either side. Under alternative 2b, the applicant proposes to operate the S-R Line within the existing ROW. The NPS anticipates that the applicant would require additional area for construction; therefore, it is estimated that under alternative 2b, the applicant would expand the ROW to the extent of their deeded property rights, which ranges from 100 feet to 380 feet. The property rights are currently being researched through deed research and ground surveys and will be updated as applicable in the final EIS. For alternative 2b, the ROW would be cleared on either side of the centerline to an appropriate width based on the deeded property rights. Clearing would be complete for all action alternatives, with the exception of the 50-foot buffer near intermittent streams/wetlands and the 100-foot buffer near perennial waterways such as the Delaware River (PPL and PSE&G 2008, 7).

Construction Components: Construction activities are described in detail in chapter 2; the activities that would affect wetlands if these areas cannot be avoided include site preparation and construction of access roads, tower foundations, crane pads, wire pull locations, and pulling and splicing sites, as well as the use of heavy equipment and staging areas. These activities would disturb wetland functions and values. Specifically, the construction of access roads would cause increased sedimentation in wetland areas, thus affecting water clarity and water quality; wetlands can also be affected by siltation and alteration of drainage patterns resulting from access road construction, particularly if access roads are in or next to sensitive wetland areas. Also, the use of heavy construction equipment such as forwarders, feller bunchers, and skidders during the removal of vegetation, as well as bulldozers and trucks during the construction and use of access roads, would contribute to the compaction of soil in and near wetland areas. Compaction can cause damage to soil structure, which determines the ability of a soil to hold and conduct water, nutrients, and air necessary for plant root activity and growth (UM 2001, 1). Soil compaction would also increase runoff, thus increasing soil erosion. Soil compaction can also cause changes to hydrology, which would affect wetland function and possibly wildlife use (including bog turtle, a special-status species) of the wetland. In addition to direct effects from construction component, indirect effects to wetlands resulting from activities in the adjacent uplands as stated in the *Bog Turtle* (Clemmys muhlenbergii*) Northern Population Recovery Plan* (USFWS 2001, appendix A) include:

- changes in hydrology (from roads, detention basins, irrigation, increases in impervious surfaces, sand and gravel mining);

- degradation of water quality (due to herbicides, pesticides, oil and salt from various sources including roads, agricultural fields, parking lots and residential developments);
- acceleration of succession (from fertilizer runoff); and
- introduction of exotic plants (due to soil disturbance and roads).

Specified BMPs to protect wetlands from increased sedimentation and compaction would be used to minimize and mitigate these impacts, as described in appendix F. All action alternatives would require blasting as part of the construction process. The required drilling and blasting could fracture limestone geology and create additional solution cavities for surficial groundwater movement where none existed prior to these activities. As underground flow paths enlarge from fracturing, conduits and sinkholes may form and surface streams and wetlands may lose flow or lose water to the subsurface (USGS 2001, 4). It is possible that groundwater withdrawal and diversion of surface water may cause aboveground and underground hydrologic systems to dry up (USGS 2001, 13). The effects of blasting may not occur immediately during the activity, but may take months or years to occur and to affect the hydrology of wetlands. Impacts from blasting in unique geologic formations can lead to a decrease in groundwater availability and quality, which could indirectly and adversely affect wetland functions and values. It is not known how blasting would affect wetland areas along the alternative line configurations. A blasting plan and postconstruction monitoring would be required to identify and monitor the potential impacts of blasting on wetlands. Although a blasting plan would be prepared and submitted to the NPS for review and approval, it is unlikely that the plan could avoid or mitigate the anticipated indirect impacts on some wetlands.

Alternative 2

In Pennsylvania, two PEM wetlands and five PFO wetlands were found along the current B-K Line ROW for alternative 2. Additionally, the Hogback Ridge wetlands (PSS) as well as Arnott Fen and the surrounding wetland complex (PEM/PSS wetland) are both located in the corridor for alternative 2 and are characterized as rare or unique communities. Along the ROW in New Jersey there is a PEM/PSS wetland surrounding Sand Pond, which is characterized as PUBH wetland; the Van Campen wetland complex (PEM/PSS), also characterized as a rare and unique community; and other small wetland areas characterized as PFO, PSS, and/or PEM. As stated above in alternative 1, Arnott Fen, Hogback Ridge, and Van Campens wetlands are all considered *Exceptional Value Wetlands* by both Pennsylvania and New Jersey State Codes; all other wetlands along alternative 2 are considered *Ordinary Value Wetlands*.

Approximately 4.1 acres of the Arnott Fen wetland complex (characterized as a PEM/PSS wetland) is in the 350-foot corridor of the proposed ROW under alternative 2. As described in the vegetation maintenance programs in chapter 2, the existing herbaceous vegetation in the fen and a 50-foot buffer surrounding the fen includes compatible plant species, which would not be cleared to prepare for construction activities (PPL and PSE&G 2008, 7). Some incompatible shrubs / small trees such as red maple exist in the fen and would be hand cleared for construction and as part of the vegetation maintenance programs.

Although no new towers would be placed in the Arnott Fen wetland complex, new towers would be constructed on either side of the fen, which would require extensive excavation and blasting activities adjacent to the fen. The effects of blasting are described in the “Construction Components” section above and could ultimately affect the fen’s hydrology, a crucial feature of wetlands.

In addition to indirect adverse impacts on the fen as a result of blasting, an access road is proposed in the fen. Approximately 0.14 acre of PEM/PSS wetlands that are part of the Arnott Fen wetland complex would be directly and adversely affected by the construction of access roads. Site preparation and construction of access roads would have the same impacts as previously described in "Common to All Alternatives," including increased sedimentation into wetland areas, which could affect water clarity and quality, especially in areas that are particularly sensitive, such as the Arnott Fen wetland complex.

Approximately 0.47 acre of the Hogback Ridge wetland (characterized as a PSS wetland) is located within the 350-foot corridor of the proposed ROW under alternative 2. Because the wetland contains deciduous scrub shrub wetland vegetation, most of the plant species in the wetland would not be disturbed. Incompatible shrub / small tree species such as red maple exist in the wetland area and would be hand cleared as part of construction and vegetation maintenance activities. Access roads would not be constructed through the Hogback Ridge wetland. However, indirect adverse impacts could occur as a result of access road construction and vegetation clearing adjacent to the wetland. These adverse impacts include the potential for impeding the natural flow of water into or out of the wetland area and changes to the movement of wetland wildlife (such as turtles and salamanders) and the distribution of wetland plant seeds.

Approximately 9.6 acres of the Van Campen wetland complex (characterized as a PEM/PSS wetland) is located in the 350-foot corridor of the proposed ROW under alternative 2. Some of the plant species in the wetland are incompatible shrub / small tree species that would be removed by hand clearing for construction and maintenance activities. However, approximately 10,000 square feet (0.23 acre) of the wetland vegetation in the ROW is proposed for clearing under alternative 2 because the applicant's proposal includes a tower in the wetland area that would require a crane pad. Additionally, approximately 0.44 acre of PEM/PSS wetlands that are part of the Van Campen wetland complex would be directly and adversely affected by access roads. As stated under "Common to All Action Alternatives," site preparation and construction of the access roads as well as the use of heavy equipment would disturb wetland functions and values.

In addition to the rare or unique communities that support wetlands discussed above, nine other wetlands would be adversely affected under alternative 2:

- Wetland AA is a PFO wetland near the Bushkill Substation. Impacts from clearing trees in the forested wetland would occur on 0.52 acre of wetland. Direct impacts from access roads would avoid wetland AA, but a very small portion (0.06 acre) of the proposed access road would be constructed in the 50-foot wetland buffer.
- Wetland BB is in the 350-foot corridor of the proposed ROW and contains forested wetland areas that support red maple, with both temporary and saturated water regimes. This wetland is considered an *Exceptional Value Wetland* because it supports special-status species. Impacts from clearing trees in the forested wetland would occur on 3.86 acres of wetland; no direct impacts from access roads would be expected. The hydrology for the wetland is provided by runoff from the adjacent slopes and from the nearby Big Bushkill Creek. Therefore, adjacent access roads or other grading construction could alter the hydrology of the wetland, which would indirectly and adversely affect wetland functions.
- Wetland CC is a PEM wetland near the northern portion of the alignment. Vegetation clearing may result in impacts on 0.22 acres of the wetland, but generally the emergent plants in the wetland are considered compatible species. Direct impacts from access roads would avoid wetland CC, but a very small portion (0.03 acre) of the proposed access road would be constructed in the 50-foot wetland buffer.
- Wetland 42 is a PFO coniferous wetland dominated by needle-leaved coniferous species (but also supporting red maple) partially located in the proposed ROW. Impacts from clearing trees in the

forested wetland would occur on 1.63 acres of wetland in the proposed ROW; access roads would directly and permanently affect approximately 0.08 acre of this wetland.

- Wetland 45 is a PSS wetland in the ROW. Impacts from clearing of shrubs / small trees in the proposed ROW would occur on 1.09 acres of this wetland. The construction of the crane pads would affect 0.12 acre of this wetland.
- Wetland 46 is a PEM/PSS wetland that surrounds a pond in the ROW; impacts from clearing shrubs / small trees would occur on 0.24 acre of this wetland in the proposed ROW. Direct impacts from access roads would avoid wetland 46, but a very small portion (0.08 acre) of the proposed access road would be constructed in the 50-foot wetland buffer.
- Wetland 47 is a PEM/PSS wetland in the ROW; impacts from clearing shrubs / small trees in the wetland would occur on 0.08 acre of this wetland in the proposed ROW. Access roads would directly and permanently affect approximately 0.01 acre of this wetland.
- Wetland 49 is a PEM/PSS wetland in the ROW. Impacts from clearing shrubs / small trees in the proposed ROW would occur on 1.34 acres of this wetland.
- Wetland NWI-1 is a PEM/PSS wetland partially located in the ROW. Impacts from clearing shrubs / small trees in the proposed ROW would occur on 0.79 acres of this wetland.

Construction impacts and vegetation maintenance activities described under alternative 2 would cause both permanent and temporary changes to wetland functions and values, including *Exceptional Value Wetlands*. Site preparation and construction of the access roads as well as the use of heavy equipment would degrade wetland functions and values. Heavy equipment operation in the ROW during the construction of access roads across a ROW in a forested wetland has been shown to interrupt the natural hydrologic regime of the forested wetland and cause the impoundment of water (Cutlip 1986). The use of heavy equipment in wetland areas can also result in the compaction of wetland soils, as discussed above under “Construction Components.”

The construction of access roads both adjacent to and through wetlands would fragment the wetlands, resulting in changes to hydrology and impeding water movement, ground-level wildlife movement, and the seed distribution of wetland plants. Access roads would also reduce the ability of wetlands to perform functions such as groundwater discharge/recharge, sediment/toxicant retention, nutrient removal, flood flow alteration and/or storage, and production export may be temporarily decreased due to temporary disturbance adjacent to the wetland. Access roads would also cause the wetlands’ stormwater/nutrient assimilative capacity to be lost and construction vehicles along the roads could introduce toxic substances (oil and grease). During construction activities, siltation/runoff into wetland areas could occur but would be contained with approved BMPs as discussed under “Common to All Action Alternatives.”

Vegetation management and clearing in wetland areas would result in habitat conversion, which would either change or degrade the following wetland functions and values: fish and wildlife productivity and habitat, threatened and endangered species habitat, vegetation habitat, water purification, and streamflow. Removing trees and small shrubs to expand the ROW would cause habitat conversion as previously discussed and would eliminate the tree canopy of forested wetlands. Tree removal in the corridor and in forested wetlands would change functions and values by reducing the vegetation canopy over these wetlands, which would reduce the biomass and change the species composition of the wetland and increase water temperatures (Cutlip 1986). The reduction in biomass would potentially alter the vegetation and wildlife species that use that wetland. This shift in the vegetation type could lessen available resources for wildlife species that depend on the conditions currently found in the wetland. Therefore, measurable changes to the abundance and diversity of wetland vegetation would occur.

Overall, alternative 2 would require construction and associated activities (blasting) and vegetation clearing and maintenance activities that would affect 23.94 acres of wetlands through conversion to scrub shrub and/or emergent wetlands, including *Exceptional Value Wetlands*. Access roads and crane pads would affect 1.02 acres of wetlands. These totals include 14.17 acres of wetland conversion impacts and 0.86 acre of access roads, tower foundations, and crane pad impacts in the rare and unique communities of Arnott Fen, Hogback Ridge, and Van Campen wetland. Approximately 0.17 acre of wetlands would be indirectly affected by vegetation clearing in the 50-foot wetland buffer. Overall, alternative 2 would result in adverse impacts on wetlands as a result of vegetation removal and maintenance, blasting activities near Arnott Fen, and the access roads, tower foundations, and crane pads, portions of which would affect rare and unique wetland communities as well as Exceptional Value Wetlands.

Cumulative Impacts

Cumulative impacts on wetlands inside the study area from other past, present, and reasonably foreseeable projects would be adverse, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the adverse impacts on wetlands as a result of alternative 2 are combined with the other projects in the study area, an overall adverse cumulative impact would be expected. Alternative 2 would contribute an appreciable increment to the overall cumulative impact.

Conclusion

In the study area under alternative 2, adverse impacts on wetlands would result impacts on wetlands due to construction activities and vegetation clearing that would result in 23.94 acres of forested wetlands being converted to scrub shrub and/or emergent wetlands during ROW clearing. Access road, tower foundation, and crane pad construction would permanently impact 1.02 acres of wetlands, including rare and unique communities that support wetlands. Approximately 0.17 acres of wetlands would be indirectly affected by vegetation clearing in the 50-foot wetland buffer for access roads. For wetlands with limestone geology (Arnott Fen) in the study area of alternative 2, required blasting could create impacts on unique geologic formations and could lead to a decrease in groundwater availability and quality that could indirectly and adversely affect wetland functions and values. It is not entirely known how blasting would affect wetland areas along alternative 2. A blasting plan and postconstruction monitoring would be required to identify and monitor the potential impacts of blasting on wetlands. Access road construction in and adjacent to wetlands could have both direct and indirect adverse impacts on wetlands. Although the construction activities would be short term, the regular maintenance of the ROW and the access roads would cause disturbance to occur throughout the period of analysis. Cleared trees in wetland areas under alternative 2 would never be allowed to mature in the ROW and cleared wetland areas would not recover during the period of analysis to become a fully functioning forested wetland. When the adverse impacts on wetlands as a result of alternative 2 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected.

Alternative 2b

In Pennsylvania, two PEM wetlands and five PFO wetlands were found along the corridor of the proposed ROW under alternative 2b. Additionally, the Hogback Ridge wetlands (PSS) as well as Arnott Fen and the surrounding wetland complex (PEM/PSS wetland) are both in the corridor for alternative 2b and are characterized as rare or unique communities. Along the ROW in New Jersey is a PEM/PSS wetland surrounding Sand Pond, which is characterized as PUBH wetland; the Van Campen wetland complex (PEM/PSS), also characterized as a rare and unique community; and some other small wetland areas characterized as PFO, PSS, and/or PEM wetlands. Arnott Fen, Hogback Ridge, and Van Campens wetlands are all considered *Exceptional Value Wetlands* by both PA and NJ State Codes; all other wetlands along alternative 1 are considered *Ordinary Value Wetlands*.

Approximately 1.30 acres of the Arnott Fen wetland complex (characterized as a PEM/PSS wetland) is located in the corridor of the proposed ROW under alternative 2b. Access roads were designed to avoid impacts on Arnott Fen under alternative 2b. Some incompatible shrubs / small trees such as red maple exist in the fen and would be hand cleared for construction and as part of the vegetation maintenance programs. Although no new tower foundations would be placed in the Arnott Fen wetland complex, new towers would be constructed on either side of the fen, which would require extensive excavation and blasting activities adjacent to the fen. The required drilling and blasting could indirectly and adversely affect the hydrology of the rare and unique wetland community in the same manner as described in detail above for alternative 2. It is not entirely known how blasting would affect wetland areas along alternative 2b. A blasting plan and postconstruction monitoring would be required to identify and monitor the potential impacts of blasting on wetlands in the study area.

Approximately 0.02 acre of the Hogback Ridge wetland (characterized as a PSS wetland) is located in the corridor of the proposed ROW under alternative 2b. Because the wetland contains deciduous scrub shrub wetland vegetation, most of the plant species in the wetland would not be disturbed. Incompatible shrub / small tree species such as red maple exist in the wetland area and would be hand cleared as part of construction and vegetation maintenance activities. Access roads would not be constructed through Hogback Ridge wetland, but would be constructed in the wetland buffer, affecting approximately 0.01 acre. A crane pad would also be partially located in the wetland, affecting approximately 0.01 acre of the wetland. However, indirect adverse impacts could result from access road construction and vegetation clearing adjacent to the wetland. These activities would adversely affect the wetland in the same manner as described in detail above for alternative 2.

Approximately 4.82 acres of the Van Campen wetland complex (characterized as a PEM/PSS wetland) is located in the corridor of the proposed ROW under alternative 2b. Some of the plant species in the wetland are incompatible shrub / small tree species that would be removed by hand clearing for construction and maintenance activities. Additionally, approximately 10,000 square feet (0.23 acre) of the wetland vegetation in the ROW is proposed for clearing under alternative 2b because the applicant's proposed plan includes a tower in the wetland area that would require a crane pad. Also, approximately 0.16 acre of PEM/PSS wetlands that are part of the Van Campen wetland complex would be directly and adversely affected by access roads. These activities would adversely affect the wetland in the same manner as described in detail above for alternative 2.

In addition to the rare or unique communities that support wetlands discussed above, nine other wetlands would be adversely affected under alternative 2b.

- Wetland BB is a PFO wetland in the proposed ROW under alternative 2b and is considered an *Exceptional Value Wetland*. Impacts from clearing trees in the forested wetland would occur on 2.06 acres of wetland; no direct impacts from access roads would be expected.
- Wetland CC is a PEM wetland near the northern portion of the alignment; generally, vegetation clearing would not affect this wetland because it is an emergent wetland, but incompatible plant species could be removed in 0.19 acre of this wetland. The access roads would avoid wetland CC, but a very small portion (0.03 acre) of the proposed access road would be constructed in the 50-foot wetland buffer.
- Wetland 42 is a PFO coniferous wetland dominated by needle-leaved coniferous species and is located in the corridor of the proposed ROW under alternative 2b. Impacts from clearing trees for the ROW in the forested wetland would result impacts on 0.58 acre of this wetland (danger trees may be individually removed if necessary); access roads would directly and permanently affect approximately 0.05 acre of this wetland.

- Wetland 45 is a PSS wetland in the ROW. Impacts from clearing shrubs / small trees would occur on 0.75 acre of this wetland. A crane pad would affect 0.10 acre of this wetland and a very small portion (0.01 acre) of the proposed access road would be constructed in the 50-foot wetland buffer.
- Wetland 46 is a PEM/PSS wetland that surrounds a pond in the corridor. Impacts from clearing shrubs / small trees would occur on 0.20 acre of this wetland.
- Wetland 47 is a PEM/PSS wetland in the ROW. Impacts from clearing shrubs / small trees would occur on 0.08 acre of this wetland; access roads would directly and permanently affect approximately 0.01 acre of this wetland.
- Wetland 49 is a PEM/PSS wetland in the ROW. Impacts from clearing shrubs / small trees would occur on 1.34 acre of this wetland.
- Wetland NWI-1 is a PEM/PSS partially located in the corridor. Impacts from clearing shrubs / small trees would occur on 0.79 acres of this wetland.

Overall, alternative 2b impacts on wetlands due to construction and associated activities (blasting) and vegetation clearing would result in the loss of 12.13 acres of wetlands through conversion to scrub shrub and/or emergent wetlands, and impacts due to access roads and crane pads would permanently affect 0.56 acre of wetlands. Approximately 0.05 acre of wetlands would be indirectly affected by vegetation clearing in the 50-foot wetland buffer from access roads. The total impacts (acreage) of alternative 2b are less than the impacts for alternative 2, and the access roads were redesigned to avoid impacts on Arnott Fen. Rare or unique wetland communities as well as Exceptional Value Wetlands would be permanently altered by crane pad construction, and blasting activities would indirectly affect Arnott Fen. Overall, adverse impacts on wetlands would occur under alternative 2b.

Cumulative Impacts

Cumulative impacts on wetlands inside the study area from other past, present, and reasonably foreseeable projects would be adverse, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the adverse impacts on wetlands as a result of alternative 2b are combined with the other projects in the study area, an overall adverse cumulative impact would be expected. Alternative 2b would not alter the level of impact.

Conclusion

In the study area under alternative 2b, adverse impacts on wetlands would occur due to construction activities and vegetation clearing that would result in converting 12.13 acres of wetlands to impervious surface or from forested wetlands to scrub shrub and/or emergent wetlands during clearing activities in the proposed corridor; access roads and crane pads would permanently affect 0.56 acre of wetlands. Approximately 0.05 acre of wetlands would be indirectly affected by vegetation clearing in the 50-foot wetland buffer from access roads. Under alternative 2b both rare or unique wetland communities and Exceptional Value Wetlands would be adversely affected. The required blasting could affect unique geologic formations (Arnott Fen) and could lead to a decrease in groundwater availability and quality, which could indirectly and adversely affect wetland functions and values. It is not entirely known how blasting would affect wetland areas along the alternative 2b alignment. A blasting plan and postconstruction monitoring would be required to identify and monitor the potential impacts of blasting on wetlands in the study area. Access road construction in and adjacent to wetlands could have both direct and indirect adverse impacts on wetlands. Although the construction activities would be short term, the regular maintenance of the ROW and the access roads would cause disturbance throughout the period of analysis. Cleared trees in wetland areas under alternative 2b would never be allowed to mature in the

ROW; therefore, cleared wetland areas would not recover within the period of analysis to become a fully functioning forested wetland. Alternative 2b has less impacts on forested wetlands as a result of tree removal compared to alternative 2; however, rare and unique communities and Exceptional Value Wetlands would be both directly and indirectly adversely affected under alternative 2b. When the adverse impacts on wetlands as a result of alternative 2b are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected.

Common to Action Alternatives 3 through 5

Restoration of the B-K Line: For alternatives 3, 4, and 5, the portion of the B-K Line between the Bushkill Substation and the eastern boundary of DEWA would be permanently removed and the ROW would be restored, as described in chapter 2. The ROW would be allowed to ultimately return to forested habitat over the long term, including wetlands that are currently maintained through vegetation clearing and tree removal. Approximately 8.43 acres of wetlands would be allowed to recover under these alternatives (includes wetland acreage in the existing B-K Line ROW at Arnott Fen, Hogback Ridge, Van Campen, and wetlands 42, 45, 46, 47, 49, and NWI-1) as shown in table 46. Spur roads would be required on a temporary basis to remove the line and would affect between a maximum of 0.67 acre of wetlands (table 46). After the line is removed, the spur roads would be removed and returned to preconstruction conditions; there would be no permanent impacts on wetlands. No periodic maintenance would be required; after construction, wetland areas would no longer be impacted by tree removal from vegetation. Therefore, approximately 8.4 acres of wetlands in the B-K Line ROW would be expected to recover under alternatives 3, 4, and 5. While the forested wetlands would not become a fully functioning in the period of analysis of this EIS, the process would begin and would be a beneficial impact.

Alternative 3

Numerous small emergent wetland areas exist in the existing transmission line ROW under alternative 3 but would generally not be affected by construction activities or vegetation maintenance because they are herbaceous plant species that are compatible with the applicant’s specifications for vegetation clearing and control. Three wetland areas in the alternative 3 corridor would be adversely affected under this alternative:

- Wetland 8 is a small PEM wetland in the corridor that is vegetated predominantly with sphagnum moss. Adverse impacts would occur on 0.02 acre of wetland 8 because an access road would be constructed through the wetland. The hydrology of this wetland arises from a seep, so impacts on this wetland as a result of an alteration of hydrology from access roads and other construction activities in the wetland are possible due to ponding and/or impoundment of water. As stated under “Common to All Action Alternatives,” site preparation and construction of the access roads as well as the use of heavy equipment would disturb the wetland functions and values.
- Wetland 10 is a PSS wetland in the corridor of alternative 3. Some of the plant species in the wetland are incompatible shrub / small tree species (red maple) that would be removed by hand clearing for construction and maintenance activities. Impacts from clearing shrubs / small trees would occur on 0.29 acre of the wetland.
- NWI-3 is a PFO wetland in the corridor of alternative 3 that supports evergreen and deciduous species. Approximately 1.43 acres of NWI-3 would be adversely affected as a result of vegetation clearing and tree removal. Removing trees in this wetland would convert it from a forested wetland to a scrub shrub and/or emergent wetland. Because this wetland is seasonally flooded, habitat conversion of this forested wetland could impact the hydrology of the wetland because fewer trees (biomass) would exist in this wetland.

In addition to wetland impacts in the alternative 3 corridor, wetland vegetation along the B-K Line corridor would be affected along the portion of alternative 3 from the Bushkill Substation to the western boundary of DEWA. Vegetation would be cleared and maintained, and access roads would be required to upgrade the line for alternative 3. Therefore, trees would be removed from wetlands BB (an *Exceptional Value Wetland*) and CC from an area in the ROW totaling approximately 1.49 acres. A very small portion (0.06 acre) of the proposed access road would be constructed in the 50-foot wetland AA buffer, and a very small portion (0.03 acre) would be constructed in the wetland CC buffer. There would be no direct impacts on wetland AA, but there would be indirect impacts to the wetland buffer as a result of construction of access roads adjacent to the wetland.

Blasting may have adverse impacts on wetlands along alternative 3. The potential impacts from blasting and drilling are the same as those described for alternative 2. Under alternative 3, general impacts on wetland functions and values as a result of construction and removing shrubs/trees would be similar to those discussed in detail under alternative 2, although total impacts (acreage) would be far less. Overall, alternative 3 would adversely affect wetlands due to vegetation clearing that would result in the loss of 3.21 acres of wetlands and due to the construction of access roads that would result in the loss of 0.02 acre of wetlands. Wetlands in rare or unique communities would not be affected under alternative 3. Indirect impacts on the 50-foot wetland buffer (0.09 acre) and temporary wetland impacts from spur roads (approximately 0.53 to 0.67 acre) would also occur under alternative 3. Approximately 8.43 acres of wetlands would be allowed to recover through the revegetation of the B-K Line. Although the B-K Line from the Bushkill Substation to the eastern boundary of DEWA would be removed and revegetated and all construction activities would be short term, the regular maintenance of the alternative 3 ROW and the access roads would cause disturbance to occur throughout the period of analysis. Therefore, the trees cleared under alternative 3 would never be allowed to mature in the ROW and would not recover during the period of analysis to return to a fully functioning forested wetland. Overall, alternative 3 would result in adverse impacts on wetlands.

Cumulative Impacts

Cumulative impacts on wetlands inside the study area from other past, present, and reasonably foreseeable projects would be adverse, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the adverse impacts on wetlands as a result of alternative 3 are combined with the other projects in the study area, an overall adverse cumulative impact would be expected. Alternative 3 would not alter the level of impact.

Conclusion

In the study area, alternative 3 would result in direct adverse impacts on forested wetlands through conversion to scrub shrub and/or emergent wetlands during ROW clearing and as a result of the construction of access roads in wetland areas. Overall, alternative 3 would cause adverse impacts on wetlands due to construction activities and vegetation clearing that would result in the loss of 3.21 acres of forested wetlands through conversion to scrub shrub and/or emergent wetlands during ROW clearing and due to the construction of access roads that would permanently impact 0.02 acre of wetlands. Wetlands in rare or unique communities or Exceptional Value wetlands would not be affected under alternative 3. When the adverse impacts on wetlands as a result of alternative 3 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected.

Alternative 4

Three wetland areas (wetland 1, wetland 2, and NWI-4) were identified in the study area for alternative 4 within the boundaries of DEWA and APPA.

Wetlands 1 and 2 are contiguous PFO wetlands in the proposed ROW. Approximately 1.77 acres of wetland 1 and 0.71 acre of wetland 2 would be adversely affected as a result of vegetation clearing and tree removal under alternative 4. Both wetlands support red maple, which is an incompatible shrub/tree species that would be cleared/removed. In addition, approximately 1.83 acres of wetland NWI-4 (a PFO/PSS wetland) would also be adversely affected by vegetation clearing and tree removal in the proposed ROW. Alternative 4 would adversely affect approximately 4.31 acres of forested wetlands (wetland 1, wetland 2, and NWI-4), not including wetlands affected by removal of the B-K Line from the Bushkill Substation to the western boundary of DEWA, as described below. In addition to vegetation clearing and tree removal, adverse impacts would occur on 0.01 acre of wetland 2 and 0.08 acre of wetland NWI-4 from access road construction activities in the wetlands. The effects of blasting may have adverse impacts on wetlands along alternative 4, as described for alternative 2; however, the impacts are unknown. Other impacts from construction activities under alternative 4 would be similar to those discussed under "Common to All Action Alternatives," including specified BMPs to minimize impacts.

Additionally, the impacts to wetlands in the proposed ROW from the Bushkill Station to the western boundary of DEWA (along the B-K Line), would be the same as those described for alternative 3. Ultimately, 1.5 acres of wetlands BB (an *Exceptional Value Wetland*) and CC would be adversely affected by tree removal, and the construction of proposed access roads would affect 0.06 acre of the 50-foot wetland AA buffer and 0.03 acre of the wetland CC buffer.

General impacts on wetland functions and values as a result of construction and removing shrubs/trees for alternative 4 would be similar to those discussed in detail under alternative 2, although total impacts (acreage) would be less. Overall, alternative 4 would affect wetlands due to construction activities and vegetation clearing that would result in the total loss of 5.8 acres of wetlands through conversion to scrub shrub and/or emergent wetlands and due to access roads that would permanently affect 0.09 acre of wetlands. Wetlands in rare or unique communities would not be affected under alternative 4. Indirect impacts on the 50-foot wetland buffer (0.09 acre) and temporary wetland impacts from spur roads (approximately 0.53 to 0.67 acre) would also occur under alternative 4. Approximately 8.43 acres of wetlands would be allowed to recover through the revegetation of the B-K Line. Although the B-K Line from the Bushkill Substation to the eastern boundary of DEWA would be removed and revegetated and all construction activities would be short term, the regular maintenance of the alternative 4 ROW and the access roads would cause disturbance to occur throughout the period of analysis. Therefore, the trees cleared under alternative 4 would never be allowed to mature in the ROW and would not recover during the period of analysis to become a fully functioning forested wetland. Overall, alternative 4 would result in adverse impacts on wetlands.

Cumulative Impacts

Cumulative impacts on wetlands inside the study area from other past, present, and reasonably foreseeable projects would be adverse, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the adverse impacts on wetlands as a result of alternative 4 are combined with the other projects in the study area, an overall adverse cumulative impact would be expected. Alternative 4 would not alter the level of impact.

Conclusion

Inside the study area, alternative 4 would result in adverse impacts on wetlands due to conversion of forested wetlands to scrub shrub and/or emergent wetlands during ROW clearing and as a result of the construction of access roads in wetland areas. Overall, alternative 4 would affect wetlands due to construction activities and vegetation clearing that would result in the total loss of 5.8 acres of wetlands from conversion and due to access roads that would result in the loss of 0.09 acre of wetlands. Wetlands in rare or unique communities or Exceptional Value wetlands would not be affected under alternative 4. When the adverse impacts on wetlands as a result of alternative 4 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected.

Alternative 5

Inside the study area, alternative 5 would follow the same route through DEWA and APPA as alternative 4, with the exception of the portion of the B-K Line from the Bushkill Station to the western boundary of DEWA. Alternative 5 would adversely affect approximately 4.31 acres of forested wetlands (wetland 1, wetland 2, and NWI-4). Additionally, the construction of access roads would adversely affect 0.09 acre of wetlands under alternative 5 (wetland 2 and NWI-4).

The portion of the B-K Line from the Bushkill Station to the western boundary of DEWA is not part of the S-R Line under alternative 5. Similar to alternative 1, periodic vegetation maintenance would be required in this section of the B-K Line because the existing transmission line would be left in place. Individual trees in these wetland areas that violate the wire security zone would be cut down, leaving stumps in place. Incompatible shrubs and trees would be removed from these wetland areas as well. Impacts resulting from felling trees in forested wetlands would be the same as described previously under alternative 1. Vegetation maintenance in forested wetlands AA and BB (an *Exceptional Value Wetland*) in the ROW would affect approximately 1.49 acres.

The effects of blasting for construction of the tower foundations may have adverse impacts on wetlands along alternative 5, as described for alternative; however, the impacts are unknown. Overall, alternative 5 would affect wetlands due to construction activities and vegetation clearing that would result in the loss of a total of 4.31 acres of wetlands through conversion to scrub shrub and/or emergent wetlands and due to access roads that would permanently affect 0.09 acre of wetlands. Wetlands in rare or unique communities would not be affected under alternative 5. Although the B-K Line from the Bushkill Station to the eastern boundary of DEWA would be removed, all construction activities would be short term and 8.43 acres of wetlands would be allowed to recover. The regular maintenance of the alternative 5 ROW and the access roads would cause disturbance to occur throughout the period of analysis. Therefore, the trees cleared under alternative 5 would never be allowed to mature in the ROW, which would prevent these wetland areas from becoming a fully functioning forested wetland. Overall, alternative 5 would result in adverse impacts on wetlands.

Cumulative Impacts

Cumulative impacts on wetlands inside the study area from other past, present, and reasonably foreseeable projects would be adverse, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the adverse impacts on wetlands as a result of alternative 5 are combined with the other projects in the study area, an adverse cumulative impact would be expected. Alternative 5 would not alter the level of impact.

Conclusion

Overall, alternative 5 would result in adverse impacts on wetlands due to construction activities and vegetation clearing that would result in the total loss of 4.31 acres of wetlands through conversion to scrub shrub and/or emergent wetlands and due to access roads that would permanently affect 0.09 acre of wetlands. Wetlands in rare or unique communities or Exceptional Value Wetlands would not be affected under alternative 5. When the adverse impacts on wetlands as a result of alternative 5 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected.

VEGETATION

In this section, impacts on vegetation communities are evaluated. The overall analysis includes an evaluation of the potential for reduction of community diversity and vitality, as well as the potential for the spread of invasive species.

METHODOLOGIES

Maps showing vegetation cover in DEWA (PNHP 2006) were consulted, and vegetation studies (NPS 2011b) were conducted to identify baseline conditions and composition in the study area. The analysis of vegetation considered that changes in plant community size, integrity, or continuity could occur as a result of the implementation of various proposed activities. This analysis included an evaluation of the potential for proposed actions to favor the establishment and/or expansion of invasive species. All proposed actions are described in detail in chapter 2, including initial vegetation clearing; construction, operation, and maintenance of the transmission line; and vegetation maintenance along the ROW.

Aerial images (ESRI 2008) were used to determine the following inside the study area: the acreages of maintained utility ROWs; the amount of forested habitat that would initially be removed to prepare for construction for the expanded ROWs; the amount of vegetation that would be permanently lost due to features of the transmission line; and the amount of mature forest that would be permanently replaced by maintained scrub shrub. Although mitigation measures would decrease the severity of impacts from construction, operation, and maintenance activities, plant communities would be subject to direct impacts, disturbance, and effects from invasive species.

STUDY AREA

The study area for vegetation includes the ROW proposed for each alternative and any areas outside the corridors where necessary pulling and splicing sites, staging areas, and access road development are proposed or would be expected. Because the location of the S-R Line outside the study area cannot be determined at this time, the indirect impacts on vegetation cannot be evaluated per alternative. The potential impacts outside the study area are generally addressed; however, further surveys may be needed prior to construction of the S-R Line.

CUMULATIVE IMPACTS COMMON TO ALL ALTERNATIVES

Actions inside and outside the parks can affect native vegetation communities. Alterations to and permanent loss of vegetation communities can occur as a result of removal for construction, fire suppression, and the establishment or spread of nonnative, invasive species that compete with native plant species. These actions can alter the diversity and abundance of native vegetation communities and lead to loss of habitat continuity. Past, present, and reasonably foreseeable activities that have beneficial or adverse impacts on plants and vegetation communities inside and outside the study area are listed below and discussed under each alternative as applicable. A complete list of projects that may contribute to cumulative impacts both inside and outside the study area can be found in appendix H.

Projects Inside the Study Area

Inside the study area, projects that would result in adverse cumulative impacts on vegetation include the following visitor access, road, and utility projects: the New Jersey Swim Beach construction (construction of new facilities), the PADOT SR 2001 road project (road reconstruction), the US Route 209 rehabilitation and replacement of Toms Creek Bridge (road and bridge repair), the Appalachian Trail relocation near the Columbia Gas Pipeline Crossing (pipeline upgrade), the Metropolitan Edison enhanced vegetation management program (for transmission lines), the Tennessee Gas Line Proposal (addition to an existing gas pipeline), the Columbia Gas Transmission Company pipeline (replacement of an existing gas pipeline), Central Jersey Power and Light vegetation maintenance (for transmission lines), and the Northeast Supply Link Expansion (Palmerton Loop gas pipeline). Illegal activities such as ORV use, flora collection, and woodcutting also adversely affect vegetation. These projects and actions would result in adverse impacts on vegetation communities through ground disturbance, soil compaction, vegetation loss, alteration of habitat, fragmentation of habitat, alteration of the natural process of succession, potential colonization by invasive plant species, and the potential spread of invasive insect species. The full impact on vegetation and habitat from the Marcellus shale natural gas drilling is still unknown, but the project would likely cause the removal or disturbance of vegetation in some locations, depending on the area under development.

Projects inside the study area that could result in beneficial cumulative impacts on vegetation include construction projects, restoration projects, fire management, and agricultural leases. Construction projects (sustainable comfort stations, hazardous structure demolition/deconstruction, and Metropolitan Edison removal of unused power poles and transformers) would restore previously disturbed areas to natural conditions. Restoration projects inside the study area (the rehabilitation of Childs Park, the restoration of flood-damaged river campsites, the realignment of McDade Trail, parkwide invasive species control programs, the Wildlife Habitat Incentive Program, and important bird area / important mammal area [IBA/IMA] programs) would collectively work to restore areas to natural conditions, prevent further impacts on vegetation from human activity, preserve and improve critical habitat, and reduce the spread of invasive species. Agricultural permits could preserve open space and habitat. Prescribed burns could perpetuate native plant species, control invasive species, and maintain natural habitat. Additionally, several land protection programs could protect vegetation communities. The beneficial effects of many of the listed programs are dependent on the availability of funding for specific projects, which is uncertain and could vary throughout the period of analysis: therefore, the level of benefit resulting from the implementation of any project is also variable.

Overall cumulative impacts on vegetation inside the study area from these projects/actions would be adverse.

Projects Outside the Study Area

Outside the study area, projects that would result in adverse cumulative impacts on vegetation include the following road and utility projects: the Marshalls Creek traffic relief project (new bypass route), the US Route 209 rehabilitation and replacement of Toms Creek Bridge (road and bridge repair), the Tennessee Gas Line Proposal (addition to an existing gas pipeline), Marcellus shale natural gas drilling, the Columbia Gas Transmission Company pipeline (replacement of an existing gas pipeline), and the PFBC natural gas leasing and water access programs. Proposed residential and commercial developments in New Jersey and Pennsylvania would also cause adverse impacts on vegetation. The impacts on vegetation and habitat from the Marcellus shale natural gas drilling and the PFBC natural gas leasing and water access programs are still unknown.

Beneficial impacts on vegetation would result from the following projects: the DEWA prescribed-burn program, the Pennsylvania weed eradication program, the Wildlife Habitat Incentive Program, and IBA/IMA programs. Several land protection programs could provide beneficial impacts on vegetation. The implementation of these programs may be dependent on funding availability, which is uncertain and may vary from year to year throughout the period of analysis. As a result, the beneficial impacts expected from the implementation of these programs could also vary.

The impacts on vegetation from these projects would be the same as those described for projects inside the study area. Therefore, cumulative impacts on vegetation outside the study area would be adverse.

IMPACTS OF THE ALTERNATIVES ON VEGETATION

The construction and operation of the S-R Line could produce impacts on vegetation communities including the removal of vegetation, the maintenance of vegetation along the proposed ROW, and the facilitation of the establishment and spread of invasive species. Forest fragmentation is also a potential impact, and it is discussed in the “Landscape Connectivity, Wildlife Habitat, and Wildlife” section.

Common to All Alternatives

Vegetation Maintenance: PPL and PSE&G, as separate utilities operating in different states, have separate vegetation management plans; however, vegetation management for both utilities would occur annually, at minimum. The details of the vegetation management plans and techniques for clearing vegetation are explained in chapter 2. The NPS considers the applicant’s current vegetation management plans to be insufficient, and the NPS would require a NPS-specific, NPS-park approved vegetation management plan.

Invasive Species: Under all action alternatives, invasive plant and wildlife species have the potential to spread as a result of vegetation removal and disturbance. Additionally, new invasive species may colonize an area where they were previously absent. Across all 50 states, invasive plants spread at an estimated annual rate of 14 million acres (NWRA 2002, 4). In western federal lands, conservative estimates of aggregate invasive plant spread range from 10% to 15% per year (Asher and Dewey 2005.). The colonization and spread of invasive plant species causes considerable problems, including competing with native species, contributing to species extinctions, altering the structure of natural plant communities, and disrupting ecosystem functions.

Before the initiation of construction, the applicant would design management guidelines for invasive plant species to be included in their vegetation management plans (explained in detail in appendix F). These guidelines, which would include regular monitoring and treatment of key invasive plant species, would also require approval by the NPS prior to implementation. The invasive species management guidelines included in the applicant’s vegetation management plans would be the primary mechanism for preventing and managing the spread of invasive plant species in and adjacent to the ROW.

In addition to the applicant’s vegetation management plans, the Eastern Rivers and Mountains Network has an early detection monitoring program to provide early identification and treatment of invasive species before they become widespread in a park, as described in the “Invasive Plant Species” section of chapter 3.

Invasive plant species are currently present in the existing ROWs and surrounding habitats of each alternative alignment. The invasive species present and the abundance of those species vary depending on the conditions in the vegetation communities along the ROW of each alternative route. Revegetating cleared and disturbed areas with native plant seeds, continued monitoring through the applicant's vegetation management plans, and to a lesser degree, the Eastern Rivers and Mountains Network early detection program would help manage the spread of invasive species in cleared and disturbed areas; however, the vegetation communities would be adversely affected by the proposed actions.

Three invasive, nonnative terrestrial insect species have the potential to affect vegetation communities in the study area: hemlock woolly adelgid, European gypsy moth, and emerald ash borer. The hemlock wooly adelgid and the European gypsy moth are present within the study area; therefore, it is not likely that these species would be spread by maintenance activities. All life stages of the emerald ash borer, but especially egg and larval stages, could be inadvertently spread during construction and maintenance activities, resulting in opportunities for new infestations throughout the study area. Mechanisms that could contribute to the spread of invasive insects include ground disturbance, mulching, the transport of mulch for use in other areas, and the transport of equipment used during vegetation removal. Trees that remain in place but are injured during construction activity could become more susceptible to new infestations of nonnative, invasive insect species. Management programs in place to minimize damage from infestations, such as the Eastern Rivers and Mountains Network early detection monitoring program, would reduce the adverse effects of nonnative, invasive insects; however, vegetation communities would be indirectly affected because of the periodicity and varying intensity of infestations.

Mitigation Measures: Mitigation measures would reduce impacts from construction, operation, and maintenance activities and are described in chapter 2 and appendix F. None of the mitigation measures would eliminate impacts on vegetation; however, they would reduce the impacts on vegetation communities by decreasing the loss of native vegetation, controlling the spread of invasive species, protecting native vegetation and sensitive communities, and restoring disturbed areas after construction.

Outside the Study Area: Outside the study area, regardless of which alternative is selected, the transmission line could pass through Carbon, Lackawanna, Luzerne, Monroe, Northampton, Pike, and Wayne counties in Pennsylvania and Morris, Sussex, and Warren counties in New Jersey. These counties are largely undeveloped and contain a variety of habitats. Habitat types that could be encountered in these counties include forest and woodland vegetation communities, riparian and wetland systems, and land altered by human activities such as development or agriculture. These habitat types are described in detail according to dominant vegetation characteristics in the "Vegetation" section of chapter 3.

The clearing, construction, and vegetation maintenance activities outside the study area would be consistent with those described for inside the study area; however, the direct impacts outside the study area cannot be determined, as described in the introduction of this chapter. In addition, specific resource impacts outside the study area cannot be identified until the route is chosen by the applicant. Once this decision is reached, additional surveys would be required to determine the type of vegetation that would be affected along the selected route.

Vegetation communities outside the study area would be adversely affected by vegetation clearing, construction, the operation and maintenance of the transmission line, vegetation maintenance, and the potential spread of invasive species. Indirect impacts may vary in intensity depending on the location, the habitat type, the condition of the existing vegetation, and the extent of activity.

Cumulative impacts on vegetation outside the study area would be adverse, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the adverse impacts on vegetation as a result of activities outside the study area are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected.

Alternative 1: No Action

All impacts on vegetation under alternative 1 would be associated with vegetation maintenance activities along the existing B-K Line ROW. Using selective clearing, vegetation maintenance currently sustains habitat in the existing ROW as scrub shrub, and this practice would continue under alternative 1. Based on aerial photographs (ESRI 2008), the existing ROW ranges from approximately 80 to 100 feet wide and includes 84 acres in the study area, with 63 acres inside NPS boundaries; this area would continue to undergo selective clearing under alternative 1. As part of vegetation maintenance, danger trees may have to be removed from the existing ROW occasionally. Because the number and location of danger trees cannot be estimated, the full impact of danger tree removal is uncertain. Maintenance activities, including the removal of danger trees, would disturb vegetation, including vegetation in rare and unique communities, but would not have an overall effect at the population level or on the viability of the plant communities.

Ground disturbance from maintenance activities, especially tree removal, could facilitate the spread of invasive plant species. Currently, the invasive species in the ROW are uncontrolled and spreading. The applicant would monitor invasive plant species through the NPS-approved vegetation management plan (described in appendix F). Overall, the impacts on vegetation under alternative 1 from vegetation maintenance, including tree removal, and the spread of invasive species would be adverse.

Cumulative Impacts

Cumulative impacts on vegetation from past, present, and reasonably foreseeable projects inside the study area would be adverse, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the adverse impacts on vegetation as a result of alternative 1 are combined with the other projects inside the study area, an overall adverse cumulative impact would be expected. Alternative 1 would not alter the level of impact.

Conclusion

Under alternative 1 inside the study area, vegetation maintenance activities would have localized effects on vegetation but the functionality of the plant communities would not be affected. Additionally, indirect impacts would occur from artificially maintaining scrub shrub habitat in the parks, which is inconsistent with NPS protection of natural, scenic, and recreational resources. Adverse impacts would occur from the continued operation of the existing transmission line due to vegetation maintenance and from the spread of invasive plant species. The effects of past, present, and reasonably foreseeable projects, when combined with the adverse impacts on vegetation under alternative 1, would result in adverse cumulative impacts on vegetation inside the study area.

Common to All Action Alternatives

Removal of Existing Structures: All action alternatives (2, 2b, 3, 4, and 5) include the removal of all or a portion of the B-K Line. The details of the removal and disposal of the existing transmission line are discussed in chapter 2.

Vegetation Clearing: For the analysis of impacts on vegetation, it was assumed that a 350-foot corridor would be cleared of vegetation for the construction of the new double 500-kV transmission line for alternatives 2, 3, 4, and 5. For alternatives 2, 3, 4, and 5, the corridor would be cleared 175 feet from the centerline of the existing ROW to either side. Under alternative 2b, the applicant proposes to operate the S-R Line within the existing ROW. The NPS anticipates that the applicant would require additional area for construction; therefore, it is estimated that under alternative 2b, the applicant would expand the ROW to the extent of their deeded property rights, which ranges from 100 feet to 380 feet. The property rights are currently being researched through deed research and ground surveys and will be updated as applicable in the final EIS. For alternative 2b, the ROW would be cleared on either side of the centerline to an appropriate width based on the deeded property rights.

In addition to vegetation clearing inside the ROW, areas outside of the ROW would also need to be cleared for all action alternatives to construct the access roads, spur roads, and pulling and splicing sites.

Areas cleared for access roads (inside and outside the ROW) and tower foundations (inside the ROW) would be maintained permanently and would result in a permanent loss of vegetation. All other cleared areas would be seeded after construction with an NPS-approved conservation seed mixture appropriate to the local conditions. The area within the ROW maintained for operation is less than that which would be cleared for constructions. Areas both inside and outside the ROW that do not need to be maintained for operation of the S-R Line would be allowed to succeed to forested area over time. Because mature forest removed for construction would not be replaced within the 15-year analysis period covered by this EIS the impacts would be considered permanent.

The successful restoration of the land temporarily cleared and/or disturbed for construction but not needed for the operation of the S-R Line could be hindered by impacts on soils sustained during the construction of the S-R Line, despite the regrading of the surface soils. The use of heavy construction equipment and the construction and use of access roads would compact the underlying soil. Compaction can cause damage to soil structure, which determines the ability of a soil to hold and conduct water, nutrients, and air necessary for plant root activity and growth (UM 2001, 1). Additionally, the removal of near-surface soils may have unfavorable consequences on productivity, adversely affecting the successful revegetation of disturbed areas. Monitoring and maintenance of revegetated areas under the applicant’s vegetation management plans would need to be implemented to ensure that vegetation restoration is successful.

Construction Components: Construction activities are described in detail in chapter 2; the activities that would affect vegetation include the construction of access roads, spur roads, tower foundations, crane pads, wire pull locations, pulling and splicing sites, and staging areas. Construction of these components would result in temporary or permanent loss of vegetation.

Alternative 2

Inside the study area, clearing and construction activities along the alternative 2 alignment would result in ground disturbance, soil compaction, and the physical removal of vegetation. Vegetation clearing would be nearly complete in the 350-foot corridor, with exceptions in sensitive areas such as wetlands and the Delaware River riparian corridor, which would be avoided to the extent feasible (PPL and PSE&G 2008, 7). Vegetation clearing would be implemented as described in the “Vegetation Clearing” section of chapter 2. Once the vegetation is cleared, temporary and access roads, tower foundations, crane pads, and pulling and splicing sites would be constructed.

The approximate acreages of vegetation that would be affected by the construction of the S-R Line in the study area for all the action alternatives are presented in table 47. Approximately 240 acres would be cleared initially in the ROW under alternative 2, with approximately 129 acres of this identified as mature forest. Pulling and splicing sites would be constructed outside the 350-foot corridor, resulting in approximately 22 acres of forest cleared for these sites and the associated spur roads; trees surrounding the pulling and splicing sites would be trimmed but not removed (unless unavoidable) to allow for construction activities. Approximately 9.8 acres of vegetation would be permanently lost through the development of access roads under alternative 2. In areas of steep topography in Pennsylvania, access roads would extend outside the proposed ROW into forested areas due to the topography. The placement of the access roads outside of the ROW would also help to reduce impacts to sensitive resources, such as wetlands (e.g., Arnott Fen) and waterways (e.g., Van Campens Brook). Approximately 6.1 acres of access roads would be inside the 350-foot corridor and 3.7 acres would be outside the corridor (see figures 28 and 29 in chapter 3).

Inside the study area, 84 acres of scrub shrub habitat are currently maintained in the existing B-K Line ROW to avoid contact with the transmission lines. Under alternative 2, the expanded ROW would be maintained at a width of 200 to 300 feet, increasing the acreage of maintained scrub shrub habitat to approximately 129 to 185 acres. The area of maintained scrub shrub within NPS boundaries would increase 43% to 62% (from 63 acres to 101–148 acres). Occasionally, trees in the ROW and danger trees outside the ROW would be removed, which would add to the area of maintained habitat. This maintenance program would result in adverse impacts on the 45 to 101 acres of previously forested area (38 to 85 acres of which is located inside the parks' boundaries) because the maintenance would prevent the vegetation from growing back to its original state. When the loss of forest from the expanded ROW is combined with the loss of forest from construction of access roads outside the ROW, 49 to 105 acres of forest would be permanently lost under alternative 2. Vegetation clearing and construction activities in the study area under alternative 2 would result in a net loss of vegetation. The effects from clearing and construction activities would be measurable and perceptible, and some reduction in the abundance, diversity, and quality of native vegetation would occur.

Alternative 2 would result in approximately 5.4 miles of disturbed land in the ROW and an additional 2.0 miles of disturbed area along the access roads outside the ROW. The expansion of the ROW would expose formerly interior trees and plants to edge conditions. This vegetation would be exposed to new conditions such as an increase in sunlight and temperature, especially along an east–west-oriented ROW that would be exposed to hot afternoon sun (Manitoba Hydro 1995, 13). The composition of vegetation along the edge would change to include more sun-tolerant species, which would include invasive species such as multiflora rose, and many invasive species that tolerate a wide range of conditions would be able to spread into shaded areas of forest. Additional edge habitat would be created by the construction of the access roads, and vegetation communities along the roads could be modified in the same manner as the vegetation in the ROW. Invasive species are often strongly associated with access roads (Mortensen et al. 2009). Seeds can be spread long distances during the construction and maintenance of access roads and vegetation maintenance activities. With the implementation of the vegetation management plan for plants and mitigation measures to protect against the spread of invasive insect species as described in chapter 2 and appendix F, the impacts on vegetation from invasive species under alternative 2 would be minimized.

Numerous rare and unique communities are present in the alternative 2 alignment and would be subject to vegetation clearing and permanent alteration of habitat, and in several instances, access roads would extend directly into sensitive habitats. Impacts on sensitive resources are discussed in the "Rare and Unique Communities" section of this chapter.

TABLE 47: APPROXIMATE ACREAGES OF VEGETATION AFFECTED BY CONSTRUCTION AND OPERATION OF THE S-R LINE IN THE STUDY AREA

Impacts	Alternatives					
	1	2	2b	3	4	5
Acres of vegetation loss from expanding the ROW for construction (including area currently maintained)[a]	0	240	144	313	113	74
Acres of mature forest cleared in the expanded ROW	0	129	42	204	70	44
Acres of permanent vegetation loss from construction of access roads inside the ROW corridor	0	6.1	4.9	4.7	2.0	1.4
Acres of permanent vegetation loss from construction of access roads outside the ROW corridor	0	3.7	4.7	1.6	0.9	0.3
Acres of impacts from construction of pulling and splicing sites outside the ROW corridor [b]	0	22	22	99	55	55
Acres of forest in the ROW maintained as scrub shrub over the long term in the study area	0	45–101	23-37	85–159	31–59	25–45
Total acres in the ROW maintained as scrub shrub in the study area over the long term	84	129–185	107-121[c]	156–230	66–94	44–64
Acres of forest in the expanded ROW maintained as scrub shrub over the long term in NPS lands in the study area	0	38–85	18-29[c]	66–117	22–41	16–28
Total area in the expanded ROW maintained as scrub shrub in NPS lands in the study area over the long term	63	101–148	81-92 [c]	94–145	42–61	30–42
Total acres maintained as scrub shrub in NPS lands in the study area over the long term with restoration of a portion of the B-K Line[d]	N/A	N/A	N/A	Increase in maintained scrub shrub of 41–92 acres	Decrease of 11 acres to increase of 8 acres in maintained scrub shrub	Decrease in maintained scrub shrub of 11–23 acres

a. The ROWs for alternatives 2, 3, 4, and 5 would be cleared to 350 feet and the alternative 2b ROW would be cleared up to 150 feet (100 feet where constrained by easement rights).

b. This total does not include vegetation removed for spur roads. The length and location of spur roads cannot be determined at this time. The area of vegetation removed from pulling and splicing sites is estimated based on the locations of the alignments where angles occur. Two sites are needed per angle and each site would be 400 feet × 600 feet outside the ROW.

c. Alternative 2b would be constructed within the applicant’s deeded property rights. A 0.75-mile portion of the alignment is limited to 100 feet wide. Danger trees would be removed outside of the ROW in this area. The amount of tree removal cannot be estimated at this time; however, the amount of maintained scrub shrub is expected to increase.

d. Under alternatives 3 through 5, approximately 53 acres of the existing ROW along the B-K Line within park boundaries would be restored.

After construction, those areas needed for construction but not for operation, and the rest of the new ROW would be seeded with an NPS-approved conservation seed mixture appropriate to the region unless otherwise specified by the NPS (PPL and PSE&G 2008, 8). The areas outside the operational ROW would be allowed to succeed to natural conditions; however, the full restoration to mature forest would not be complete within the analysis period of this EIS (15 years).

Inside the study area, alternative 2 would result in a net loss of vegetation, would increase the amount of habitat artificially maintained as scrub shrub, would alter habitat types in rare and unique communities, and would facilitate the spread of invasive species. Alternative 2 would result in the permanent loss and alteration of forested habitat. Overall, the actions of alternative 2 would have adverse impacts on vegetation in the study area.

Cumulative Impacts

Cumulative impacts on vegetation from past, present, and reasonably foreseeable projects inside the study area would be adverse, as described previously in the "Cumulative Impacts Common to All Alternatives" section. The adverse impacts on vegetation as a result of alternative 2, when combined with the other projects inside the study area, would be expected to result in an overall adverse cumulative impact. Alternative 2 would not alter the level of impact.

Conclusion

Under alternative 2, adverse impacts on vegetation inside the study area would result from vegetation clearing, the construction of the proposed double 500-kV transmission line, the deconstruction of the existing transmission line, the potential spread of invasive species, and vegetation management for the operation of the S-R Line. Collectively, these impacts would reduce the abundance, diversity, and quality of native vegetation. Additionally, adverse impacts would occur from artificially maintaining scrub shrub habitat in the parks, which is not consistent with NPS protection of natural, scenic, and recreational resources. However, the areas maintained by the applicant would be monitored and treated for invasive species. When the adverse impacts from alternative 2 are combined with the adverse impacts from past, present, and reasonably foreseeable projects, the cumulative impacts on vegetation would be adverse.

Alternative 2b

The types of impacts in the study area along the alternative 2b alignment would be the same as those identified for alternative 2: ground disturbance, soil compaction, and the physical removal of vegetation. Vegetation clearing would be nearly complete in the existing ROW, with exceptions in sensitive areas, which would be avoided to the extent feasible (PPL and PSE&G 2008, 7).

Approximately 144 acres of vegetation would be cleared in the existing ROW under alternative 2b in preparation for construction. Included in this total is approximately 42 acres of mature forest. Approximately 22 acres of forest would be cleared for pulling and splicing sites that would be constructed outside the ROW. Additionally, 9.6 acres of vegetation would be permanently removed for the construction of the access roads. Approximately 4.9 acres of access roads would be constructed in the ROW corridor, and 4.7 acres would be outside the corridor (see figures 30 and 31 in chapter 3).

Inside the study area, 84 acres of scrub shrub habitat are currently maintained in the existing B-K Line ROW. Under alternative 2b, the final width of the ROW would be maintained at 200 to 300 feet, except where the applicant's deeded property rights restrain the ROW to a narrower width. This operational width would maintain approximately 107 to 121 acres of vegetation as scrub shrub habitat with 81 to 92 acres of this inside NPS boundaries. Under alternative 2b, approximately 23 to 37 acres of currently mature forest would be converted into artificially maintained scrub shrub habitat; 18 to 29 acres of which is located within NPS boundaries. Additionally, the removal of danger trees is a part of the applicant's vegetation maintenance plans. The loss of mature forest through the removal of danger trees is not accounted for because the loss cannot be accurately estimated. Approximately 0.75 mile of the existing ROW in Pennsylvania is 100 feet wide. It is anticipated that danger tree removal would occur in this area, which includes the heavily forested Hogback Ridge. Construction activities and the removal of danger trees in the study area along the alternative 2b alignment would result in a net loss of vegetation, including rare and unique communities.

After the double 500-kV transmission line is constructed, the crane pads, pulling and splicing sites, and access roads would be removed and access roads would be reduced to 15 feet wide; these areas and the rest of the new ROW would be seeded with an NPS-approved conservation seed mixture containing native plant species appropriate to the region unless otherwise specified by the NPS (PPL and PSE&G 2008, 8). Due to soil compaction incurred during construction activities as described in the "Common to All Action Alternatives" section, restoration in these disturbed areas could be difficult despite tilling/regrading of the surface soils and would require monitoring as described in the applicant's vegetation management plans to ensure successful growth. As stated for alternative 2, the spread of invasive plant species can increase as a result of changes in vegetation composition after site clearing and access road construction and use. Although mitigation measures would be employed, there is a potential to spread invasive species along the disturbed land in the ROW (approximately 5.4 miles) and along the access roads (approximately 2.4 miles outside the ROW).

Fire hazards would exist from the operation of the double 500-kV transmission line in the existing 100-foot ROW. The 100-foot ROW is insufficient to meet the NESC requirements (DEA 2010b), which state that transmission lines must not only be designed to provide adequate vertical clearance, but also to allow for adequate horizontal clearance at the edge of the ROW during high wind conditions for electrical and safety considerations. The safety clearance required around the conductors is determined by normal operating voltages, conductor temperatures, short-term abnormal voltages, windblown swinging conductors, and contamination of the insulators. Conductor displacement as a result of high winds is termed "conductor blowout." The minimum horizontal clearance to the edge of the ROW under high wind conditions to minimize the risks associated with conductor blowout was determined to be greater than 100 feet. Therefore, alternative 2b would not comply with ROW width standards for conductor blowouts. If trees are not removed beyond the 100-foot ROW, the double 500-kV transmission line could create fire hazards, especially if a conductor blowout occurs. Fires can increase the probability of recurring fires and impact biodiversity. After a fire, the dead trees fall and the remaining vegetation is open to direct sunlight, causing it to dry, thus increasing the chance of subsequent fires. Vegetation that is harmed during forest fires is more susceptible to colonization and infestation by insects, which could further disrupt the vegetation community (Nasi et al. 2002, 36).

Inside the study area, alternative 2b would result in a net loss of vegetation including areas of mature forest, would alter habitat types in rare and unique communities, and would facilitate the spread of invasive species. An unknown number of mature trees would be identified as danger trees and would be removed to ensure the reliability of the transmission line. In addition, the final operational width of the ROW is not in compliance with the NESC requirements and could increase the probability of fires. Overall, the actions of alternative 2b would have adverse impacts on vegetation in the study area.

Cumulative Impacts

Cumulative impacts on vegetation from past, present, and reasonably foreseeable projects inside the study area would be adverse, as described previously in the "Cumulative Impacts Common to All Alternatives" section. The adverse impacts on vegetation as a result of alternative 2b, combined with the other projects inside the study area, would be expected to result in an overall adverse cumulative impact. Alternative 2b would not alter the level of impact.

Conclusion

Under alternative 2b, adverse impacts on vegetation would result from vegetation clearing, the construction of the proposed double 500-kV transmission line, the potential spread of invasive species, and vegetation management (including the removal of danger trees) for the operation of the S-R Line. Collectively, these actions would reduce the abundance, diversity, and quality of native vegetation. Impacts would occur from artificially maintaining scrub shrub habitat in the parks, which is not consistent with NPS protection of natural, scenic, and recreational resources. Additionally, maintaining a portion of the ROW at a width of 100 feet increases the risk of fire from the conductors coming in contact with vegetation in high wind situations. When the adverse impacts from alternative 2b are combined with the adverse impacts from past, present, and reasonably foreseeable projects, the cumulative impacts on vegetation would be adverse.

Common to Alternatives 3, 4, and 5

Restoration of the B-K Line: For alternatives 3, 4, and 5, the portion of the B-K Line between the Bushkill Substation and the eastern boundary of DEWA would be permanently removed and the ROW would be restored, as described in chapter 2. Vegetation in the existing ROW would be cleared and spur roads would be constructed for the removal process. Inside the existing ROW, approximately 53 acres of land within NPS boundaries would be cleared of vegetation. An additional 1.1 to 1.5 acres of vegetation within NPS lands but outside the ROW would be cleared to construct the access roads. Removal of the conductors and structures and chipping the foundations below ground surface would cause ground disturbance. The use of heavy machinery during all these activities would cause further ground disturbance and soil compaction.

Following deconstruction of the B-K Line, approximately 54 acres of land disturbed by clearing and construction of the spur roads and the ROW would be restored to original conditions to the greatest extent possible. These areas would be prepared by disking or tilling as needed to mitigate soil compaction. Following soil preparation, the areas would be seeded with an NPS-approved conservation seed mixture for native species appropriate to the region and allowed to succeed naturally into forested habitat over the long term; however, soil compaction could hinder the restoration process and complete restoration of the ROW into mature forest would not occur within the period of analysis of this EIS. Although the vegetation communities would not return to mature conditions in the period of analysis of this EIS, the process would begin over 54 acres of previously disturbed area and would counteract the effects of clearing and construction under alternatives 3, 4, and 5.

Alternative 3

Impacts on vegetation in the study area would result from ground disturbance, soil compaction, the physical removal of vegetation, and the potential spread of invasive species along the alternative 3 alignment. In preparation for construction, approximately 313 acres of vegetation would be removed in the expanded ROW; approximately 204 acres of this would be mature forest (table 47). An additional 99 acres of mature forest would be cleared for pulling and splicing sites and spur roads outside the 350-foot corridor, and trees surrounding the pulling and splicing sites would be trimmed as necessary to allow for construction activities.

Inside the study area, approximately 65 acres of scrub shrub habitat are currently maintained in the existing ROW for alternative 3, including 31 acres within NPS boundaries. The expanded ROW would be maintained at a width of 200 to 300 feet, increasing the acreage of maintained scrub shrub habitat to approximately 156 to 230 acres, including approximately 66 to 117 acres of currently forested area. The area of maintained scrub shrub within NPS boundaries would be increased from 31 acres to 94 to 145 acres. Access roads created in the New Jersey portion of the alternative 3 route would extend outside the proposed ROW into forested areas (see figure 32 in chapter 3) to accommodate large vehicles on steep terrain. Approximately 4.7 acres of the access roads would be located within the 350-foot corridor and 1.6 acres would be located outside the corridor. Approximately 85 to 159 acres of mature forest would be permanently altered and maintained as scrub shrub habitat after construction of the transmission line under the applicant’s vegetation maintenance plans. With the loss of mature forest from the construction of the access roads outside the ROW, the total acreage of forest permanently altered to scrub shrub would increase by about 2 acres to 87 to 161 acres.

After construction, the crane pads, pulling and splicing sites, and spur roads would be removed and access roads would be reduced to 15 feet wide. These areas, those needed for construction but not for operation, and the rest of the new ROW would be seeded with an NPS-approved conservation seed mixture appropriate to the region unless otherwise specified by the NPS (PPL and PSE&G 2008, 8). The restoration of areas used only for construction would allow 50 to 150 feet of the cleared ROW to return to natural conditions. Under alternative 3, the B-K Line from the Bushkill Substation to the eastern boundary of DEWA would be decommissioned and removed, allowing the original corridor to succeed naturally into mature forest in the long term. Approximately 53 acres along the B-K Line within park boundaries would be restored. The restoration of these areas would result in a net increase in maintained scrub shrub of 41 to 92 acres under alternative 3. The full restoration to mature forest though the restoration could be hindered by soil compaction and loss of near-surface soils, as described for alternative 2. Ultimately, the restoration of the B-K Line ROW and of areas temporarily disturbed during construction would not be complete within the analysis period of this EIS; however, the restoration process would begin, which would be valuable for the vegetation communities.

As stated for alternative 2, the spread of invasive species can increase from changes in vegetation composition after site clearing and access road construction and use. Although mitigation measures would be employed, alternative 3 would create a corridor approximately 6.9 miles long and approximately 200 to 300 feet wide that would contain newly disturbed land, which may provide favorable conditions for invasive species to spread.

Inside the study area, alternative 3 would result in a net loss of vegetation, would increase the amount of habitat artificially maintained as scrub shrub, would alter habitat types in rare and unique communities, and would potentially facilitate the spread of invasive species over 6.9 miles. The alternative 3 alignment contains sensitive habitats that would be affected by the construction and operation activities of alternative 3; however, the variety and abundance of these habitats is less than those in the alignment for alternatives 1, 2, and 2b. Overall, the actions of alternative 3 would have adverse impacts on vegetation in the study area.

Cumulative Impacts

Cumulative impacts on vegetation from past, present, and reasonably foreseeable projects inside the study area would be adverse, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the adverse impacts on vegetation as a result of alternative 3 are combined with other projects inside the study area, an overall adverse cumulative impact would be expected. Alternative 3 would not alter the level of impact.

Conclusion

Under alternative 3, adverse impacts on vegetation inside the study area would result from vegetation clearing, the construction of the proposed double 500-kV transmission line, the potential spread of invasive species, and vegetation management for the operation of the S-R Line and would result in a decline in the functionality of the plant communities. Adverse impacts would also occur from artificially maintaining scrub shrub habitat in the parks, which is not consistent with NPS protection of natural, scenic, and recreational resources. The removal of the existing B-K Line would reduce the net area of vegetation lost and maintained as scrub shrub; however, the full restoration of the area would not be complete in the period of analysis. When the adverse impacts from alternative 3 are combined with the adverse impacts from past, present, and reasonably foreseeable projects, the cumulative impacts on vegetation would be adverse.

Alternative 4

Vegetation clearing inside the study area in preparation for the construction of the S-R Line under alternative 4 would remove approximately 113 acres of vegetation initially in the expanded ROW; approximately 70 acres of this would be mature forest (table 47). An additional 55 acres of forest would be cleared for pulling and splicing sites and spur roads outside the 350-foot corridor, and trees surrounding the pulling and splicing sites would be trimmed to allow for construction activities as necessary.

Because alternative 4 is located along the edge of DEWA, the forests are more fragmented than those along other alternatives. Forested areas are bordered by developed areas, paralleled by another existing ROW, and bisected by existing paved roads. Overall, the existing habitat is lower quality and contains less value than the habitat along the alignments for alternatives 1, 2, 2b, and 3.

Vegetation removal and the expansion of successional habitat in the proposed ROW would occur and would permanently alter habitat along the route. Approximately 31 to 59 acres of former mature forest would be maintained as scrub shrub habitat following construction of the S-R Line, and approximately 22 to 41 acres of this would be within DEWA and APPA boundaries. Permanent vegetation loss would occur in the ROW where tower foundations and access roads are constructed. Approximately 2.9 acres of vegetation would be permanently eliminated by the access roads under alternative 4. In some areas inside the study area, access roads would extend outside the proposed ROW into forested areas (see figure 33 in chapter 3). Approximately 2.0 acres of the new access roads would be within the 350-foot corridor and 0.9 acre would be outside the corridor. With the clearing required for permanent access roads outside the ROW, the total amount of mature forest lost would increase to 32 to 60 acres.

Inside the study area, 35 acres of scrub shrub habitat are currently maintained within the existing ROW. Vegetation maintenance would result in adverse impacts on the 31 to 59 acres of previously forested area, because the maintenance would not allow trees to grow to maturity. Impacts would also result from the occasional removal of trees in the proposed ROW and danger trees outside the ROW. Under alternative 4, the expanded ROW would be maintained at a width of 200 to 300 feet, increasing the acreage of maintained scrub shrub habitat to approximately 66 to 94 acres, with 42 to 61 acres within NPS boundaries.

After construction, crane pads, pulling and splicing sites, and spur roads would be removed and permanent access roads would be reduced to 15 feet wide. These areas would be restored by tilling or regrading the soils and seeding with an NPS-approved conservation seed mix, as previously described. Additionally, the B-K Line from the Bushkill Substation to the eastern boundary of DEWA would be decommissioned and removed and this area would also be restored, allowing the corridor to succeed naturally into mature forest in the long term. Approximately 53 acres within NPS boundaries would be restored, resulting in a potential range in conditions from a net increase in maintained scrub shrub of 8 acres to a net decrease in maintained scrub shrub of 11 acres, based on a ROW width of 200 to 300 feet. All areas of restoration would be subject to impacts from soil compaction and the loss of surface soils, and the restoration would not be complete within the analysis period of this EIS.

Clearing, construction, and vegetation maintenance activities that would remove existing vegetation and disturb ground and soil surfaces could spread invasive species. As stated for alternative 2, the spread of invasive species can increase from disturbance from site clearing and access road construction and use. Although mitigation measures would be implemented, alternative 4 would result in approximately 2.3 linear miles of newly disturbed land within the ROW and an additional 0.5 linear mile along access roads outside the ROW that could facilitate the spread of invasive species.

Inside the study area, alternative 4 would result in a potential range in conditions from a net increase in maintained scrub shrub of 8 acres to a net decrease in maintained scrub shrub of 11 acres, could increase the amount of habitat artificially maintained as scrub shrub, would alter habitat types in rare and unique communities, and would facilitate the spread of invasive species. Overall, the actions of alternative 4 would have adverse impacts on vegetation in the study area.

Cumulative Impacts

Cumulative impacts on vegetation from past, present, and reasonably foreseeable projects inside the study area would be adverse, as described previously in the “Cumulative Impacts Common to All Alternatives” section. The adverse impacts on vegetation as a result of alternative 4, combined with the other projects inside the study area, would be expected to result in an overall adverse cumulative impact. Alternative 4 would not alter the level of impact.

Conclusion

Under alternative 4, adverse impacts on vegetation would result from vegetation clearing, the construction of the proposed double 500-kV transmission line, the potential spread of invasive species, and vegetation management for the operation of the S-R Line. These adverse impacts would reduce the abundance, diversity, and quality of native vegetation. Additionally, impacts would occur from artificially maintaining scrub shrub habitat in the parks, which is inconsistent with NPS protection of natural resources. The deconstruction of a portion of the B-K Line would allow a portion of the B-K Line ROW to revegetate. When the adverse impacts from alternative 4 are combined with the adverse impacts from past, present, and reasonably foreseeable projects, the cumulative impacts on vegetation would be adverse.

Alternative 5

The alignments for alternatives 4 and 5 follow the same route through DEWA and APPA; however, the acreage affected by alternative 5 would be less than that for alternative 4 (table 47) because alternative 5 would take a different course outside the study area and would not reenter DEWA west of the Bushkill Substation.

Under alternative 5, approximately 74 acres of vegetation would be cleared initially to prepare for construction; approximately 44 acres of this is characterized as mature forest. The pulling and splicing sites would require the removal of an additional 55 acres of forest. After construction, access roads would encompass 1.7 acres, including 0.3 acres outside the ROW, resulting in a permanent loss of 1.4 acres of mature forest inside the ROW within the road footprint.

Inside the study area, 19 acres of scrub shrub habitat are currently maintained within the existing ROW. Under alternative 5, the expanded ROW would be maintained at a width of 200 to 300 feet, increasing the acreage of maintained scrub shrub habitat to approximately 44 to 64 acres. Approximately 30 to 42 acres of this land is within NPS boundaries, an increase from the current 19 acres of maintained scrub shrub.

Under alternative 5, areas used only during construction would be restored following the construction period. Additionally, the B-K Line from the Bushkill Substation to the eastern boundary of DEWA would be decommissioned and removed, allowing the corridor to succeed naturally into mature forest in the long term. Approximately 53 acres within NPS boundaries would be restored, resulting in a net decrease in maintained scrub shrub area along the alternative 5 alignment over the long term of 11 to 23 acres. As stated previously, restoration to mature forest could be hindered by soil compaction and loss of near-surface soils, and the restoration of the B-K Line and of areas temporarily disturbed during construction would not be complete within the analysis period of this EIS.

As stated for alternative 2, the spread of invasive species can increase from changes in vegetation composition after site clearing and through the construction and use of permanent roads. Mitigation measures to manage the spread of invasive species would be employed; however, alternative 5 would result in approximately 1.7 linear miles of disturbed land within the ROW and an additional 0.2 mile along the access roads outside the ROW, which could facilitate the spread of invasive species.

Inside the study area, alternative 5 would result in a net gain of vegetation, would decrease the amount of habitat artificially maintained as scrub shrub, would alter habitat types in rare and unique communities, and would facilitate the spread of invasive species. Overall, the actions of alternative 5 would have adverse impacts on vegetation in the study area.

Cumulative Impacts

Cumulative impacts on vegetation from past, present, and reasonably foreseeable projects inside the study area would be adverse, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the adverse impacts on vegetation as a result of alternative 5 are combined with the other projects in the study area, an overall adverse cumulative impact would be expected. Alternative 5 would not alter the level of impact.

Conclusion

Under alternative 5, adverse impacts on vegetation inside the study area would result from vegetation clearing, the construction of the proposed double 500-kV transmission line, the deconstruction of the existing transmission line, the potential spread of invasive species, and vegetation management for the operation of the S-R Line, which would reduce the abundance, diversity, and quality of native vegetation. Additionally, adverse impacts would occur from artificially maintaining scrub shrub habitat in the parks, which is not consistent with NPS protection of natural, scenic, and recreational resources. The removal of the existing B-K Line would result in a decrease in maintained scrub shrub habitat; however, the full restoration of the area would not be complete in the period of analysis. When the adverse impacts from alternative 5 are combined with the adverse impacts from past, present, and reasonably foreseeable projects, the cumulative impacts on vegetation would be adverse.

LANDSCAPE CONNECTIVITY, WILDLIFE HABITAT, AND WILDLIFE

Landscape connectivity is an important ecological component when evaluating the quality of a habitat. High quality habitat is critical for the health and viability of wildlife populations, which ultimately contribute to the overall health and functionality of these natural systems. The amount of connectivity among patches of habitat increases the quality of habitat because wildlife are able to freely move between the patches and maintain genetic diversity, leading to healthy populations; ease of travel varies depending on the species' mobility or ability to disperse (Wilderness Society 2004, 1–5). Many wildlife species currently have the ability to travel freely from Pennsylvania state lands across NPS lands and the Delaware River, and across New Jersey state lands in an uninterrupted complex of nearly half a million acres. Fragmentation of the habitat can create barriers for individuals of a species traveling between populations and can lead to isolation of a species (D'Eon et al. 2002). In some cases the large scale connectivity that presently exists is dependent upon undeveloped private property that has no long term protection status. The present condition is subject to fragmentation through potential development. As a result, every significant action that diminishes this aspect of the environment has increased importance.

DEWA, APPA, and MDSR form the backbone of the natural landscape in this region and as such provide the most important element in an ecosystem that crosses several states. Across the country similar connectivity projects have been focusing on these same issues and goals of protecting the ecological benefits of a landscape, such as Mojave Complex in the California desert, the Yellowstone to Yukon Project, and the Everglades Complex in Florida. Research programs such as NASA's Park Analysis and Monitoring Support program, which looks at land use change surrounding NPS lands on more of a landscape scale, have become more prevalent throughout the country. A national effort is underway through the Natural Resource Advisory Group (Advisory Group) to bring landscape-scale connectivity actions to the forefront of NPS programs. The Advisory Group has developed recommended action items, program elements, and products to meet NPS needs regarding landscape-scale connectivity.

The NPS has been working with state and local agencies and other nongovernmental conservation organizations in both Pennsylvania and New Jersey to identify priority areas and lands that connect state and federal lands. The focus of the private/public partnership on conservation is landscape connectivity at a regional scale.

METHODOLOGIES

The evaluation of wildlife, wildlife habitat, and landscape connectivity was based on a qualitative assessment of the expected alterations to habitats inside and outside the study area resulting from the implementation of each alternative. The assessment of landscape connectivity in its traditional sense of continuity of habitat on a regional scale cannot be accomplished in this analysis because of the separate analyses of the areas inside and outside the study area. Because the location of the S-R Line outside the study area cannot be determined at this time, a direct analysis of the impacts on landscape connectivity is not possible. Therefore, connectivity at the regional scale is discussed as a cumulative impact.

Inside the study area, the analysis focuses on contiguous habitat patches and the impact of the alternatives on these patches. The proposed project alignment for each alternative is based on an existing ROW; therefore, baseline conditions include some amount of existing fragmentation along the alignment for each alternative. Determination of habitat loss, alteration, or restoration was based on an analysis of likely vegetation changes resulting from each alternative.

A terrestrial study area, as described in the following section, was created to determine impacts on landscape connectivity within its perimeter. The amount of habitat fragmentation — and therefore the impacts on contiguous habitat patches — that would result was analyzed using NPScape, a landscape dynamics monitoring project (NPS 2010ad). NPScape uses GIS-based modeling and land cover data for NPS lands and the surrounding area to produce a suite of landscape-scale data sets, maps, reports, and other products to inform resource management and planning at local, regional, and national scales (NPS 2010ad). For the analysis in this EIS, contiguous habitat patches were determined for the existing conditions of the terrestrial study area using major and minor roads, trails, and existing ROWs as fragmenting features. The specifications of each alternative were used to create contiguous habitat patches for the proposed conditions. The modeled information was used to determine the impacts from the alternatives on contiguous habitat patches and therefore wildlife habitat. These analyses were then used to evaluate the impacts on wildlife and migratory birds that use the land in the terrestrial study area. It should be noted that because of the relatively narrow terrestrial study area, patches along the edges of the terrestrial study area boundary appear small, but the actual size of these patches is unknown. The terrestrial study area was designed to end at the VSL points.

The parks' wildlife species are directly affected by the natural abundance, biodiversity, and ecological integrity of their habitat. Wildlife groups analyzed in this section include aquatic species, terrestrial invertebrates, birds, reptiles and amphibians, and mammals. All rare, threatened, and endangered species are discussed in the "Special-status Species" section. The impact analysis for terrestrial wildlife species included an assessment of impacts on species associated with habitat types that would be altered with the implementation of each alternative.

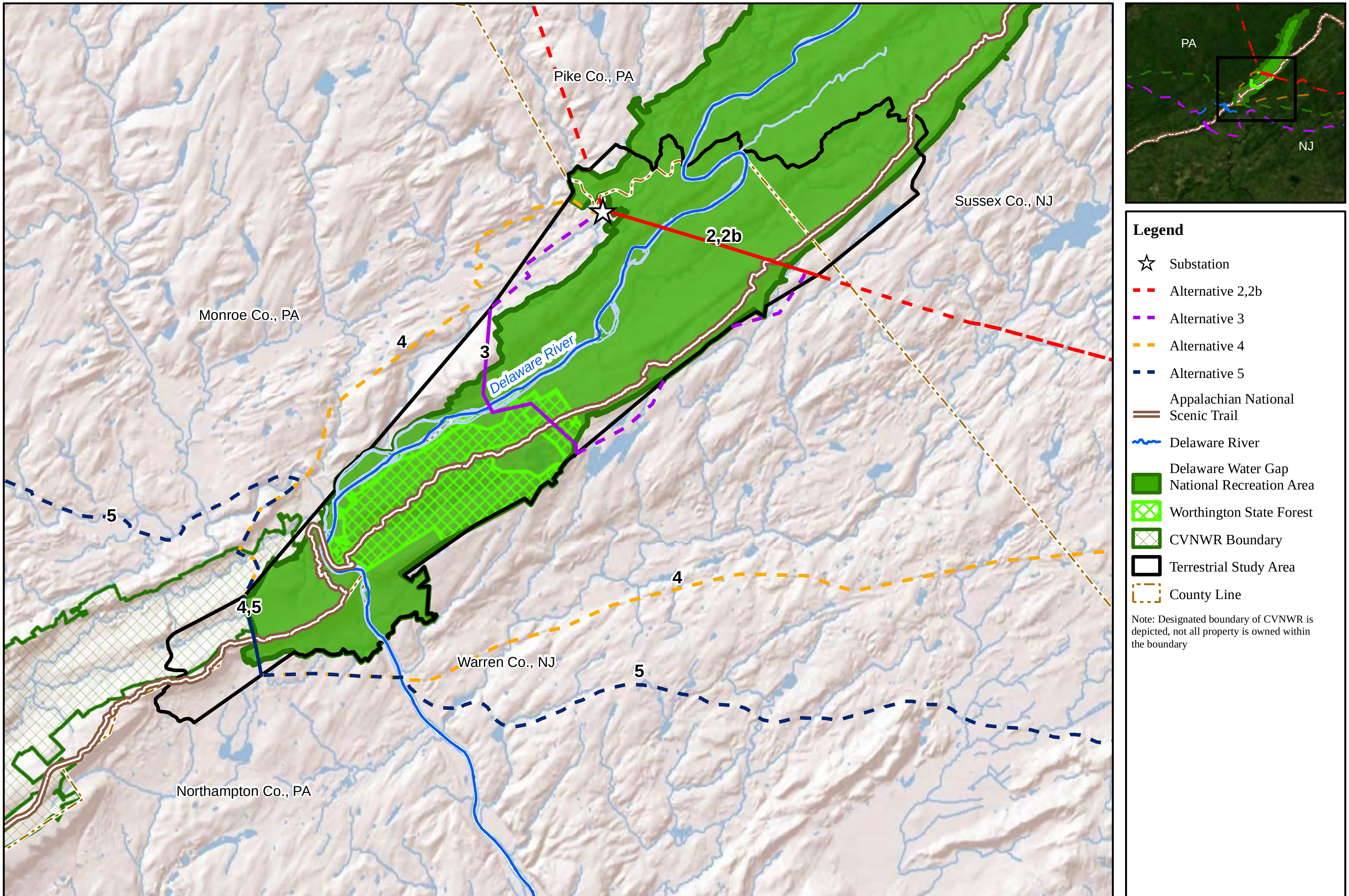
TERRESTRIAL STUDY AREA

The terrestrial study area for landscape connectivity, wildlife habitat, and wildlife includes all portions of the parks between the VSLs for each alternative and is bounded in the north by the DEWA boundary and in the south by major roads south of DEWA (figure 70). This terrestrial study area was created because impacts from construction, operation, and maintenance activities would affect terrestrial resources beyond the corridors of the alternatives. Because the location of the S-R Line outside the terrestrial study area cannot be determined at this time, the indirect impacts on landscape connectivity, wildlife habitat, and wildlife cannot be evaluated per alternative. The potential impacts outside the study area are generally addressed; however, further surveys may be needed prior to construction of the S-R Line.

CUMULATIVE IMPACTS COMMON TO ALL ALTERNATIVES

Actions inside and outside the parks affect vegetation communities that provide habitat for wildlife. Alterations to and permanent loss of natural vegetation communities have occurred, are occurring, and will occur as a result of natural and unnatural successional changes and the establishment of invasive species. Forests in DEWA have been altered and are still regenerating from timber harvesting that has occurred more than a half century ago. The original forest has proceeded through a number of successional changes and is also subjected to the invasion of nonnative species. Other alterations and the loss of natural vegetation communities can result from many types of development, including agriculture, residential, commercial, industrial, and infrastructure; fire suppression; natural successional changes; and the establishment of nonnative invasive species resulting from actions and projects other than timber cutting.

Landscape Connectivity: Species response and migration as a result of climate change make the preservation of landscape connectivity in a large-region perspective key to the survival of many species in the future. Trends in the United States, and particularly the immediate project region, show an increase in low-density rural housing development and a resulting increase in impervious surface cover (Jantz 2009). This type of land use change leads to changes in the patterns of the natural landscape, isolating the pockets of natural areas and ultimately causing a decline in landscape connectivity. The pressures from residential development and the infrastructure to support the expanding communities and populated areas and the resulting fragmentation make the efforts to protect the connectivity between shrinking and more isolated natural areas increasingly difficult. As a result, the importance of the Appalachian Mountain chain as it runs through the densely populated northeast is critical in maintaining the connectivity between the isolated pockets of protected natural landscapes.



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

Figure 70
Terrestrial 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: October, 2011

Studies conducted using remote sensing technologies have shown that DEWA and the surrounding undeveloped natural lands have areas of existing high density of connectivity based on the connections between protected lands and the proximity of the large protected lands to DEWA. Analysis of the biological integrity of the region show that the park lands have more natural landscape than the surrounding private lands (Goetz et al. 2011). Therefore, the value of these public lands, such as DEWA and surrounding state land pockets, and natural corridors such as the one APPA follows along the ridges of the Appalachian Mountain chain, provide critical short- and long-distance paths that wildlife may follow to avoid the more densely human-developed areas (Geotz et al. 2011). These corridors connecting natural areas create critical migration pathways between the large intact habitat patches in the upper northeast and the Southern Appalachian Mountains. The increased isolation of the protected habitats decreases the chances for wildlife migration and could result in extinctions (Geotz et al. 2009) The resulting decline in landscape connectivity has both ecological and social consequences.

The pressures of population growth and the resulting growth in infrastructure increase the fragmentation of the natural areas, affecting both the local habitat continuity and the greater landscape connectivity (Geotz et al. 2009). For example, increases in impervious surface area can lead to greater runoff, affecting water quality and increasing the risk of flooding events (Geotz et al. 2011). Maintaining the ecological integrity of public lands such as DEWA and APPA and their linkages to other natural protected lands in the immediate and greater region helps slow the loss of connectivity and maintain these critical habitat corridors. Maintaining landscape connectivity in the heavily populated northeast is becoming more difficult and more important to the survival of many species. Figure 53 shows federal, state, and other conservation lands in Pennsylvania and New Jersey between the Susquehanna and Roseland substations. Each severed link isolates the protected natural areas and breaks the pathways, losing the critical regional landscape connectivity. The central position of the proposed S-R Line geographically could create two separate and distinct park land management areas.

Habitat Alteration and Development: Historically, in the northeastern United States woodlands were cleared in unregulated harvesting of timber to support agricultural activities, which resulted in the creation of large expanses of early successional habitat maintained by agricultural practices. However, in the past century, agricultural activities have decreased and forested areas have regrown, reducing the acreage of early successional habitat. Species that use early successional habitat, such as brown thrasher and golden-winged warbler, have exhibited population declines. Currently forested areas are second-growth forests, which contain mature hardwoods that are generally over 100 years old and produce valuable mast crops for a variety of wildlife. Mast crops are those which provide food for wildlife, such as oak trees that provide acorns. These forests represent a stable forest that will remain as such for another 100 years or more if left undisturbed. It is rare and valuable to have such a large contiguous block of undisturbed mature forest on the East Coast. Despite the alterations to the original eastern forests over the past 300 years, the large tracts of intact deciduous woodlands currently found in the eastern United States are known to support high densities of breeding songbirds, most of which migrate to the tropics for the winter. These eastern forests are also important for other migratory species that pass through on their way to and from their breeding grounds (Lebbin et al. 2010, 174). Inside and outside the terrestrial study area, development from residential and second-home construction, utility and infrastructure projects, and communications towers contributes to the incremental loss of forested lands or results in the alteration of habitats into maintained clearings and early successional habitat, which can also alter the abundance and composition of wildlife populations. Ultimately, the maintained and early successional habitat resulting from development benefits those species that can adapt to human-altered habitats (e.g., house sparrows, European starlings, raccoons, opossums, and gray squirrels) or those that prefer scrub shrub habitats (such as golden-winged warbler and brown thrasher), while species that are considered interior forest-dwelling species (e.g., wood thrush, scarlet tanager, and a variety of warblers and vireos) decline in abundance. As a result, large areas of protected intact woodlands inside and outside the terrestrial study area that provide habitat for many wildlife species, as described in chapter 3, are becoming increasingly important as a result of development and habitat fragmentation in the surrounding area. Lands protected by the NPS in the parks, New Jersey and Pennsylvania protected state-owned lands, and lands protected by other organizations such as land trusts, the National Audubon Society, and The Nature Conservancy provide islands of natural habitat for wildlife, including insects and other invertebrates, migratory bird species, salamanders and frogs, small mammals, and black bear (see figure 53).

Communications Towers, Wind Turbines, and Transmission Lines: In addition to habitat alteration and development, the siting of communications towers, wind turbines, and transmission lines, especially on hilltops and ridgelines, can adversely affect wildlife through habitat fragmentation, loss, or alteration due to construction as well as through direct mortality of migrating bird and bat species. The USFWS conservatively estimates that between 4 and 5 million birds are killed each year at communications towers and a total of 200 to 500 million birds may die annually when communications tower collisions are combined with collisions with vehicles, buildings, windows, and high-tension lines (Erickson et al. 2001, 7–10). A review of studies on bird collisions with communications towers reported that individuals from 230 species have been killed; many of these species are nocturnal migrants, including Neotropical migrants such as the red-eyed vireo and warblers. Of those 230 species, 52 are of conservation concern and are listed on the USFWS Nongame Species of Management Concern List or Partners in Flight Watch List (Shire et al. 2000, 2). There are presently no cell towers within the boundaries of DEWA or any major transmission lines of the magnitude and intensity proposed here.

Collisions with high-tension lines have been documented since 1876 and can be a significant source of mortality, especially for ducks, geese, swans, herons, and cranes when lines are near open water sources or wetlands. When the lines are located in upland areas, raptors and passerines are more susceptible (Erickson et al. 2001, 10). Bird and bat species can be killed as a result of wind turbine developments, which are often sited in linear fashion along ridges and hilltops. Bird fatalities may result from collisions with the turbines and structures. Bird fatalities primarily involve nocturnal migrants, but in areas of large open grasslands, diurnal raptors such as hawks and eagles can also collide with wind energy structures. Current estimates place mortality of birds from wind turbines at approximately 33,000 birds per year; however, wind turbines are less abundant than other structures and newer design technology may reduce bird collisions (Erickson et al. 2001, 19). Bat mortality at wind turbines is associated with the sudden drop in air pressure near the turning blades of the turbines (which causes barotrauma, or internal hemorrhaging caused by a sudden drop in air pressure) and affects migratory bats, primarily during fall migration (Baerwald et al. 2009, 1077).

These actions can alter the distribution and abundance of wildlife and influence reproductive success and survival. Other projects may result in the protection, restoration, or enhancement of wildlife species inside and outside the parks. Past, present, and reasonably foreseeable activities that have beneficial or adverse impacts on wildlife and wildlife habitat in the parks inside and outside the terrestrial study area are summarized below. These projects were taken from the list of cumulative projects for the S-R Line in appendix H. Cumulative impacts were then determined by combining the impacts of the alternative being considered with the impacts from the projects listed below. This cumulative impact analysis was done for each alternative and is presented at the end of the impact analysis discussion for each alternative.

Projects Inside the Study Area

Inside the terrestrial study area, cumulative projects that have resulted or would result in adverse impacts on landscape connectivity, wildlife habitat, and wildlife include the following visitor access, road, and utility projects: the New Jersey Swim Beach construction (construction of new facilities), the PADOT SR 2001 road project (road reconstruction), the rehabilitation of River Road (road repair), the I-80 weigh station (facilities upgrade), the US Route 209 rehabilitation and replacement of Toms Creek Bridge (road and bridge repair), the repair of failing Watergate Dam #10, US Route 209 Raymondskill Creek Bridge rehabilitation, Pocono Environmental Education Center cabin replacement (rehabilitation and replacement of structures), the Appalachian Trail Relocation near the Columbia Gas Pipeline Crossing (pipeline upgrade), the Metropolitan Edison Enhanced Vegetation Management Program (for transmission lines), Central Jersey Power and Light vegetation maintenance (for transmission lines), the Tennessee Gas Line Proposal (addition to an existing gas pipeline), the Columbia Gas Transmission Company pipeline (replacement of an existing gas pipeline), and the Northeast Supply Link Expansion (Palmerton Loop gas pipeline). Nine utility lines cross Kittatinny Ridge in the terrestrial study area in Pennsylvania and New Jersey with aboveground conductors. Eight of the nine utility lines are power lines and one is a telephone line; each of these crossings presents a risk to migratory birds that use Kittatinny Ridge. Illegal activities such as ORV use, flora collection, hunting/poaching, and woodcutting also adversely affect wildlife habitat and wildlife. These projects and actions would result in adverse impacts through habitat loss, alteration, and fragmentation and wildlife disturbance and mortality. The impacts on landscape connectivity, wildlife habitat, and wildlife from several projects, including the rehabilitation of River Road, the I-80 weigh station, and the repair of Watergate Dam #10, are still unknown.

Cumulative projects inside the terrestrial study area that have resulted or would result in beneficial impacts on landscape connectivity, wildlife habitat, and wildlife include construction projects, restoration projects, fire management, and agricultural permits. The construction projects (sustainable comfort stations, hazardous structure demolition/deconstruction, and Metropolitan Edison removal of unused power poles and transformers) would restore previously disturbed areas to natural conditions. The restoration projects inside the terrestrial study area (the rehabilitation of Childs Park, the restoration of flood-damaged river campsites, the realignment of McDade Trail, parkwide invasive species control programs, the Wildlife Habitat Incentive Program, and IBAs/IMAs) would help preserve sensitive habitat, avoid further impacts on habitat, and restore previously disturbed habitats. Agricultural permits would preserve open space and habitat. Prescribed burns would perpetuate native plant species and maintain natural habitat. Additionally, several land protection programs (as detailed in appendix B) could protect vegetation communities. The beneficial effects of many of these programs are dependent on the availability of funding for specific projects, which is uncertain and could vary throughout the period of analysis; therefore, the level of benefit resulting from the implementation of any project is also variable.

Cumulative projects inside the terrestrial study area would result in adverse cumulative impacts on landscape connectivity, wildlife habitat, and wildlife.

Projects Outside the Study Area

Outside the terrestrial study area, cumulative projects that have resulted or would result in adverse impacts on landscape connectivity, wildlife habitat, and wildlife include the following road and utility projects: the Marshalls Creek traffic relief project (new bypass route), the US Route 209 rehabilitation and replacement of Toms Creek Bridge (road and bridge repair), the Tennessee Gas Line Proposal (addition to an existing gas pipeline), the Marcellus shale natural gas drilling, the Columbia Gas Transmission Company pipeline (replacement of an existing gas pipeline), the PFBC natural gas leasing and water access programs, Martins Creek Power Plant (contaminated water spill), the Federal Energy Regulatory Commission relicensing of Yards Creek Generating Station (relicensing power plant), and wind turbines in northeastern Pennsylvania. Proposed residential and commercial developments in New Jersey and Pennsylvania would also cause adverse impacts on landscape connectivity, wildlife habitat, and wildlife. The impacts from the Marcellus shale natural gas drilling and the PFBC natural gas leasing and water access programs are still unknown. Thirty-seven utility lines cross the Kittatinny Ridge outside the terrestrial study area in Pennsylvania and New Jersey with aboveground conductors; 2 of these are telephone lines and 35 are power lines. Each of these crossings presents a risk to migratory birds that use Kittatinny Ridge. Beneficial impacts on landscape connectivity, wildlife habitat, and wildlife have resulted or would result from the following projects: the DEWA prescribed burn program, Pennsylvania's weed eradication program, the Wildlife Habitat Incentive Program, and IBA/IMA programs. Nongovernmental organizations such as The Nature Conservancy work toward identifying and preserving land that contains rare or unique features or key habitat for plants and wildlife. The beneficial effects of many of the listed programs are dependent on the availability of funding for specific projects, which is uncertain and could vary throughout the period of analysis; therefore, the level of benefit resulting from the implementation of any project is also variable. Despite land protection and conservation outside the terrestrial study area, land in the 10 counties of New Jersey and Pennsylvania that are part of this analysis are subject to continued development that would continue the loss, alteration, and fragmentation of habitat, including rare and unique communities. Projects outside the terrestrial study area would result in adverse cumulative impacts on landscape connectivity, wildlife habitat, and wildlife.

IMPACTS OF THE ALTERNATIVES ON LANDSCAPE CONNECTIVITY, WILDLIFE HABITAT, AND WILDLIFE

Common to All Alternatives

Vegetation Maintenance: PPL and PSE&G have separate vegetation management plans because they are distinct utility companies working in two different states; however, vegetation management for both utilities would occur annually, at minimum. The details of the applicant’s vegetation management plans and clearing techniques are explained in chapter 2. The NPS considers the applicant’s current vegetation management plans to be insufficient, and the NPS would require a NPS-specific, NPS-park approved vegetation management plan.

Invasive Wildlife Species: Of the five invasive nonnative terrestrial wildlife species presented in chapter 3, three have the potential to affect vegetation communities that provide wildlife habitat: hemlock woolly adelgid, European gypsy moth, and emerald ash borer. Impacts from these invasive wildlife species are analyzed in the “Vegetation” section of this chapter.

Wintering Golden Eagles: The migration of golden eagles in the eastern United States is strongly tied to the Appalachian ridgelines. Every year golden eagles are observed at the Hawk Watch sites Hawk Mountain and Raccoon Ridge along APPA during fall migration. Golden eagles are also known to overwinter in the Appalachian range in areas with small forest openings along ridgelines (VADGIF 2011). Wintering golden eagles are present inside and outside the terrestrial study area.

Mitigation Measures: Mitigation measures would reduce impacts from operation and maintenance activities under the action alternatives and are described in chapter 2 and appendix F. None of the mitigation measures would eliminate impacts on landscape connectivity, wildlife habitat, or wildlife; however, they would reduce the impacts on these resources by decreasing the loss of habitat and preventing the take of bird nests and direct mortality of wildlife species.

Outside the Study Area: Landscape connectivity, wildlife habitat, and wildlife are currently under pressure from a number of stressors, including development, pollution, toxic chemicals, invasive species, pests, disease outbreaks, habitat fragmentation, and wildfires, making them highly vulnerable to additional impacts such as those from climate change (NABCI 2010, 44). Outside the terrestrial study area, regardless of which alternative is selected, the transmission line could pass through Carbon, Lackawanna, Luzerne, Monroe, Northampton, Pike, and Wayne counties in Pennsylvania and Morris, Sussex, and Warren counties in New Jersey. These counties are largely undeveloped and contain a variety of habitats and developed areas. In general, the transmission lines outside the terrestrial study area could pass through a variety of habitats, including rare and unique communities, state wildlife management areas, and lands designated as IBAs and IMAs.

The clearing, construction, and vegetation maintenance activities outside the terrestrial study area would be consistent with those described for inside the terrestrial study area. However, the impacts outside the terrestrial study area would be indirect because the activities related to constructing and operating the S-R Line would not be caused by activities permitted by the NPS; the specific impacts cannot be determined because of the physical distance from NPS-authorized activities. Additionally, the specific resources that would be affected by the transmission line outside the terrestrial study area cannot be identified until the route is chosen by the applicant. Upon this decision, additional surveys would be required to determine the type of habitat that would be affected along the selected route.

There are more developed, residential, and agricultural lands outside the terrestrial study area than inside. However, large tracts of contiguous forest and wetland habitat outside the terrestrial study area remain because of the largely rural nature of the counties in New Jersey and Pennsylvania; these tracts could be further fragmented depending on the final route of the transmission line. The impacts on landscape connectivity outside the terrestrial study area would be expected to be less severe than those inside the terrestrial study area. The use of existing ROWs, road alignments, and other corridors could minimize the extent of permanent habitat loss, but it is likely that the width of the ROW outside the terrestrial study area would be increased by several hundred percent to accommodate the double 500-kV transmission lines.

The types of impacts on wildlife would be expected to be similar to those inside the terrestrial study area and would result from disturbance and direct mortality from clearing, construction, and maintenance activities and isolation due to fragmentation. The alignments for alternatives 4 and 5 would cross the Delaware River outside the terrestrial study area. Transmission lines transecting the Delaware River could affect raptors that forage along the river. In addition, migratory raptors may forage along newly established ROWs and could collide with transmission lines. Thirty-seven utility lines cross Kittatinny Ridge outside the terrestrial study area in Pennsylvania and New Jersey with aboveground conductors; 2 of these are telephone lines and 35 are power lines. Each of these crossings presents a risk to migratory birds that use Kittatinny Ridge. As stated for inside the terrestrial study area, the height and number of conductors would increase, raising the risk of collisions. A linear expanse of early successional habitat that could benefit some species such as golden-winged warblers, indigo buntings, the black rat snake, and small mammals would be maintained in the ROW. ROWs also function as movement corridors for species such as white-tailed deer and can function as foraging areas for raptors.

Outside the terrestrial study area, indirect adverse impacts on landscape connectivity, wildlife habitat, and wildlife would result from vegetation maintenance under the no-action alternative. Vegetation clearing, the construction of the transmission line, the operation and maintenance of the transmission line, and vegetation maintenance under the action alternatives would result in adverse impacts. Cumulative impacts on landscape connectivity, wildlife habitat, and wildlife outside the terrestrial study area would be adverse, as described previously in the “Cumulative Impacts Common to All Alternatives” section.

Alternative 1: No Action

Landscape Connectivity and Wildlife Habitat: In the existing ROW, the clearing of vegetation and subsequent alteration of wildlife habitat from the original woodland habitat has developed into a patchwork containing a variety of successional stages; the process has been occurring for 80 years and predates the establishment of DEWA. The existing ROW ranges from approximately 80 to 100 feet wide and creates a linear tract from east to west across one of the widest portions of DEWA. The ROW also bisects MDSR and APPA.

The existing ROW represents a complete east–west fragmentation of the habitats. The habitat patches adjacent to the existing ROW range from approximately 1 acre to 5,301 acres, with the larger patches east of Community Drive. North of the alignment, the parks include roads and trails that do not interfere with wildlife movement to any real extent. However, to the south, existing ROWs also bisect the parks. An existing ROW laterally bisects the habitats of DEWA, MDSR, and APPA 5 miles south of the alternative 1 alignment.

The continued vegetation maintenance under alternative 1 would sustain the current fragmentation and artificially maintained scrub shrub habitat. Occasionally, danger trees would be removed from the edges of the adjacent forested areas, but this maintenance is not expected to notably increase the fragmentation along the alignment. Therefore, additional fragmentation of the habitat would not occur.

Within the ROW, the wire zone / border zone vegetation management employed by the applicant creates varying wildlife habitat, with a herbaceous layer in the wire zone and a shrub layer in the border zone. Vegetation maintenance completed in August 2010 has resulted in varying habitat conditions. In some areas, herbaceous and shrub habitats were retained; however, in other areas, only a herbaceous layer was left in the ROW, bordered by mature forest.

A variety of successional habitat stages provides habitat for a wide range of aquatic species, terrestrial invertebrates, birds, amphibians and reptiles, and mammals. Common wildlife species include white-tailed deer, small mammals (mice, voles, shrews, etc.), eastern cottontail, red and gray fox, raccoon, and songbirds, including Neotropical migrant bird species such as indigo bunting, eastern towhee, field sparrow, and song sparrow. Wetland areas and streams in the ROW provide habitat for a variety of frogs, toads, salamanders, and turtles. If the vegetation is trimmed to the herbaceous layer, the habitat would support fewer species of wildlife because the variety of habitat conditions and vegetation species would be more limited.

Disturbance provides the opportunity for invasive plant species to spread and colonize in new areas. As described in the “Vegetation” section, ground disturbance during vegetation maintenance and removal of danger trees could facilitate the spread of invasive species. Invasive species can alter the structure of natural plant communities and disrupt ecosystem functions, changing the habitat structure. If wildlife species cannot adapt to the changes, the habitat may become inhospitable.

Wildlife: The ROW is an artificially maintained habitat that is not natural to the parks and is not compatible with the surrounding natural habitats. In addition, the presence and periodic maintenance of the ROW is not consistent with NPS conservation of park resources and values, including wildlife and wildlife habitats and the processes that sustain them.

Existing conditions in the alternative 1 alignment contain vegetation in varying stages of succession. While two portions of forest are divided by the ROW, the vegetation in the ROW provides a significant amount of cover and a variety of habitats. Under the no-action alternative, the level and frequency of vegetation maintenance could be increased over historical levels, preventing the natural process of succession and limiting species variation and complexity. The ROW habitat is artificially maintained; however, it provides shelter, food, and nesting areas to species that use early successional habitat and provides a migratory corridor for large mammals, bats, and butterflies. Vegetation maintenance, which has been conducted sporadically in the past, could sustain a relatively open ROW. The largest impact on wildlife from the change in conditions would be the loss of cover as they move across the ROW from one adjacent patch of forest to another. The impacts on specific wildlife groups as a result of regular vegetation maintenance activities and the resulting change in habitat are discussed in the following paragraphs.

Aquatic Species: Maintenance activities would not be conducted in water bodies located along the existing transmission line. In addition, no measurable change to water quality parameters would result from maintenance activities because the increase in soil erosion would be undetectable and surface waters would have no increase in total suspended solids levels. There would be no observable or measurable impacts on aquatic species, their habitats, or the natural processes sustaining them.

Terrestrial Invertebrates: Vegetation maintenance activities would have the potential to affect invertebrates through direct mortality. Less mobile invertebrate species, such as crawling insects, as well as invertebrate eggs, may suffer direct mortality as a result of their inability to escape during clearing activities. These impacts would result during maintenance activities but would not be expected to affect the viability of a species. However, the ROW could be used as a migratory corridor by invertebrate species such as butterflies and dragonflies, resulting in beneficial impacts.

Birds: All maintenance activities would have the potential to disturb and temporarily displace bird species in the vicinity. If maintenance were conducted during the breeding/nesting season, direct loss of eggs, nests, and less mobile young could result and adults may abandon eggs, nests, or young due to disturbance. Although impacts would occur within a relatively narrow and linear footprint, bird species that had nested in the ROW prior to the new vegetation maintenance plan and schedule could lose portions of nesting territories or entire nesting territories and could be forced to relocate territories. Species that could be present in the ROW include ruffed grouse, American woodcock, black-billed and yellow-billed cuckoos, and woodpeckers, as well as many seasonally present Neotropical migrants; flycatchers, vireos, and warblers are known to nest in the parks (PEEC 2008, 1–6). Additionally, migratory waterfowl species use the Delaware River riparian corridor as breeding and foraging habitat. Location and defense of new nesting territories would require time and energy that would otherwise be used for producing young, and it is unlikely that all displaced individuals would be successful in establishing new territories; this could result in lower overall productivity of the population. However, impacts on birds during the breeding season would be minimized by the implementation of seasonal restrictions for maintenance activities, which the applicant has not agreed to observe to date.

The ROW and adjacent habitat would be used by species that prefer more open habitats, such as sparrows (field sparrow, song sparrow), eastern bluebird, eastern kingbird, tree swallow, and predatory raptors. During required maintenance clearing, brush piles should be left to provide cover and nesting habitat and shelter for species such as eastern towhee and gray catbird, as well as wintering white-throated sparrow and dark-eyed junco. Impacts from disturbance would result during maintenance activities; however, the viability of bird populations would not be affected.

The ROW creates edge habitat along the adjacent woodlands that is preferred by brown-headed cowbirds. As nest parasites, brown-headed cowbirds often parasitize Neotropical migrant species such as vireos and warblers. A high abundance of cowbirds in an area can result in multiple cowbird eggs in host nests (Smithsonian 2011). In addition, nest predators such as American crow, opossum, and raccoon may prey on eggs and young birds in nests in and adjacent to the ROW. The continued maintenance and operation of the ROW would maintain edge habitat, resulting in the continued potential for these parasitic and predatory species to find nests and young, which would have adverse impacts on nesting bird species in and adjacent to the ROW. Edge habitat may not remain consistent, because danger trees may be removed from the forested area adjacent to the ROW, increasing disturbance of the habitat and altering it.

Even though it has not been documented in the parks, there may be potential hazards (collisions and electrocutions) to birds from the existing transmission lines, despite adherence to BMPs and mitigation as described in appendix F. Raptors, including resident species, may attempt to perch on the towers, resulting in electrocution. The transmission lines that transect the Delaware River could also affect raptors that forage along the river (osprey and bald eagle). There is also a potential for bird collisions involving waterfowl and large wading birds, such as great blue heron, that are known to nest colonially in DEWA.

A known bald eagle roost and foraging area exists near the alternative 1 alignment. Impacts on bald eagles are discussed in the “Special-status Species” and “Rare and Unique Communities” sections of this chapter.

Amphibians and Reptiles: Vegetation maintenance has the potential to affect reptiles and amphibians through disturbance and direct mortality. Mobile species could be displaced during maintenance activities, but the impacts would be temporary and localized. If the maintenance of the ROW is conducted during the breeding season for amphibians and reptiles, direct mortality of large numbers of individuals of some species could result. Amphibians such as spring peeper, American toad, bullfrog, leopard frog, and spotted and tiger salamanders could be adversely affected. Many amphibian species migrate in large numbers, and some species, such as spotted and Jefferson salamanders, can travel from a few hundred feet to more than a quarter of a mile to their breeding habitats (NYSDEC n.d.). Seasonal restrictions on vegetation maintenance would be enforced if the activities are planned in a known amphibian migration route. Spring peepers, wood frogs, spotted salamanders, red spotted newts, and Jefferson salamanders are known to migrate in large numbers, crossing River Road at various sites, and the parks have enforced road closures to reduce mortality of these migrating amphibians (NPS 2003e). Reptiles such as snapping turtle, painted turtle, and eastern box turtle could also be affected by direct mortality during their spawning season as they move from aquatic and wetland habitats to upland habitats to lay eggs. Impacts on reptiles and amphibians due to direct mortality during vegetation maintenance would not be expected to affect the viability of a species.

Amphibian species typically find shelter under moist leaves or logs. Continued vegetation maintenance in the ROW would result in an increase in sun exposure and reduced forest canopy; therefore, the availability of preferable habitat would be limited in the ROW. With reduced vegetation cover, predatory animals could hunt more effectively along the ROW, resulting in adverse impacts on prey species such as frogs, salamanders, and snakes because vegetation cover would be reduced immediately after maintenance; however, increased predation would not lead to population-level impacts.

Mammals: Larger mammals using habitats in and adjacent to the ROW would be affected by the periodic and localized disturbance from the activity and noise of vegetation maintenance along the ROW; however, displaced wildlife would be expected to return to the ROW and adjacent habitats when maintenance is completed. During vegetation maintenance activities, less mobile species, including small mammals, and denning or burrowing mammals (striped skunk, ground hog, moles, voles, mice, shrews) may suffer direct mortality as a result of their inability to escape during maintenance activities. Impacts from disturbance and direct mortality under the no-action alternative would not affect the viability of the species.

The existing ROW is surrounded and secluded by forest in most locations allowing it to function effectively as a wildlife corridor. Impacts at the population level would not be expected. The ROW would continue to act as a movement corridor for species such as white-tailed deer, black bear, coyote, and fox and would be used for hunting by fox, bear, and coyote, resulting in beneficial impacts for these species.

Overall Impacts on Landscape Connectivity, Wildlife Habitat, and Wildlife: Adverse impacts on landscape connectivity, wildlife habitat, and wildlife under alternative 1 would result from the continued artificial maintenance of the habitat in the ROW, loss of habitat from removal of danger trees outside the ROW, and disturbance and direct mortality of wildlife.

Cumulative Impacts

Cumulative impacts inside the terrestrial study area from past, present, and reasonably foreseeable projects would result in adverse impacts on landscape connectivity, wildlife habitat, and wildlife as described previously in the "Cumulative Impacts" section. When the adverse impacts as a result of alternative 1 are combined with the impacts of other projects in the terrestrial area, an overall adverse cumulative impact would be expected. Alternative 1 would not increase the levels of impacts.

Conclusion

Although artificial maintenance of scrub shrub habitat in the parks is not consistent with NPS protection and national designations of natural, scenic, and recreational resources, alternative 1, the no-action alternative, would result in the continued maintenance of the ROW. The present situation would remain constant; however, edge habitat may change due to the removal of danger trees. The amount of artificially maintained habitat could increase from the removal of danger trees; however, because of the uncertain definition of danger trees, the impact cannot be measured. The structural stage of the habitat in the ROW may differ from current conditions, because some areas are being trimmed to the herbaceous layer during maintenance, eliminating the shrub layer and limiting the diversity of the habitat. A different regime of vegetation maintenance of alternative 1 could alter the available habitat.

The protection afforded wildlife species in the parks, including those that use the ROW, would continue under the implementation of resource management programs to protect and enhance wildlife habitat; however, the ROW would continue to be maintained as a managed habitat in the parks. The activities of alternative 1 would affect wildlife through disturbance, direct mortality, increased predation, and changes to the functional use of the habitat in the ROW. Impacts on wildlife would continue inside the terrestrial study area during maintenance activities, from continued long-term maintenance of the transmission line, and from potential hazards (electrocution and collision) to birds from the existing transmission lines.

The effects of past, present, and reasonably foreseeable future projects, when combined with the impacts under alternative 1, would result in adverse cumulative impacts on landscape connectivity, wildlife habitat, and wildlife inside the terrestrial study area.

Common to All Action Alternatives

Removal of Existing Structures: All action alternatives (2, 2b, 3, 4, and 5) include the removal of all or a portion of the B-K Line. The details of the removal and disposal of the existing transmission lines are discussed in chapter 2.

Vegetation Clearing: For the analysis of impacts on landscape connectivity, wildlife habitat, and wildlife, it was assumed that a 350-foot corridor would be cleared of vegetation for the construction of the new double 500-kV transmission line for alternatives 2, 3, 4, and 5. For alternatives 2, 3, 4, and 5, the corridor would be cleared 175 feet from the centerline of the existing ROW to either side. Under alternative 2b, the applicant proposes to operate the S-R Line within the existing ROW. The NPS anticipates that the applicant would require additional area for construction; therefore, it is estimated that under alternative 2b, the applicant would expand the ROW to the extent of their deeded property rights, which ranges from 100 feet to 380 feet. The property rights are currently being researched through deed research and ground surveys and will be updated as applicable in the final EIS. For alternative 2b, the ROW would be cleared on either side of the centerline to an appropriate width based on the deeded property rights.

In addition to vegetation clearing inside the ROW, areas outside of the ROW would also need to be cleared for all action alternatives to construct the access roads, spur roads, and pulling and splicing sites. Areas cleared for access roads (inside and outside the ROW) and tower foundations (inside the ROW) would be maintained permanently and would result in a permanent loss of vegetation. All other cleared areas would be seeded after construction with an NPS-approved conservation seed mixture appropriate to the local conditions. The area within the ROW maintained for operation is less than that which would be cleared for constructions. Areas both inside and outside the ROW that do not need to be maintained for operation of the S-R Line would be allowed to succeed to forested area over time. Because mature forest removed for construction would not be replaced within the 15-year analysis period covered by this EIS the impacts would be considered permanent.

The successful restoration of the land temporarily cleared and/or disturbed for construction but not needed for the operation of the S-R Line could be hindered by impacts on soils sustained during the construction of the S-R Line, despite the regrading of the surface soils. The use of heavy construction equipment and the construction and use of access roads would compact the underlying soil. Compaction can cause damage to soil structure, which determines the ability of a soil to hold and conduct water, nutrients, and air necessary for plant root activity and growth (UM 2001, 1). Additionally, the removal of near-surface soils may have unfavorable consequences on productivity, affecting the successful revegetation of disturbed areas. Monitoring and maintenance of revegetated areas under the applicant’s vegetation management plans would need to be implemented to ensure that vegetation restoration is successful.

Construction Components: Construction activities are described in detail in chapter 2; the activities that would affect landscape connectivity, wildlife habitat, and wildlife include the construction of access roads (including turnaround areas), tower foundations, crane pads, wire pull locations, pulling and splicing sites, and staging areas. Wire pull locations, pulling and splicing sites, staging areas, and spur roads would create impacts because vegetation would be removed; however, these features are temporary and the disturbed areas would be restored, as described in chapter 2. Restoration would not be complete within the period of analysis of this EIS; however, this section focuses on the activities that would produce permanent impacts (i.e., ROW expansion and the construction of access roads and tower foundations).

Alternative 2

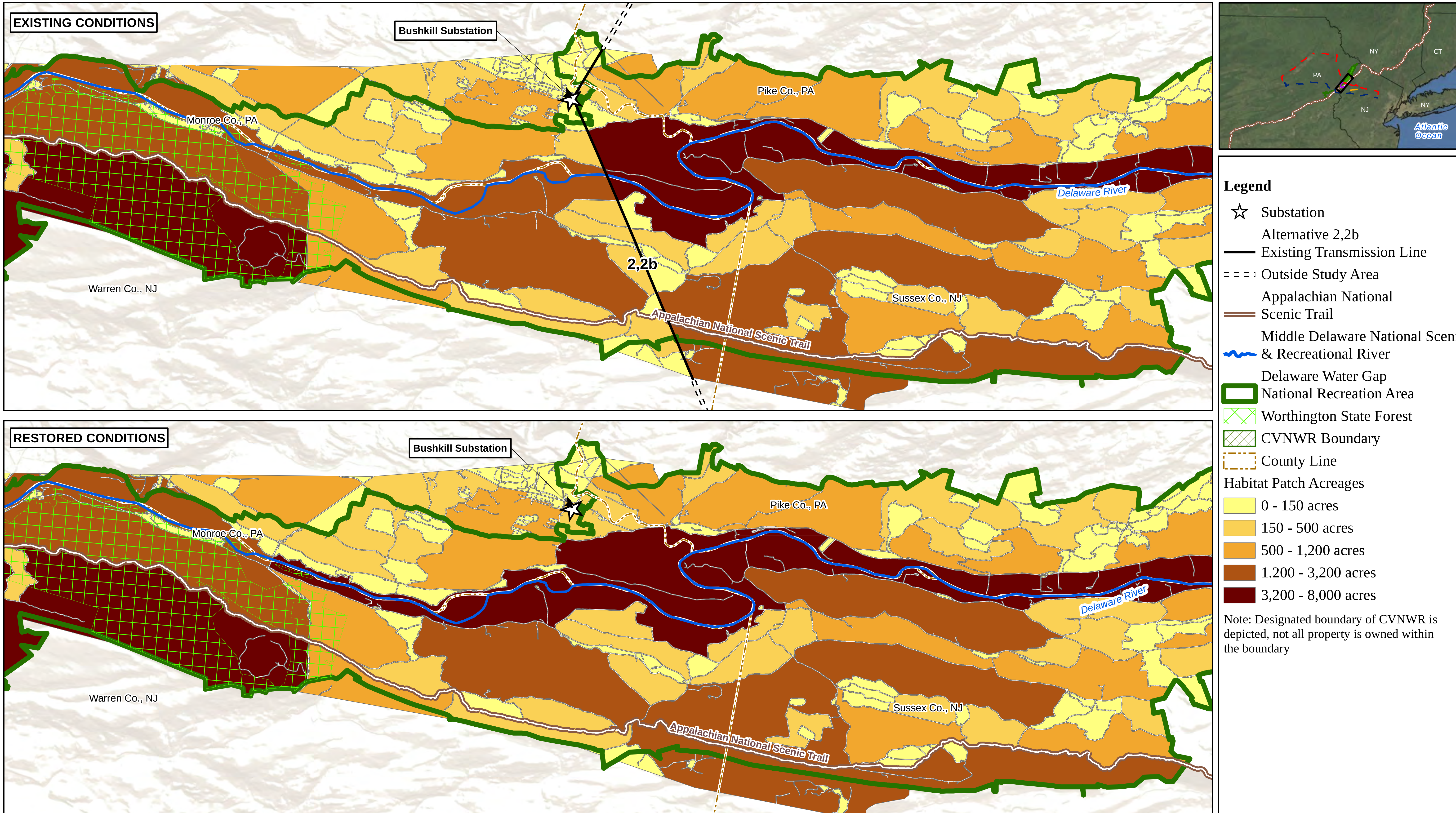
Landscape Connectivity and Wildlife Habitat: Permanent habitat loss under alternative 2 would result from the construction of access roads, the widening of the proposed ROW, and the construction of tower foundations, resulting in a loss of approximately 45 to 101 acres (table 47). Approximately 311 acres of utility ROWs currently exist in the terrestrial study area. This total includes all existing alternative alignments, as well as other ROWs not related to the S-R Line. Under alternative 2, the combined area of mechanically and/or chemically maintained corridors would increase to approximately 356 to 412 acres, with an additional 3.7 acres of access roads constructed outside the expanded ROW (table 47). The permanent loss of forest from access roads and from the alteration of forest to maintained scrub shrub habitat as a result of alternative 2 actions would represent an increase in artificially maintained area of 14% to 32%. The current ROW width ranges from approximately 80 to 150 feet; under alternative 2, this width would increase to 200 to 300 feet, representing a permanent increase in maintained habitat of 33% to 275%. The expansion of the ROW under alternative 2 would fragment the habitats that exist on either side of the corridor. All patches of habitat along the ROW would be reduced in size and some smaller patches would be eliminated completely (figure 71). Access roads would create new fragmentation under alternative 2. For example, three existing patches are each broken into two or three smaller patches by the construction of access roads. At the western boundary of DEWA, a patch of approximately 21.4 acres would be bisected by an access road, creating two patches of 2.5 acres and 18.6 acres. One patch south of the ROW that is currently 95 acres would be fragmented into three patches with acreages of 15, 24, and 48. Similarly, the largest contiguous patch in DEWA is currently 5,301 acres. This patch would be reduced to 5,256 acres by a combination of the ROW expansion and the fragmentation of a new 14.7-acre patch by access roads, resulting in a loss of approximately 44 acres. Under alternative 2, the number of smaller patches (from 0 to 150 acres) would increase from 9 to 19. The number of larger patches would not decrease, although patch sizes would be reduced. The largest patches adjacent to the alternative 2 alignment (those over 150 acres) would be reduced in size by 0.2% to 8%.

The impacts on wildlife habitat from fragmentation include the loss of habitat, reduced habitat patch size, increased edge, and increased isolation of patches (USDA 1999, 2–4). The alternative 2 alignment would be sited along an existing ROW; therefore, the habitat is already fragmented. The reduction of habitat and patch size from expansion of the ROW and construction of the access roads would have impacts on wildlife habitat. Widening the ROW would reduce the acreage of forest interior and could affect forest interior–dwelling species, such as wood thrush and scarlet tanager. Increased fragmentation from widening the ROW and access roads could become an obstruction to movement for less mobile species such as invertebrates, small mammals, reptiles, and amphibians (Peterken 2002, 5). The alternative 2 alignment would cut through areas of northern hardwood and eastern hemlock forests. Wildlife species that use these habitats likely travel throughout the extent of these forests. The expanded ROW would limit the ability for less mobile species to do so. Within smaller habitats such as the Van Campen Brook wetland, access roads that bisect the habitat could affect the dispersal of reptiles and amphibians. Additionally, the towers and access roads could impede the movement of some smaller wildlife species from one patch to the next. Loss of habitat connections across a landscape is one of the most severe threats to the survival of many wildlife species (Wilderness Society 2004, 1).

The expansion of the ROW would not create more edge habitat; however, it would expose formerly shaded interior trees and plants to edge conditions of increased sunlight and temperature, especially along an east–west-oriented ROW that would be exposed to hot afternoon sun (Manitoba Hydro 1995, 13). The composition of vegetation along the edge would change to include more sun-tolerant species, thus changing the habitat. Additional edge habitat would be created by the construction of access roads, and habitats along the roads would be modified in the same manner.

Vegetation in the 100-foot riparian buffers would not be cleared for construction or during continued vegetation maintenance (PPL and PSE&G 2008, 7). The Delaware River riparian corridor could act as a travel corridor in which wildlife could move from one side of the ROW to the other. Retaining passageways such as these would benefit the wildlife, but would not reduce the level of impact from the widening of the ROW.

Wildlife: Under alternative 2, wildlife would be affected by clearing and construction activities, the operation and maintenance of the proposed transmission line, and vegetation maintenance. Impacts on all animal groups due to vegetation maintenance are described in detail under alternative 1. The impacts from disturbance and direct mortality due to construction activities are the same as those described for vegetation maintenance; however, the impact levels may be different due to the intensity of disturbance or amount of activity. The additional miles of road and increased human access activity may impact wildlife and diminish contiguous habitat.



Legend

- Substation
- Alternative 2,2b Existing Transmission Line
- Outside Study Area
- Appalachian National Scenic Trail
- Middle Delaware National Scenic & Recreational River
- Delaware Water Gap National Recreation Area
- Worthington State Forest
- CVNWR Boundary
- County Line

Habitat Patch Acreages

- 0 - 150 acres
- 150 - 500 acres
- 500 - 1,200 acres
- 1.200 - 3,200 acres
- 3,200 - 8,000 acres

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

0 1 2
Miles

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

Figure 71
Alternative 2,2b
Existing vs. Restored Conditions

Source: ESRI Streetmap 2009;
NPS 2011;
ArcGIS Map Service 2010;

Projection: NAD 83 UTM Zone 18N
Date: October 2011

Aquatic Species: The degradation of water quality and habitat alterations would result in impacts on aquatic species. The removal of vegetation along the streambanks would adversely affect aquatic species by reducing shade, removing terrestrial-based food and habitat sources (insects, large woody debris), and destabilizing the shorelines and streambanks. The increase of sediment loads and total suspended solids due to soil erosion from the construction and use of access roads and crane pads would also contribute to adverse impacts. An increase in sediment loads and turbidity could adversely affect the habitat, reproduction, respiration, and survival of fish and benthic macroinvertebrates and could bury or smother aquatic vegetation. The installation of stream crossing structures associated with the access roads would affect aquatic organisms by potentially blocking access to spawning habitat, feeding areas, and shelter, and restricting the movement of organic material such as leaves and woody debris that provide food and shelter for aquatic organisms. Stream crossing structures would also alter the natural flow dynamics and sediment transport regimes, resulting in streambank erosion, streambed scour, and changes in sediment deposition. These geomorphic changes would alter existing habitat conditions and affect the community structure of fish and benthic macroinvertebrates. Construction along streams could also contribute to the spread of invasive vegetation, which frequently becomes established in construction areas and could have adverse impacts on aquatic species. Blasting near water bodies could produce shock waves that could kill or injure fish and other aquatic species; however, the degree of impact from blasting would depend on the amount and type of explosive, the underlying geology, and the distance from the water body (AFS 2010, 3). If blasting affects surface water flow or quantity as described above, there would be additional adverse impacts on aquatic species. There would be a measurable change in the water quality; the loss of vegetation would alter habitat and food availability, and the potential for blasting in limestone could alter flow or water availability. Impacts on aquatic species and their habitats or on the natural processes sustaining these species could affect the overall amount, integrity, and connectivity of habitat in the terrestrial study area.

Terrestrial Invertebrates: Under alternative 2, invertebrates would be affected through disturbance and direct mortality during clearing and construction activities due to the use of large construction vehicles and the potential use of helicopters.

Birds: Impacts from disturbance during clearing activities would occur on birds in and near the construction corridor for the expanded ROW and roads. During migration, migratory Neotropical bird species would avoid areas adjacent to the ROW during site preparation, tree clearing, and construction activities. Direct loss of nests, eggs, and nestlings due to clearing, construction, and vegetation maintenance activities would be minimized by implementing seasonal restrictions (March 15–July 31) on activity.

Under alternative 2, the expanded ROW would maintain the same amount of edge habitat along the adjacent woodlands; however, edge habitat may change due to the removal of danger trees and would be increased along the access roads where they extend outside the ROW into forested habitat. It is expected that over the long term, brown-headed cowbird nest parasitism and predation by opportunistic species such as American crow, opossum, and raccoon would increase. Many Neotropical migrant species that breed in the northeastern United States are ground-nesting species that build open nests; these species are therefore more susceptible to nest predation and brood parasitism and as a result are more sensitive to the fragmentation of habitat and creation of forest edges (Faaborg 2002, 8). The continued maintenance of the ROW would maintain or increase edge habitat and would continue the potential for parasitic and predatory species to find nests and young of breeding birds.

Over the long term, the creation and maintenance of early successional habitat in the new ROW footprint could favor species that prefer scrub shrub habitat for nesting, such as field and song sparrows, eastern bluebird, eastern kingbird, tree swallow, golden-winged warbler, and indigo bunting; predatory raptors, as previously mentioned, would be expected to resume using the ROW. Additionally, brush piles created after vegetation maintenance would provide shelter and potential nest sites for species such as eastern towhee and gray catbird, as well as wintering white-throated sparrow and dark-eyed junco.

The terrestrial study area is located along a major north–south fall migration corridor for raptors, and newly constructed transmission lines would create a bird collision hazard where they are oriented in an east–west direction. The configuration of the conductors for the S-R Line would be vastly different than that of the B-K Line. Instead of 6 lines, the S-R Line structures (which would be twice as tall as the B-K Line structures) would carry a total of 20 lines. Raptors have acute eyesight and are daytime migrants, and would not be expected to collide with transmission lines or structures. However, raptors' flight strategies vary and many raptors forage along the riverbanks of the Delaware River, which would bring these birds to lower altitudes, increasing the potential for collisions. Additionally, hawks are known to use lower altitudes when gliding along ridgelines. Altitudes used by ridge-gliding migrant red-tailed hawks can be as low as 5 to 20 feet or as high as 600 feet above the treetops or ridgetop. When ridge gliding, efficiency is gained by maintaining altitude, especially when the ridge is oriented in the same alignment as the migration path (Kerlinger 1995, 166). Orienting tall structures perpendicular to the flight path of ridge-gliding raptors may result in collisions with wires if conditions are such that raptors are using lower altitudes along a ridge such as Kittatinny Ridge. Because Kittatinny Ridge is oriented north–south and provides ideal conditions for migratory hawks, especially in fall, the potential for collisions would exist. Raptors may also collide with wires when foraging along the ROW. Additionally, large birds of prey attempting to perch on poles can be electrocuted at wire-to-wire or conductor-to-ground connections.

Bird collisions may also occur when a transmission line runs perpendicular to a flight path used by a concentration of birds, such as a flock of Canada geese, that move back and forth from feeding and roosting sites on a daily basis or when migrants are traveling at reduced altitudes (usually in inclement weather) and encounter structures. The Delaware River would be traversed by transmission lines under alternative 2, which could affect birds that forage along the river. The proposed transmission line would be routed through several wetland complexes, including the Van Campen Brook wetland complex. The current ROW is located along the same wetlands; however, the birds are generally transient in the area and would move out of and avoid areas of disturbance. Because of the large size of the new transmission line towers, the height and configuration of the lines may increase the potential for collision with groups of waterfowl that migrate at night and may use the wetlands and open water areas associated with the wetlands.

The presence of higher transmission line structures and lines could adversely affect migratory bird species where the lines transect migratory and habitual flight paths to and from foraging or roosting areas. In a study of wind turbine impacts on migratory birds in Michigan, the majority of migratory birds were observed flying between the tree canopy and 328 feet (100 meters) above the canopy. Many raptors are equipped to use thermals to maximize their energy use during migration and average an altitude of 328 to 1,640 feet (100 to 500 meters) above the tree canopy. However, many other migrating birds are not physically capable of using thermals and often migrate at low altitudes, observed as flights just above the tree canopy (Paterson et al. 2010, 11). Currently, the transmission line conductors are generally at the height or below the top of the tree canopy. The height of the new towers would result in the conductors being considerably higher than the tree canopy. Additionally, the number of conductors would increase to approximately 20 lines under alternative 2. Where agricultural lands are traversed by the ROW, transmission lines and towers could create attractive perching areas from which raptors could discern prey, and towers could create a hazard for raptors foraging along the river, particularly ospreys and bald eagles. The conditions of the proposed alternative 2 transmission line would likely increase collisions. The proposed transmission line would be constructed according to APLIC standards and would use the best available technology for deterring raptors from using the transmission towers and lines. A sizable number of bird collisions is not expected; however, the effectiveness of the APLIC standards on a 500-kV line crossing DEWA, MDSR, and APPA is unknown.

A known bald eagle roost and foraging area exists near the alternative 2 alignment. Impacts on bald eagles are discussed in the “Special-status Species” and “Rare and Unique Communities” sections of this chapter.

Amphibians and Reptiles: Reptiles and amphibians would be affected through disturbance and direct mortality during clearing and construction activities under alternative 2. With the use of large construction equipment in a concentrated area, direct mortality from strikes by equipment and vehicles are expected. Construction activities could include the use of helicopters, which could result in an intense period of noise and disturbance over a wider area and would coincide with on-the-ground construction activity. Disturbance and displacement of wildlife species could result from the noise and activity surrounding the use of helicopters. Impacts from disturbance would have the potential to be widespread due to noise. Direct mortality of individual animals would not affect the viability of the species.

Predation could increase in the ROW under alternative 2 because the vegetation would be maintained at an early successional stage, which can expose species to predators because of less vegetation cover. In addition, as previously described, reduced forest canopy and an increase in sun exposure would reduce the amount of habitat available to amphibians.

Mammals: Clearing and construction activities under alternative 2 would disturb and displace large and mobile mammals; less mobile species could suffer direct mortality. As stated for amphibians and reptiles, the impacts from disturbance could be intensified by the use of helicopters during construction.

After construction, the expanded ROW would be maintained regularly, which could increase its use as a movement corridor by larger mammals but could also increase predation on small mammals as a result of less vegetation cover. Maintenance activities would result in disturbance and direct mortality. These impacts are discussed in detail under alternative 1.

Overall Impacts on Landscape Connectivity, Wildlife Habitat, and Wildlife: Adverse impacts on landscape connectivity, wildlife habitat, and wildlife under alternative 2 would result from habitat loss, habitat alteration, the continued artificial maintenance of the habitat within in the ROW, the isolation of habitat patches, increased edge habitat, the disturbance and direct mortality of wildlife, and the isolation of some species.

Cumulative Impacts

Adverse cumulative impacts on landscape connectivity, wildlife habitat, and wildlife would result inside the terrestrial study area from past, present, and reasonably foreseeable projects, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the adverse impacts as a result of alternative 2 are combined with the impacts from the other projects in the terrestrial study area, an overall adverse cumulative impact would be expected. Alternative 2 would not increase the levels of impacts.

Conclusion

Alternative 2 would result in adverse impacts on landscape connectivity, wildlife habitat, and wildlife. Inside the terrestrial study area, the habitat patches adjacent to the alternative 2 alignment would experience a reduction in size from the expansion of the ROW and further fragmentation from the construction of access roads. The number of patches from 0 to 150 acres would increase from 9 to 19 patches, due to access roads bisecting existing patches and creating several smaller patches. Reductions in the size of larger patches would range from 0.2% to 10%. The increases in habitat fragmentation would result in more isolation between the patches on either side of the ROW and could make some of the smaller patches uninhabitable for certain species. The expansion of the alternative 2 ROW would represent a 14% to 32% increase in the amount of maintained scrub shrub habitat in the terrestrial study area.

Although a transmission line ROW currently exists along the alternative 2 alignment, the expansion of the ROW under this alternative could create inhospitable conditions for some species, potentially isolating them on either side of the ROW. Wildlife species would be affected by the actions of alternative 2 throughout the period of analysis. Disturbance and direct mortality would begin with clearing activities and continue through the vegetation maintenance activities. Artificially creating and maintaining successional habitat often increases the number of wildlife species that inhabit the area; however, this local diversity has the potential to lead to the extinction of native species that require large areas of undisturbed habitat (Willyard et al. 2004, 16–17). The adverse impacts from alternative 2, when combined with the adverse impacts from past, present, and reasonably foreseeable projects, would result in adverse cumulative impacts on landscape connectivity, wildlife habitat, and wildlife.

Alternative 2b

Landscape Connectivity and Wildlife Habitat: Alternative 2b would result in a loss of approximately 23-37 acres of habitat loss due to clearing activities and construction of the components of the S-R Line. This alternative would increase the area of maintained utility ROWs in the terrestrial study area from 311 acres to 334 to 348 acres. The current ROW width ranges from approximately 80 to 100 feet; under alternative 2b, this width would increase to 200 to 300 feet where the ROW is not limited by the applicant’s deeded property rights. The widening of the ROW under alternative 2b represents a permanent increase in maintained habitat of 0% to 275%. The permanent loss of forest from access roads and from the alteration of forest to maintained scrub shrub habitat as a result of alternative 2b actions would represent an increase in artificially maintained area of 7% to 12%. Additionally, the removal of danger trees is a part of the applicant’s vegetation maintenance plans. This portion of vegetation maintenance could involve the removal of individual trees or it could include larger patches of trees, if the trees are deemed to be a threat to the transmission line. A 0.75 mile portion of the existing ROW in Pennsylvania is 100 feet wide. It is anticipated that danger trees would be removed in this area, which includes the heavily forested Hogback Ridge community, and would result in a net loss of mature forest. The amount of danger trees that would be removed is unknown.

Under alternative 2b, the expansion of the ROW and construction of the S-R Line components would fragment the existing habitat in the same manner as described for alternative 2. Patches would be reduced in size and access roads would create new fragmentation. Access roads would be constructed outside the existing ROW and would cause the loss of 4.7 acres of forested land (table 47). The construction of access roads would increase the number of patches from 22 to 30. New patches that would be created by the access roads range from approximately 0.3 acre to 6.6 acres. In two instances, access roads would bisect larger patches, creating two or three smaller patches from each larger patch. For example, one 95-acre patch south of the ROW would be fragmented into three patches with acreages of approximately 17, 26, and 50. The removal of danger trees would also add to fragmentation; however, a definitive amount of deforestation cannot be determined until engineering plans and vegetation surveys are completed.

The wildlife habitat encountered under alternative 2b is the same as that described for alternatives 1 and 2. The construction of access roads would bisect microhabitats and isolate less mobile species on either side of the road. The removal of danger trees could result in a change in conditions along the alternative 2b alignment, depending on the number of trees removed. Newly exposed vegetation that was formerly in shaded areas would be affected by edge conditions such as increased temperature and sun exposure, which could change vegetation composition and habitat conditions.

Wildlife: Under alternative 2b, wildlife would be affected by clearing and construction activities, the operation and maintenance of the proposed transmission line, and vegetation maintenance. Impacts on all wildlife groups are described in detail under alternatives 1 (impacts from vegetation maintenance) and 2 (impacts from construction). The types of impacts from the construction and operation of the proposed transmission line under alternative 2b would be the same.

Overall Impacts on Landscape Connectivity, Wildlife Habitat, and Wildlife: Adverse impacts on landscape connectivity, wildlife habitat, and wildlife would result from habitat loss, habitat alteration, the continued artificial maintenance of the habitat in the ROW, the isolation of habitat patches, the disturbance and direct mortality of wildlife, and the isolation of some species.

Cumulative Impacts

Adverse cumulative impacts on landscape connectivity, wildlife habitat, and wildlife would result inside the terrestrial study area from past, present, and reasonably foreseeable projects, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the adverse impacts as a result of alternative 2b are combined with the impacts from the other projects in the terrestrial study area, an overall adverse cumulative impact would be expected. Alternative 2b would not increase the levels of impacts.

Conclusion

Alternative 2b would result in adverse impacts on landscape connectivity, wildlife habitat, and wildlife from artificially maintaining a ROW that bisects natural landscapes in the parks despite NPS protection and national designations of natural, scenic, and recreational resources. Inside the terrestrial study area, alternative 2b would result in the permanent loss of approximately 4.5 acres of mature forest through the construction of access roads. The access roads would increase the number of patches adjacent to the ROW from 19 to 33. A majority of the new patches created by construction of the access roads be small, from 0.03 to 6.5 acres. The removal of danger trees would cause the additional removal of mature forest, but the amount cannot be determined at this time.

Adverse impacts on wildlife would also result from these changes to landscape connectivity and wildlife habitat. Wildlife species would be affected by the actions of alternative 2b throughout the period of analysis. Disturbance and direct mortality would begin with clearing activities and would continue through vegetation maintenance activities. When the adverse impacts from alternative 2b are combined with the adverse impacts from past, present, and reasonably foreseeable future projects, adverse cumulative impacts on landscape connectivity, wildlife habitat, and wildlife would result.

Common to Alternatives 3, 4, and 5

Restoration of the B-K Line: Alternatives 3, 4, and 5 would require the removal of the B-K Line between the Bushkill Substation and the eastern boundary of DEWA. The details of the removal and disposal of the existing conductors and structures are discussed in chapter 2. Vegetation in the existing ROW would be cleared and spur roads would be constructed for the removal process. In the existing ROW, approximately 53 acres of land within NPS boundaries would be cleared of vegetation. An additional 1.1 to 1.5 acres of vegetation within NPS lands and the terrestrial study area but outside the ROW would be cleared to construct access roads. These clearing and construction activities would remove wildlife habitat and disturb wildlife. Human presence and noise would disturb wildlife in the area and the use of heavy machinery during the deconstruction process would cause direct mortality of less mobile species.

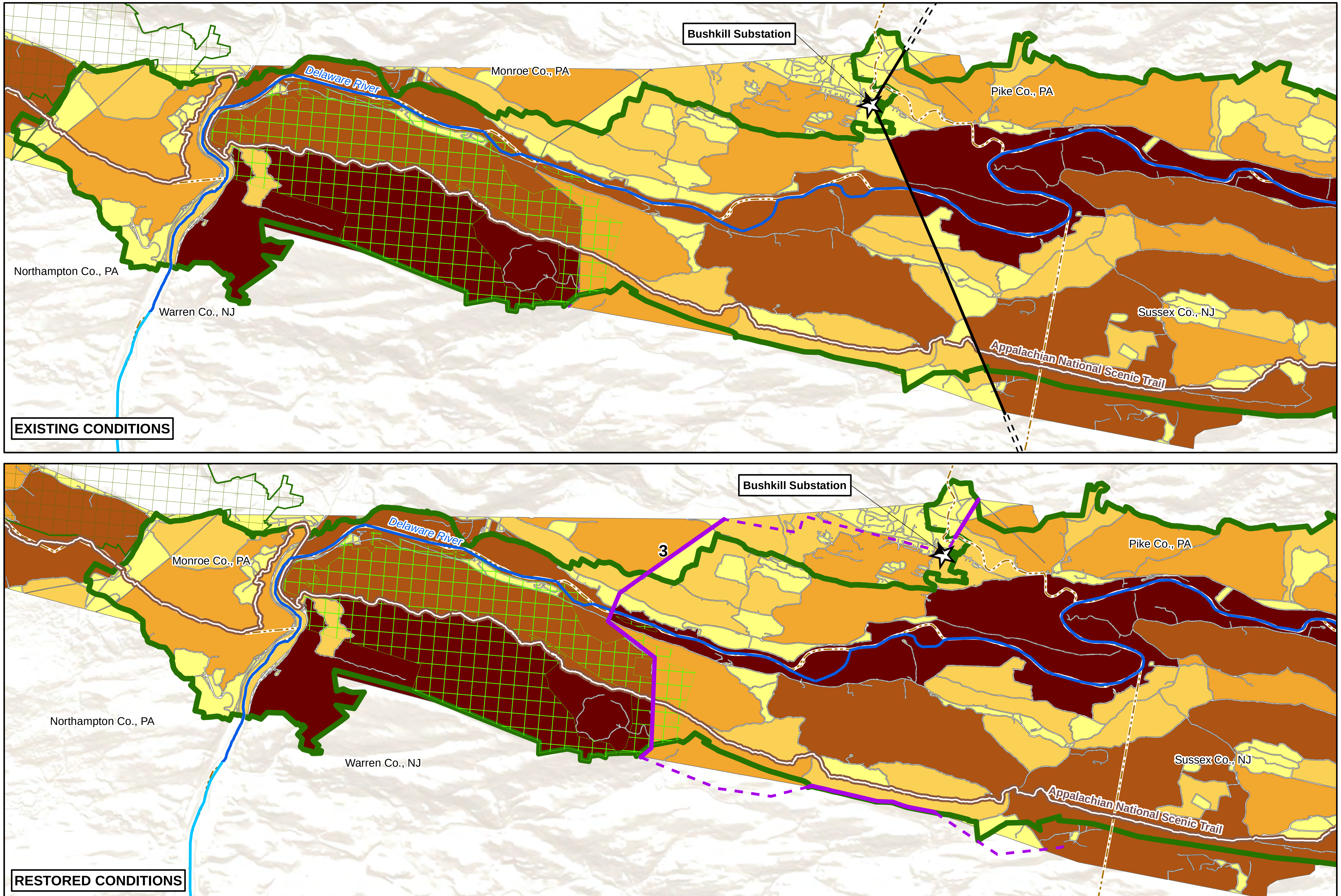
Following the deconstruction of the B-K Line, the access roads and the ROW would be restored to original conditions to the greatest extent possible. These areas would be disked or tilled as needed to mitigate soil compaction. After soil preparation, the areas would be seeded with an NPS-approved conservation seed mixture and allowed to succeed naturally into forested habitat over the long term; however, restoration of the ROW to mature forest would not be complete within the period of analysis of this EIS. Allowing the natural process of succession to reclaim the ROW as natural habitat would result in 53 fewer acres of utility ROW in the terrestrial study area (table 47). In the long term, the restoration would also create connectivity among large patches of habitat that are currently fragmented. The restoration would cause an increase in two patches (originally 4,031 and 1,786 acres) that are currently bisected by the B-K Line, resulting in an increase in size of 3.9% and 307% (for a total of 4,188 and 7,272 acres, respectively). The larger patch, which would generally follow MDSR, contains several rare and unique communities and would stretch approximately 18.3 miles through DEWA. The restoration of the B-K Line would allow two to three patches to join and create larger patches in five instances (figures 72 and 73). In the eastern portion of DEWA in New Jersey, two large habitat patches of 2,338 and 2,763 acres would gain connectivity with patches south of the B-K Line, creating patches of 2,393 acres and 3,053 acres. This area is separated into two patches by the Trail; however, the Trail a 3-foot wide earthen path that is well integrated into the environment.

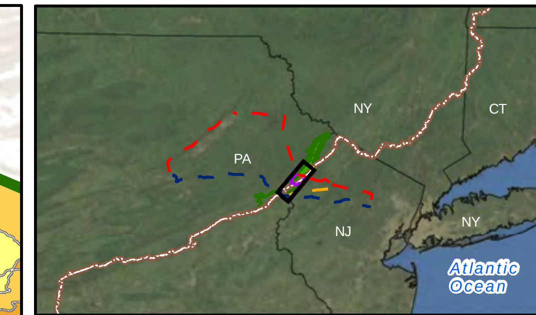
Alternative 3

Landscape Connectivity and Wildlife Habitat: The existing ROW along the alternative 3 alignment ranges from approximately 40 to 125 feet wide. The ROW proposed for alternative 3 would be expanded and permanently maintained at 200 to 300 feet wide, an increase of 60% to 650%. With the ROW expansion and the construction of access roads outside the ROW, approximately 87 to 161 acres of mature forest would be lost under alternative 3 (table 47). As stated for alternative 2, the fragmentation of the landscape and habitats would increase from widening the ROW, and the fragmentation and the amount of edge would increase from the construction of the access roads and the removal of danger trees.

The forest blocks through which the alternative 3 alignment would pass represent some of the larger contiguous forest stands in the parks. Currently, 17 habitat patches exist adjacent to the alternative 3 alignment, ranging from 0.15 acre to 4,332 acres. Under alternative 3, the number of habitat patches would increase to 20, the sizes of which would range from 0.012 to 7,272 acres. The increase in the number of patches would be small, with the largest measuring 1.2 acres, and would result from the construction of access roads, which would extend outside the ROW. Ten of the larger patches (more than 150 acres) adjacent to the ROW of alternative 3 would experience a reduction in size ranging from 0.2% to 10%.

Alternative 3 would include a portion of the existing B-K Line alignment from the Bushkill Substation to the western boundary of DEWA. This portion of DEWA is currently fragmented by other existing ROWs and roads. The patches of habitat in this area would be reduced in size and some smaller patches would be eliminated completely by the expansion of the ROW; access roads would also create new fragmentation. One patch that is currently 21.4 acres would be bisected by an access road, creating two patches of approximately 2.5 acres and 18.6 acres. The two patches larger than 100 acres would be reduced in size by approximately 0.2% to 1.8%.





Legend

- Substation
- Alternative 3
- Alternative 3 (outside study area)
- Existing Transmission Line
- Outside Study Area
- Appalachian National Scenic Trail
- Middle Delaware National Scenic & Recreational River
- Delaware River
- Delaware Water Gap National Recreation Area
- CVNWR Boundary
- Worthington State Forest
- County Line

Habitat Patch Acreages

- 0 - 150 acres
- 150 - 500 acres
- 500 - 1,200 acres
- 1.200 - 3,200 acres
- 3,200 - 8,000 acres

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

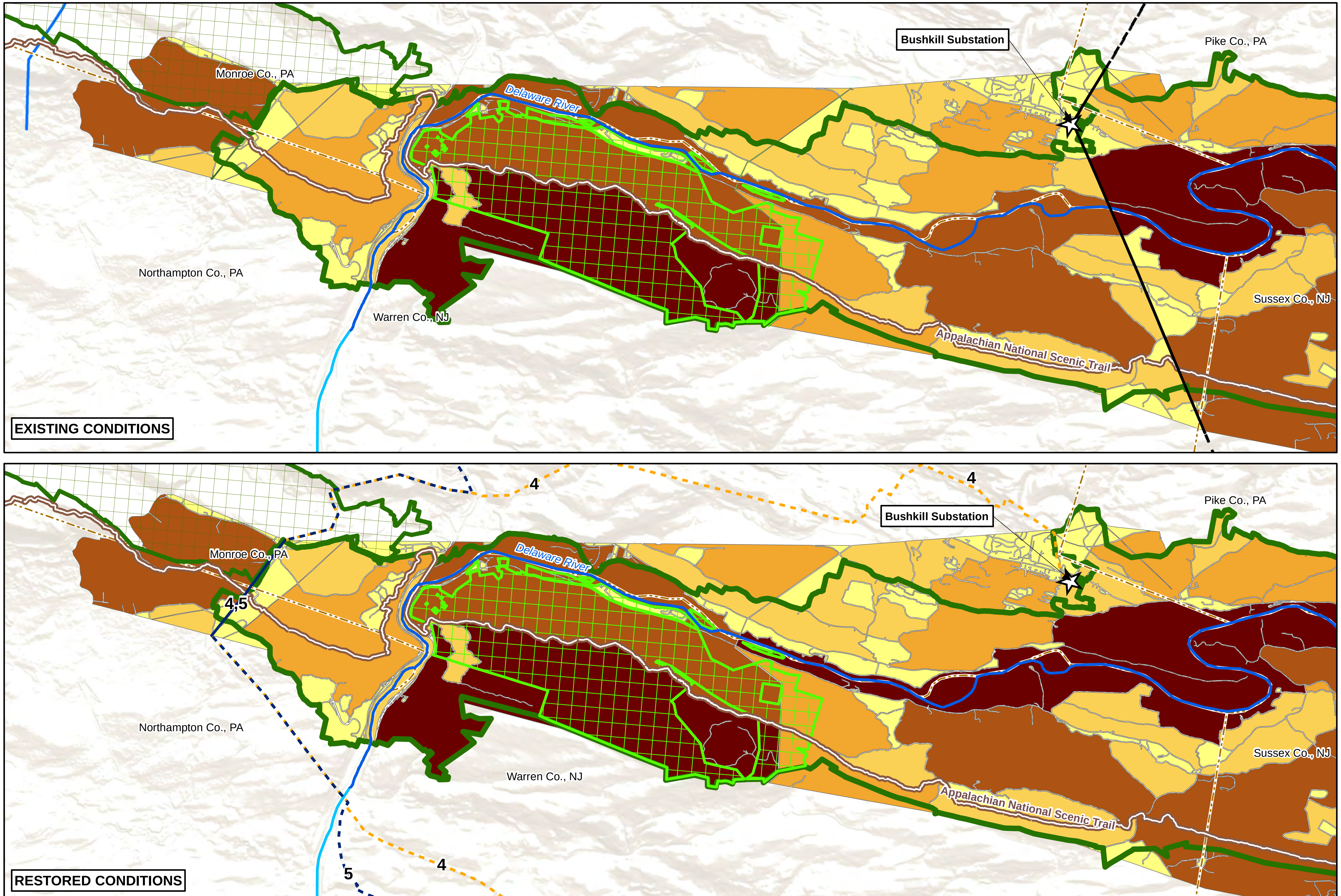
0 1 2
Miles

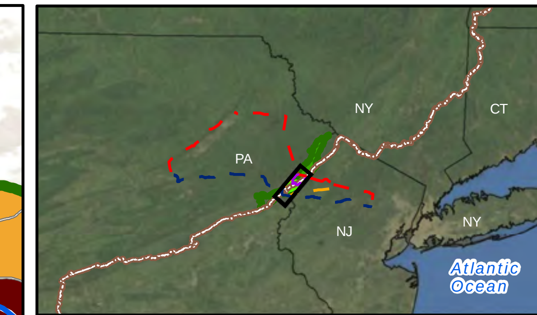
Susquehanna to Roseland Transmission Line Proposal and Right-of-Way Request EIS

Figure 72
Alternative 3
Existing vs. Restored Conditions

Source: ESRI Streetmap 2009;
NPS 2011;
ArcGIS Map Service 2010;

Projection: NAD 83 UTM Zone 18N
Date: October 2011





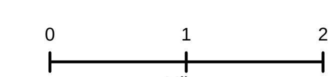
Legend

- Substation
- Alternative 4,5
- Alternative 4 (outside study area boundary)
- Alternative 5 (outside study area boundary)
- Existing Transmission Line
- Existing Transmission Line (outside study area boundary)
- Appalachian National Scenic Trail
- Middle Delaware National Scenic & Recreational River
- Delaware River
- Delaware Water Gap National Recreation Area
- Worthington State Forest
- CVNWR Boundary
- County Line

Habitat Patch Acreages

- 0 - 150 acres
- 150 - 500 acres
- 500 - 1,200 acres
- 1.200 - 3,200 acres
- 3,200 - 8,000 acres

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



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

Figure 73
Alternative 4,5
Existing vs. Restored Conditions

Source: ESRI Streetmap 2009;
NPS 2011;
ArcGIS Map Service 2010;

Projection: NAD 83 UTM Zone 18N
Date: October 2011

Inside the terrestrial study area, there are currently 311 acres of utility ROWs that are maintained as scrub shrub habitat. The permanent loss of forest from access roads and the alteration of forest to maintained scrub shrub habitat as a result of alternative 3 actions would add to this total. The combined area of mechanically and/or chemically maintained corridors would amount to approximately 396 to 470 acres, with an additional 1.6 acres of access roads constructed outside the expanded ROW (table 47). However, while 87 to 161 acres of mature forest would be lost under alternative 3, approximately 53 acres of previously maintained habitat would be restored along the B-K Line, as described above in the "Common to Alternatives 3, 4, and 5" section. The restoration would create the largest habitat patch in DEWA, approximately 7,272 acres, which would generally follow MDSR for approximately 18.3 miles. In the long term, outside the analysis period of this EIS, the total area maintained in utility ROWs would be approximately 343 to 417 acres, resulting in an increase in maintained area of 10% to 34%.

The length of expanded and maintained ROW along the alternative 3 alignment in the parks is approximately 5.4 miles, while the length in the parks that would be restored is approximately 3.7 miles. With the restoration of the B-K Line, there would not be any other east–west feature that would completely linearly fragment habitats in DEWA north of the alternative 3 alignment. The restoration of most of the existing ROW along the B-K Line would counteract some of the impacts from implementing alternative 3; however, the reduction in habitat fragmentation and further habitat isolation would not completely mitigate the adverse effects of constructing, operating, and maintaining the S-R Line along the alternative 3 alignment.

The alternative 3 alignment contains a variety of habitats, including mature hemlock forests, riparian corridors, and abundant wetlands. Tree removal and the expansion of successional habitat in the ROW would permanently alter habitat, creating a wider expanse of successional habitat that would require maintenance for the period of analysis. The alternative 3 alignment is generally an east–west corridor, which would be susceptible to increased sun exposure, which can alter vegetation composition as discussed for alternative 2. Additionally, 100-foot riparian corridors would be retained as previously discussed, which could create wildlife movement corridors between the habitats on either side of the alignment.

Under alternative 3, the impacts on wildlife habitat from fragmentation would include the loss of habitat, reduced habitat patch size, increased edge, and the increased isolation of patches along 6.9 miles of the alignment. These impacts are described in detail under alternative 2. In addition to mature forests, agricultural fields would be affected under alternative 3. The agricultural fields are maintained habitat; however, these fields provide nesting and foraging habitat for a variety of wildlife species, including birds, reptiles, and mammals, and activities in the fields could disrupt these species.

The alternative 3 alignment would traverse 7.2 miles of the terrestrial study area and would affect a variety of habitats. Clearing, construction, and the continued maintenance of the expanded ROW would result in adverse impacts on landscape connectivity and wildlife habitat due to habitat fragmentation, loss, and alteration and further isolation of habitat patches. However, the beneficial impacts from the restoration of a portion of the existing B-K Line ROW would decrease these impacts somewhat.

Wildlife: All activities under alternative 3 (clearing and construction activities, the operation and maintenance of the proposed transmission line, and vegetation maintenance) would affect wildlife. Impacts on all animal groups are described in detail under alternatives 1 and 2. The types of impacts from the construction and operation of the proposed transmission line under alternative 3 would be the same as those described previously.

Overall Impacts on Landscape Connectivity, Wildlife Habitat, and Wildlife: Adverse impacts on landscape connectivity, wildlife habitat, and wildlife under alternative 3 would result due to habitat loss, habitat alteration, the continued artificial maintenance of the habitat in the ROW, the isolation of habitat patches, increased edge habitat, the disturbance and direct mortality of wildlife, and the isolation of some species.

Cumulative Impacts

Cumulative impacts on landscape connectivity, wildlife habitat, and wildlife inside the terrestrial study area from past, present, and reasonably foreseeable projects would be adverse, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the adverse impacts as a result of alternative 3 are combined with the impacts from the other projects in the terrestrial study area, an overall adverse cumulative impact would be expected. Alternative 3 would not increase the level of impact.

Conclusion

Alternative 3 would result in adverse impacts on landscape connectivity, wildlife habitat, and wildlife from artificially maintaining a ROW that bisects natural landscapes in the parks despite NPS protection and national designations of natural, scenic, and recreational resources. Inside the terrestrial study area, alternative 3 would result in an increase in ROW width of approximately 60% to 650% from current conditions. The implementation of alternative 3 would fragment the habitat patches adjacent to the ROW by the construction of access roads. Additionally, the patches would be reduced in size by the expansion of the ROW. However, under alternative 3, the B-K Line from the Bushkill Substation to the eastern boundary of DEWA would be restored to natural conditions. In the long term, the restoration would allow habitat patches that are currently bisected by the ROW to reconnect, resulting in larger patches of contiguous habitat. The restoration would create the largest habitat patch in DEWA, approximately 7,272 acres, which would generally follow MDSR for approximately 18.3 miles. The restoration of the B-K Line ROW would offset some of the habitat fragmentation and further habitat isolation impacts of alternative 3, but it would not completely mitigate these impacts. The expansion of the alternative 3 ROW would represent a 10% to 34% increase in the amount of maintained scrub shrub habitat in the terrestrial study area.

These changes to landscape connectivity and wildlife habitat would also result in adverse impacts on wildlife. Wildlife species would be affected by the activities of alternative 3 throughout the period of analysis. Disturbance, direct mortality, and isolation would begin with clearing activities and would continue through the vegetation maintenance activities. When the adverse impacts from alternative 3 are combined with the adverse impacts from past, present, and reasonably foreseeable projects, adverse cumulative impacts on landscape connectivity, wildlife habitat, and wildlife would result.

Alternative 4

Landscape Connectivity and Wildlife Habitat: The alternative 4 alignment would be constructed along an existing ROW that varies in width from 70 to 120 feet. Expanding this corridor to 200 to 300 feet for alternative 4 would create a ROW approximately 67% to 328% wider than the existing ROW. Both fragmentation and edge habitat would be increased by clearing, construction, and vegetation maintenance activities under alternative 4.

The types of effects of habitat fragmentation, loss, and alteration and further isolation of habitat patches under alternative 4 would be the same as described in detail under alternative 2. The habitat available along the alternative 4 corridor is diverse; however, the forests surrounding the alternative 4 corridor have been fragmented by additional ROWs, permanent roads, and developed areas near the route (figure 73). Concentrating infrastructure at the edges of DEWA would reduce the amount of fragmentation by preserving larger contiguous habitat patches. The habitat patches on both sides of the existing ROW that would be affected are generally smaller in size than those described for alternatives 2 and 3, ranging from approximately 1.2 to 945 acres. Currently, three habitat patches adjacent to the alternative 4 alignment contain more than 150 acres. Under alternative 4, these patches would be reduced by 0.2% to 1.8%. Because alternative 4 would mostly use existing access roads, no further fragmentation would result from access road construction.

The permanent loss of forest from access roads and the alteration of forest to maintained scrub shrub habitat as a result of alternative 4 actions would add to the 311 acres of maintained habitat currently in the terrestrial study area. The combined area of mechanically and/or chemically maintained corridors would amount to approximately 377 to 405 acres. While 31 to 59 acres of mature forest would be lost under alternative 4, with an additional acre lost outside the ROW from the construction of access roads, approximately 53 acres of previously maintained habitat would be restored along the B-K Line (table 47), as described in above in the “Common to Alternatives 3, 4, and 5” section. In the long term, outside the analysis period of this EIS, the total area maintained in utility ROWs would be approximately 324 to 352 acres. This range represents an increase of 4% to 13% in maintained areas.

The alternative 4 alignment contains mostly deciduous woodland communities with some wetlands. The types of impacts from habitat fragmentation, loss, and alteration and further isolation of habitat patches under alternative 4 would be expected to be similar in nature to those described under alternative 2. Because the alternative 4 alignment is oriented in a north–south direction, the effects of sun exposure would not be as severe as for east–west-oriented alignments.

Wildlife: Under alternative 4, wildlife would be affected by clearing and construction activities, the operation and maintenance of the proposed transmission line, and vegetation maintenance. Impacts on all wildlife groups are described in detail under alternatives 1 and 2. The types of impacts from the construction and operation of the proposed transmission line under alternative 4 would be the same.

Overall Impacts on Landscape Connectivity, Wildlife Habitat, and Wildlife: Adverse impacts on landscape connectivity, wildlife habitat, and wildlife under alternative 4 would result due to habitat loss, habitat alteration, the continued artificial maintenance of the habitat in the ROW, the isolation of habitat patches, increased edge habitat, the disturbance and direct mortality of wildlife, and the isolation of some species.

Cumulative Impacts

Cumulative impacts on landscape connectivity, wildlife habitat, and wildlife inside the terrestrial study area from past, present, and reasonably foreseeable projects would be adverse, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the adverse impacts as a result of alternative 4 are combined with the impacts from the other projects in the terrestrial study area, an overall adverse cumulative impact would be expected. Alternative 4 would not increase the level of impact.

Conclusion

Alternative 4 would result in adverse impacts from a decrease in mature forest, an increase in edge habitat, increased habitat fragmentation, the disturbance and direct mortality of wildlife, increased predation, and the isolation of some species. Inside the terrestrial study area, alternative 4 would result in the permanent loss of mature forest through the widening of the existing ROW and the construction of access roads. The habitat patches along the alternative 4 alignment are currently fragmented by existing roads, other ROWs, and encroaching development, because this alignment is sited at the edge of the DEWA boundary. The habitat patches along the alignment (including the portion of the B-K Line from the Bushkill Substation to the western portion of DEWA) currently range from approximately 1.2 to 945 acres and the larger habitat patches would be reduced in size by approximately 0.4% to 1.2%. The restoration of the B-K Line ROW from the Bushkill Substation to the eastern boundary of DEWA would help offset the impacts from habitat fragmentation and further habitat isolation under alternative 4.

Wildlife would be affected by the adverse impacts on landscape connectivity and wildlife habitat. During all activities under alternative 4, wildlife could suffer direct mortality, disturbance, isolation, and an increase in competition for resources in remaining habitat patches. The development of early successional habitat along the ROW as a result of the long-term maintenance of vegetation inside the terrestrial study area would result in a long-term shift in species composition. When the adverse impacts from alternative 4 are combined with the adverse impacts from past, present, and reasonably foreseeable projects, adverse cumulative impacts on landscape connectivity, wildlife habitat, and wildlife would result.

Alternative 5

Landscape Connectivity and Wildlife Habitat: The alternative 5 alignment would be constructed along an existing ROW that varies in width from 70 to 100 feet. Under alternative 5, the ROW would undergo an increase in width of approximately 100% to 329%. Fragmentation and edge habitat would be increased under alternative 5.

The wildlife habitat along the alternative 5 alignment is the same as that described for alternative 4 and would be affected by the same habitat fragmentation and isolation impacts, with reductions in the size of the large habitat patches from 0.4% to 0.9% and no further fragmentation from the construction of access roads.

As a result of alternative 5 actions, the combined area of mechanically and/or chemically maintained corridors would amount to approximately 355 to 375 acres in the terrestrial study area, with an additional 0.3 acres of access roads constructed outside the expanded ROW (table 47). While 25 to 45 acres of mature forest would be lost under alternative 5 (including 16 to 28 acres of forest in the parks), approximately 53 acres of previously maintained habitat would be restored along the B-K Line, as described in above in “Common to Alternatives 3, 4, and 5.” In the long term, outside the analysis period of this EIS, the total area maintained in utility ROWs would be approximately 302 to 322 acres, which would result in a decrease in maintained habitat of 3% to an increase of 4% from the current 311 acres. The adverse impacts on landscape connectivity and wildlife habitat under alternative 5 from clearing, construction, and the continued maintenance of the expanded ROW would not be completely mitigated by beneficial impacts from the restoration of the B-K Line.

Wildlife: Under alternative 5, wildlife would be affected by direct mortality, increased predation, and isolation through clearing and construction activities, the operation and maintenance of the proposed transmission line, and vegetation maintenance. Impacts on all wildlife groups are described in detail under alternatives 1 and 2. The types of impacts from the construction and operation of the proposed transmission line under alternative 5 would be the same.

Overall Impacts on Landscape Connectivity, Wildlife Habitat, and Wildlife: Adverse impacts on landscape connectivity, wildlife habitat, and wildlife under alternative 5 would result due to habitat loss, habitat alteration, the continued artificial maintenance of the habitat in the ROW, the isolation of habitat patches, increased edge habitat, the disturbance and direct mortality of wildlife, and the isolation of some species.

Cumulative Impacts

Cumulative impacts on landscape connectivity, wildlife habitat, and wildlife inside the terrestrial study area from past, present, and reasonably foreseeable projects would be adverse, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the adverse impacts as a result of alternative 5 are combined with the impacts from the other projects in the terrestrial study area, an overall adverse cumulative impact would be expected. Alternative 5 would not increase the level of impact.

Conclusion

Alternative 5 would result in adverse impacts on landscape connectivity, wildlife habitat, and wildlife from artificially maintaining a ROW that bisects natural landscapes in the parks despite NPS protection and national designations of natural, scenic, and recreational resources. Inside the terrestrial study area, alternative 5 would result in the permanent loss of mature forest through the widening of the existing ROW.

Under alternative 5, the expansion of the existing ROW would decrease the size of the habitat patches and eliminate several small patches, which would increase habitat isolation. The larger habitat patches would be decreased by 0.4% to 0.9%. The restoration of the B-K Line from the Bushkill Substation to the eastern boundary of DEWA under alternative 5 would mitigate some of the adverse impacts of constructing, operating, and maintaining the S-R Line. In the long term, decommissioning the existing transmission line along the B-K Line and allowing the ROW to revegetate naturally would result in benefits to landscape connectivity; however, the existing ROW would not return to mature forest within the analysis period of this EIS.

These changes to landscape connectivity and wildlife habitat would also result in impacts on wildlife. Wildlife species would be affected by the actions of alternative 5 throughout the period of analysis. Disturbance and direct mortality would begin with clearing activities and would continue through the vegetation maintenance activities. When the adverse impacts from alternative 5 are combined with the adverse impacts from past, present, and reasonably foreseeable projects, adverse cumulative impacts on landscape connectivity, wildlife habitat, and wildlife would result.

SPECIAL-STATUS SPECIES (AQUATIC AND TERRESTRIAL)

In this section, impacts on federally and state-listed threatened and endangered species as well as candidate species described as present or with the potential to be found in the study area (see chapter 3) are analyzed and given equal consideration for analysis in this EIS. To date no critical habitat has been designated for any federally listed species in the study area. Included in the analysis is an evaluation of the alternatives as they relate to impacts on both aquatic and terrestrial special-status species.

METHODOLOGIES

The impact analysis for special-status species included a determination of species likely to inhabit areas potentially affected, a determination of habitat types that would be lost or altered (changed from one habitat type to another), and a discussion of other potential direct and indirect effects. Impacts on special-status species were assessed in terms of changes in the amount and connectivity of special-status species habitat, the integrity of the habitat (including past disturbance) and populations, and the potential for increased/decreased disturbance.

Specific impacts on special-status species are described in this section for listed species known to be present or with the potential to be found inside the study area (see chapter 3). In general, it is not known where and to what extent special-status species would be present outside the study area. Potential impacts that could occur outside the study area, including those that may affect listed special-status migratory bird species, are discussed on a qualitative basis using best available information. Due to a lack of information and the uncertainty of impacts, a range is described for impacts outside the study area.

Inside the study area, impacts on special-status species are analyzed for the transmission line corridor as described for each alternative and any areas outside the corridor where necessary pulling and splicing sites and access road development, including spur roads, are proposed. Outside the study area, a possible route was plotted to the Susquehanna and Roseland substations. Because the NPS cannot dictate where the line would actually go, the direct impacts from the construction and maintenance of the transmission line outside the study area cannot be determined; however, indirect impacts are analyzed.

STUDY AREA

The study area for special-status species includes the ROW for each alternative and any area outside the ROWs where necessary pulling and splicing sites, staging areas, and access road development are proposed or would be expected. Because the location of the S-R Line outside the study area cannot be determined at this time, the indirect impacts on special-status species cannot be evaluated per alternative. The potential impacts outside the study area are generally addressed; however, further surveys would be required prior to construction of the S-R Line.

CUMULATIVE IMPACTS COMMON TO ALL ALTERNATIVES

For this EIS, actions inside and outside the study area could affect vegetation and aquatic communities that provide habitat for special-status plant and wildlife species (including fish; aquatic and terrestrial invertebrates; migratory, breeding, and resident birds; amphibians and reptiles; and small and large mammals). Alteration, degradation, fragmentation, and permanent loss of vegetation communities that provide habitat for special-status plant and wildlife species could occur as a result of development projects, fire suppression, the loss of habitat continuity, water quality degradation, and the establishment of nonnative invasive species. These actions could alter the behavior, reproductive success, and survival of special-status species, which in turn could affect the distribution and abundance of species. In addition, climate change may alter species distribution as a result of the expansion or contraction of breeding ranges, changes in food resources, and the availability of seasonally used habitats. Specific to bats, the spread of white-nose syndrome could decimate communal winter roosts in hibernacula throughout the region, including outside the study area described for this EIS.

Other actions inside and outside the study area may result in the protection, restoration, or enhancement of natural resources that would result in benefits to special-status species and habitat. Past, present, and reasonably foreseeable activities that would affect special-status species inside and outside the study area are listed below and discussed under each alternative as applicable. A complete list of projects that may contribute to cumulative impacts both inside and outside the study area can be found in appendix H.

Projects Inside the Study Area

Inside the study area the cumulative projects with adverse impacts include the following road and utility projects: Old Mine Road South rehabilitation, US Route 209 Raymondskill Creek Bridge rehabilitation (bridge repair), Watergate Dam #10 (dam restoration), the Tennessee Gas Line Proposal (addition to an existing gas pipeline), the Columbia Gas Transmission Company pipeline (replacement of an existing gas pipeline), and the Northeast Supply Link Expansion (Palmerton Loop gas pipeline). The New Jersey Swim Beach (Turtle Beach) project, located on the Delaware River at the Coppermine Inn site, provides an accessible opportunity for protected swimming that meets visitor demand as recommended in the GMP for DEWA and MDSR (NPS 1987). Although this project may initially have an adverse impact on special-status species, the swim beach project has an overall beneficial effect through the closure of the informal swim beach that has evolved over time; the closure of the informal swim beach reduces (but does not eliminate) adverse impacts to special status species. Although not a project, the illegal collection of special-status plants and animals in DEWA also has adverse impacts on listed species.

Beneficial impacts on special-status species are expected to occur from the McDade Trail realignment as well as from designating lands as IBAs or IMAs. The IBA and IMA designation helps preserve critical habitat and guide habitat management decisions for wildlife, including special-status species, as described in chapter 3. Additionally, there are several land protection programs, including county and township open space and conservation plans, which could protect special-status species and associated habitat. The beneficial effects of many of the listed programs are dependent on the availability of funding for specific projects, which is uncertain and could vary throughout the period of analysis; therefore, the level of benefit resulting from the implementation of any project is also variable.

Although these projects would protect special-status species, the beneficial impacts would not reduce the adverse impacts from the above-mentioned development projects. Overall, cumulative impacts on special-status species inside the study area from the actions of other past, present, and future projects are expected to be adverse.

Projects Outside the Study Area

Outside the study area, cumulative projects that could result in adverse impacts on special-status species include the following road and utility projects: Marcellus shale natural gas drilling, the Columbia Gas Transmission Company pipeline (replacement of an existing gas pipeline), the PPL proposal for a 138/12-kV substation (which opens up additional areas to electric transmission), and transportation improvement and replacement projects in Pennsylvania and New Jersey. In addition, proposed and future residential and commercial developments in New Jersey and Pennsylvania could cause adverse impacts on special-status species through loss and fragmentation of habitat. Outside the study area, land can be protected by other agencies under federal, state, or private ownership. Nongovernmental organizations such as The Nature Conservancy work toward identifying and preserving land that contains rare or unique features or key habitat for plants and wildlife. The beneficial effects of many of these programs are dependent on the availability of funding for specific projects, which is uncertain and could vary throughout the period of analysis. Therefore, the level of benefit resulting from the implementation of any project cannot be predicted. Despite land protection and conservation programs, land would continue to be subject to development that would continue to cause the loss, alteration, and fragmentation of habitat. As a result, actions and activities in the past, present, and foreseeable future would contribute to the decline in the quality of habitat that may support special-status species. Overall, cumulative impacts on special-status species outside the study area would be adverse.

IMPACTS OF THE ALTERNATIVES ON SPECIAL-STATUS SPECIES

Due to their mobility, it is possible that the special-status aquatic, terrestrial invertebrate, bird, reptile and amphibian, or mammal species described in chapter 3 (tables 13, 15, 16, 17, and 18) could be present inside or outside the study area for any of the alternatives (1 through 5) where adequate appropriate habitat exists. This section focuses on the special-status species (both wildlife and plant species) that have been observed or otherwise documented and those with a high probability of being present inside or outside the study area, as applicable, for each alternative.

Common to All Alternatives

Consultation: Consultation with USFWS is ongoing at present and future coordination would clarify the extent to which adverse effects to listed species would be likely to occur and would determine whether a biological assessment (BA) would be required for this project. Based on the BA, NPS would conclude if the project is or is not "likely to adversely affect" any federally listed (or proposed) species and the USFWS would concur (or not) in writing in response to the BA.

Vegetation Maintenance: Vegetation management would occur at least annually. The details of the applicant's vegetation management plans and techniques for clearing vegetation are explained in chapter 2. Vegetation maintenance activities would sustain habitat in the existing ROW as early successional scrub shrub. Maintenance activities would have the potential to temporarily disturb and/or displace special-status species foraging or nesting in and along the length of the existing ROW as a result of noise and human activity.

Invasive Plant Species Management: Nonnative, invasive plant species can compete with native species, including special-status species. While not all nonnative species are harmful, those that are invasive can have serious consequences for native habitats. Management of nonnative, invasive species in the study area can indirectly affect special-status species using habitats where management is conducted. Invasive species management programs in the study area are discussed in the "Invasive Plant Species" section of chapter 3 and would also be implemented through the applicant's NPS-approved vegetation management plans (see chapter 2 and appendix F).

Electrocutions with Existing Transmission Lines: Electrocution can occur when a bird simultaneously contacts electrical equipment elements, either phase to phase or phase to ground (APLIC 2006, ix). This normally occurs when a bird attempts to perch on a transmission tower/pole with insufficient clearance between these elements; birds such as raptors may also use the poles for nesting and could be electrocuted attempting to launch from or land in their nests. Bird electrocutions typically occur on power lines with voltages less than 60 kV because there is inadequate separation between energized conductors and hardware or between ground conductors and hardware (APLIC 2006, ix, 106). Because the existing B-K Line is 230 kV, it is unlikely that bird electrocution would occur regularly because the phase-to-phase and phase-to-ground separation is greater than 60 inches, the recommended separation for large raptors such as eagles (APLIC 2006, 60).

Recent literature indicates that electrocution continues to be a cause of mortality for various raptors in North America, particularly eagles, some hawks, and owls, although nonraptor electrocutions have also been documented (APLIC 2006, 10). Other bird electrocutions that have been reported include ospreys and great blue herons (APLIC 2006, 10) as well as barred owls (APLIC 2006, 31). Long-legged wading birds such as herons may be electrocuted on poles where there is insufficient vertical separation between conductors or between conductor and ground (APLIC 2006, 38). Smaller special-status bird species such as warblers are not expected to be electrocuted by the existing transmission lines because they cannot make simultaneous contact with the two elements of electrical equipment. Bald and golden eagles continue to be a focus of electrocution research in North America, with electrocution accounting for less than 1% to 25% of eagle deaths in various studies (APLIC 2006, 10). Habitat is a key factor influencing bird use of poles. For example, in open areas lacking natural perches, power poles provide sites for hunting, feeding, resting, roosting, or nesting (APLIC 2006, 23). In general, there are fewer reported raptor electrocutions in forested habitat versus open habitats (Switzer 1977; Benson 1981). It is possible that some special-status raptor species (e.g., barred owl and red shouldered hawk) could use power-line poles for perching, especially when foraging along ROWs. Bald eagles and ospreys are nesting with increasing frequency on artificial structures such as power poles and communication towers (APLIC 2011a; USFWS 2007a, 4). Other species of raptors, such as Cooper's hawk and northern goshawk, that typically inhabit forested areas may be more likely to perch in trees than on the exposed perches provided by electric transmission and distribution facilities (APLIC 2006, 23).

Collisions with Existing Transmission Lines: Bird collisions with power lines may occur when a transmission line runs perpendicular to a flight path used by birds that move back and forth from feeding and roosting or nesting sites on a daily basis or when migrant birds are traveling at reduced altitudes (usually in inclement weather) and encounter the structures. Migrating special-status raptors, such as osprey, Cooper's hawk, northern goshawk, red shouldered hawk, bald eagle, and golden eagle, can encounter transmission lines crossing their flight path if the lines are located along raptor migration corridors. Orientation of tall structures perpendicular to the flight path of ridge-gliding raptors may result in collisions with wires if weather conditions are such that raptors are using lower altitudes along a ridge such as Kittatinny Ridge. Raptors have acute eyesight and are daytime migrants, and would not be expected to collide with transmission lines or structures unless their flight brings them to lower altitudes because of foggy or rainy weather that reduces visibility or when foraging along the ROW.

As recommended by the New Jersey USFWS Field Office, the applicant has drafted an Avian Protection Plan to address electrocution, collision, and other impacts. The USFWS will recommend finalization of the APP with input from all affected natural resource agencies once a preferred alternative is selected.

Mitigation Measures: Mitigation measures would be implemented to minimize impacts on special-status species. Mitigation measures are considered to be integrated into each alternative as applicable for impact analysis. Mitigation measures that would avoid direct impacts on special-status species would be the most efficient measures and would include time-of-year restrictions, preconstruction surveys, construction monitoring, habitat preservation and habitat restoration components, and postconstruction monitoring. Preconstruction surveys in particular are expected to be efficient at reducing direct impacts on special-status species because surveys would identify the presence of special-status species before site preparation and construction are initiated. Some mitigation measures, such as modifying the location of towers and access roads, may not be possible and other measures, such as road closures and/or patrols, may not be effective at some locations; however, mitigation measures would be implemented to the extent practical to avoid adverse effects on special-status species. The efficacy of mitigation techniques varies widely between mitigation measures, as described in chapter 2 and appendix F, and is considered based on best professional judgment when determining the impacts of each alternative on each special-status species.

Outside the Study Area: Outside the study area, regardless of which alternative is selected, the transmission line could pass through Carbon, Lackawanna, Luzerne, Monroe, Northampton, Pike, and Wayne counties in Pennsylvania and Morris, Sussex, and Warren counties in New Jersey. These counties are largely undeveloped and contain a variety of habitats, including forest, successional habitat, riparian areas, and wetlands, as well as land altered by human activities such as development or agriculture. Because the location of the S-R Line outside the study area cannot be determined at this time, the extent that special-status species or their habitats may be present are unknown. As a result, impacts are considered indirect. Outside the study area, there would be no impact on any special-status species if the species or its habitat is not present in the project ROW.

Special-status Aquatic Species: Impacts on special-status freshwater mussel species could occur if the construction of temporary stream crossings is required, due to the potential for direct mortality and alteration of habitat conditions. If special-status species are present, preconstruction relocation of freshwater mussels would minimize impacts. As a more mobile species, the bridle shiner would be expected to move away from disturbance caused by site preparation or construction activities in open water habitat. The removal of vegetation during the construction of the transmission line could temporarily disturb soils, increasing erosion and sedimentation into open water habitat and affecting water quality, which would indirectly affect special-status aquatic species. The project could be expected to result in a adverse impact on special-status aquatic species outside the study area.

Special-status Bird Species: The impacts on special-status bird species outside the study area would primarily occur from the loss of habitat as a result of clearing during construction activities and displacement and disturbance due to noise from construction and human activities. Habitat use by special-status bird species would likely resume after the cessation of activities and as habitat recovers. However, the use of the habitat in the permanent ROW could change because the habitat in the ROW would be maintained as scrub shrub. The presence of larger and higher transmission line structures and lines could cause collision and electrocution hazards for birds, including special-status species, migrating along the Kittatinny Ridge outside the study area. For all special-status bird species outside the study area, impacts would be adverse.

Special-status Reptile and Amphibian Species: For both Pennsylvania and New Jersey, special-status reptile and amphibian species have the potential to be present for all alternatives outside the study area, provided the proper habitat exists along the chosen route. Reptiles and amphibians would have a higher risk of direct mortality because these species are less mobile and often camouflage themselves in the surrounding substrate. The NJENSP reviewed records and data for New Jersey and NPS lands during early consultation (review did not include private lands outside of the study area), but the review did not indicate any known presence of special-status reptile or amphibian species (NJENSP 2010a). However, potential habitat for the bog turtle, a federally listed species, was identified in Morris and Sussex counties, New Jersey, during surveys (EcolSciences 2008, 8–15). If special-status reptile or amphibian species, especially the bog turtle, are present, adverse impacts could occur due to the possibility of direct mortality from construction equipment, the loss or alteration of habitat, and noise associated with construction activities and increased human activity. For all special-status reptile and amphibian species outside the study area, impacts would be adverse.

Special-status Mammal Species: Special-status mammal species that may be present include bats (including the federally listed Indiana bat) and the bobcat. For all alternatives outside the study area, habitat for bats (including the Indiana bat) may be affected by the clearing of vegetation, including dead standing trees that function as summer roost trees or trees that act as habitat for maternity colonies. Caves or mines are likely not to be physically affected by the construction of a transmission line; however, disturbance during hibernation could cause bats to abandon the hibernacula. Although no Indiana bats were found during mist netting surveys and no hibernacula were identified (Sanders 2009, 6), small-footed bats were caught during mist netting surveys outside the study area in Lackawanna, Monroe, and Pike counties, Pennsylvania (Sanders 2009, 6). If winter hibernacula or roost or maternity colony trees for bats are located in the proposed ROW, including the potential for use by Indiana bats, adverse impacts on bats could occur. However, it is assumed that seasonal restrictions on construction activities that would be implemented to protect the Indiana bat. Habitat projects such as the Hopatcong Forest Restoration Project and mitigation proposed along the Passaic River (USFWS 2010b) would offset the potential impacts of the proposed transmission line.

Bobcats could be present in appropriate habitat outside the study area and would primarily be affected by disturbance from construction and human activity as well as from the regular maintenance of the ROW during operation. However, it is expected that impacts due to disturbance would be adverse. Daytime activities associated with the clearing and maintenance of the ROW would be expected to have minimal impacts on the bobcat due to the crepuscular/nocturnal nature of the animal. Bobcats could also use the ROW, when completed, as a corridor for movement and hunting and could be expected to maintain territories that may overlap with the ROW and the habitats along the transmission line. There is also the potential for bobcat den sites to be located in the alignment chosen for the ROW. Den sites could be unavoidably or unknowingly destroyed during construction activities but it is expected that den sites would not be encountered frequently. For all special-status mammal species outside the study area, impacts could be adverse.

Special-status Plant Species: Adverse impacts could occur on special-status plant species from construction activities and periodic maintenance. Ground-disturbing activities, including construction of towers and crane pads, the grading of new access roads and spur roads, and tower removal, have the potential to disturb or destroy special-status plant species. If special-status species are identified outside the study area prior to construction, the plants could be relocated prior to ground-disturbing activities. Following the initial clearing activities it would be possible for special-status plant species to reestablish, provided that the requisite habitat conditions remain in the corridor.

Conclusion: Outside the study area, there would be no impact on any special-status species if the species or its habitat are not present in the project ROW. Adverse impacts on special-status wildlife species could occur from direct mortality, alteration of habitat, loss of habitat, disruption of foraging and nesting behaviors from disturbance due to construction noise and human activity. Adverse impacts on special-status plant species occur from ground-disturbing and maintenance activities.

Alternative 1: No Action

Special-status Aquatic Species: A total of four special-status state-listed aquatic species are known to be present or have the potential to be found in the existing ROW under alternative 1: three freshwater mussels (yellow lampmussel, creeper, and alewife floater) and one fish species, bridle shiner (NJENSP 2010a, 2; PFBC 2010a, 1; Horwitz et al. 2008, 75). Vegetation maintenance activities have the potential to increase sedimentation and turbidity in surface waters by increasing soil erosion and runoff through the removal of stabilizing vegetation and the exposure of soil. Impacts on fish and mussels from increased sedimentation could include smothering, displacement, and a loss of suitable bottom habitat for species that prefer rocky or gravel bottom habitat. Increased turbidity and suspended solids associated with sedimentation could affect respiration and feeding of mussels and fish and could result in mortality. The removal of vegetation along smaller water bodies, such as tributary streams, could result in changes to water temperatures and light attenuation and could affect habitat conditions for some aquatic species, leading to displacement. The use of herbicides could indirectly affect fish and mussel species. The introduction of contaminants such as herbicides would result in acute or chronic effects on aquatic organisms including decreased growth, disturbed reproductive cycles, or increased mortality. Maintenance would not occur directly in surface waters and the use of BMPs, including erosion and sedimentation control practices, NPS-approved herbicides (including herbicides accepted for use near aquatic habitats), low-impact vegetation maintenance techniques, and water-body buffers, would minimize impacts on special-status aquatic species; however, impacts on special-status aquatic species would be adverse.

Special-status Terrestrial Invertebrate Species: Two special-status terrestrial invertebrate species, Arogos skipper and Mitchell’s satyr, both butterfly species, have the potential to be present in the existing B-K Line ROW. The herbaceous plant communities and grasses associated with Arogos skipper habitat would be compatible with vegetation requirements for the ROW and may create additional suitable habitat for the Arogos skipper. It is possible that if the ROW could be colonized by the Arogos skipper and conservation measures could be implemented, a beneficial impact could occur.

Suitable wetland habitat (fens) for Mitchell’s satyr, a federally listed endangered species, exists in the alternative 1 alignment; approximately 0.99 acre of the Arnott Fen wetland complex is located in the B-K Line ROW. Although it was historically found in New Jersey, Mitchell’s satyr is undocumented in Pennsylvania where suitable fen habitat is found inside the study area and Mitchell’s satyr was not observed during invertebrate surveys conducted along the ROW (EcolSciences 2009). Mitchell’s satyr is currently only found in 13 locations in Michigan and 2 locations in Indiana (USFWS 2010d, 1). As a result, no impact on Mitchell's satyr is expected under alternative 1. Vegetation maintenance to remove danger trees and incompatible vegetation species (generally tall-growing, nonherbaceous species) and continued NPS protection of the fen would maintain suitable habitat for Mitchell's satyr, should the butterfly find and colonize the habitat or should a program be considered to establish the species in the future.

Special-status Birds: A total of 12 special-status (state-listed) bird species have been observed or have the potential to be present in the ROW under alternative 1: great blue heron, osprey, bald eagle, Cooper's hawk, northern goshawk, red shouldered hawk, Virginia rail, barred owl, veery, black-throated green warbler, cerulean warbler, and golden-winged warbler. Impacts on the bald eagle are discussed in the following section, although some notes are made here regarding general impacts on raptors. The ROW has been established for 80 years and alternative 1 would continue to maintain the existing conditions. Impacts are not expected from the continued presence of the line under alternative 1 except for impacts related to vegetation maintenance in the ROW, as described below.

If vegetation trimming or removal occurs during the nesting season, it is possible that the golden-winged warbler could be adversely affected. During vegetation clearing, nests could be destroyed or become more exposed to scavenging or predation, leading to mortality of eggs and young or abandonment by adults. The gradual reestablishment of successional habitat in the ROW following clearing activities could benefit this species, but this habitat would not be available immediately. Forested and emergent wetlands, as well as riparian areas adjacent to the Delaware River, exist in the ROW and can be used by the following state-listed bird species: great blue heron, osprey, bald eagle, red shouldered hawk, and Virginia rail. Barred owls may use forested wetlands and riparian areas along the Delaware River. Migrant and resident individuals of special-status raptor species such as Cooper's hawk, northern goshawk, and barred owl may hunt along the ROW and would continue to use the ROW and edge habitat under alternative 1. In addition, wetlands in the ROW under alternative 1 would continue to provide breeding and nesting habitat for such special-status bird species as Virginia rail and great blue heron. Other bird species, such as the osprey, bald eagle, and red shouldered hawk, would continue to use the wetland habitat in the Arnott Fen community.

Maintenance activities could impact the golden-winged warbler could occur under alternative 1 if they occur during the breeding season, but the possible creation of additional habitat may also occur in the ROW. In general, special-status bird species would continue to use requisite habitats available along the existing B-K Line under alternative 1.

Bald Eagle: The alternative 1 alignment bisects an important communal winter eagle roost known as the Hogback Ridge winter roost (USFWS 2010b). No other communal winter roost site for bald eagles has been documented in the southern portion of DEWA. The majority of eagles using the roost fly back and forth through the existing transmission line corridor to forage downriver. Because bald eagles rely on established roost sites based on their proximity to sufficient food sources, the Bald Eagle Guidelines note that ongoing, existing uses may proceed; however, the guidelines recommend against placing transmission lines near communal roost sites (USFWS 2007a, 15). Because no new transmission lines would be placed near communal roost sites under alternative 1, this alternative would be consistent with the Bald Eagle Guidelines (USFWS 2007a, 10).

No studies have been conducted to determine impacts from the existing 230-kV transmission line, but its presence has not appeared to limit the development of both wintering and breeding populations of the bald eagle; the wintering population and winter roost developed with the presence of the transmission line. Because alternative 1 would not result in any changes to the existing transmission line, it is unlikely to adversely affect the bald eagle winter roosting site along the Delaware River. Additionally, no habitat used by bald eagles that is beyond the existing ROW would be removed or altered under alternative 1. Impacts from disturbance and activities associated with maintenance activities would occur primarily during daytime hours and individual eagles may temporarily avoid areas of activity; however, the winter roost would still be available as a nocturnal roost site and minimal additional habitat would be cleared; the bald eagle population could continue to roost and nest along the Delaware River in the study area under alternative 1.

Electrocutions with Existing Transmission Lines: Because the existing power line is 230 kV, it is unlikely that bird electrocution would occur regularly because the phase-to-phase and phase-to-ground separation is greater than 60 inches, the recommended separation for large raptors such as eagles (APLIC 2006, 60). Bird electrocution could occur in the ROW under alternative 1, but it has not been documented in the study area and is considered to be unlikely and infrequent.

Collisions with Existing Transmission Lines: The Delaware River is traversed by transmission lines under alternative 1; however, the lines have been in place for 80 years and although they may affect special-status raptors such as ospreys and bald eagles that forage along the river, no observations of collisions with the existing lines have been documented. The Bald Eagle Guidelines note that ongoing, existing uses may continue. Therefore, alternative 1 would be consistent with the Bald Eagle Guidelines (USFWS 2007a, 10). Other special-status bird species include passerine species such as the veery and three species of warblers, which would generally not be at risk for power line collisions because these birds migrate at altitudes higher than power lines. The potential for bird collisions with the existing transmission lines exists but collisions are considered to be unlikely due to the height and structure of the transmission line, which does not present a serious hazard to migrating raptors.

Overall, adverse impacts on the great blue heron, osprey, bald eagle, Cooper’s hawk, Northern goshawk, red-shouldered hawk, and barred owl would occur as a result of electrocution from and collision with the existing transmission line under alternative 1.

Special-status Reptiles and Amphibians: A total of seven special-status (one federally listed and six state-listed) reptiles and amphibians have been observed or have the potential to be present in suitable habitats in the existing ROW of alternative 1: bog turtle, timber rattlesnake, northern fence lizard, wood turtle, eastern box turtle, northern copperhead, and longtail salamander. Maintenance activities have the potential to disturb and temporarily displace northern fence lizards (in Pennsylvania) and all turtle and snake species that may use the existing scrub shrub habitat in the existing ROW, due to noise and increased human activity. Basking, foraging, birthing, and nesting activities could be disturbed during maintenance activities. Conservation measures would be required to reduce the impacts from maintenance to avoid the likelihood of take. Protection measures that include the use of handheld equipment instead of machinery and the implementation of seasonal restrictions during nesting and birthing seasons for turtle and snake species (typically between March and September) would be implemented. However, inadvertent crushing of nests, turtles, or snakes by workers could still occur but conservation measures would be implemented to reduce and/or avoid impacts. Impacts on all special-status reptile and amphibian species are expected to be adverse.

Special-status Mammals: A total of four special-status mammal species have been observed or have the potential to be present in the ROW habitats that have been mapped in the alternative 1 corridor: the bobcat, the small-footed bat, and the northern myotis (state-listed species) and the Indiana bat (a federally listed endangered species).

The ROW would continue to act as a corridor for movement and hunting for bobcats but regular maintenance of the transmission line and ROW vegetation has the potential to disturb and temporarily displace bobcats due to disturbance from noise and increased human activity. Daytime activities associated with the clearing of the ROW would be expected to have minimal impacts on the bobcat due to the crepuscular/nocturnal nature of the animal. Overall, regular maintenance of the ROW would cause disturbance to the bobcat occur along the entire length of the ROW.

Indiana bats are known to hibernate in nearby counties, and it is possible that individuals from these wintering sites are present in DEWA during the breeding season (April through September). In addition, summer foraging or roosting habitat for special-status bats occurs in the alternative 1 corridor. Annual maintenance of vegetation would occur during daylight hours, which would reduce the potential for impacts on bats. If trees that could provide habitat for summer roosts or maternity colonies are in need of removal, surveys would be conducted prior to removal to ensure that no bats are using the trees. As a result, adverse impacts on the Indiana bat, the small-footed bat, and the northern myotis are anticipated under alternative 1. Bat echolocation studies by researchers at East Stroudsburg University are currently underway to assess species presence, relative abundance, and locations. Results will be used to update information on bat species presence and relative abundance in this EIS. This impact analysis for bats could change based on the results of these surveys.

Overall, adverse impacts on all special-status mammals are expected under alternative

Impacts on Special-status Plants: total of 12 special-status (state-listed) plant species have been observed or could be present in the existing B-K Line ROW for alternative 1: A-sedge, downy willow-herb, small-headed rush, brook lobelia, Carolina grass-of-Parnassus, bog goldenrod, shrubby cinquefoil, Clinton’s wood fern, reed meadowgrass, marsh bedstraw, stiff club moss, and white heath aster.

Listed plant species that have been documented or could be present in suitable open canopy wetland habitat include A-sedge, downy willow-herb, small-headed rush, brook lobelia, Carolina grass-of-Parnassus, bog goldenrod, and shrubby cinquefoil (Mellon 2010a). As low-growing and herbaceous species, these special-status plant species should not require vegetation maintenance, which primarily targets incompatible plant species (generally tall-growing, nonherbaceous species) and danger trees. Disturbance to listed plant species may occur during vegetation management through the removal of incompatible species. Impacts on the above-listed special-status wetland plant species would be adverse.

Suitable habitat for Clinton’s wood fern is known from one location outside the existing ROW. Plant surveys for this species did not reveal Clinton’s wood fern in the existing transmission line corridor (Mellon 2010a). It is unlikely that this species would be affected by maintenance activities occurring under alternative 1 because the species was only identified in an area outside the ROW that would not undergo vegetation maintenance under alternative 1. Although numerous wetlands have been delineated in the parks, Clinton’s wood fern was not observed during the surveys conducted in 2010 (Mellon 2010a).

Reed meadowgrass was observed during surveys conducted in 2010 (Mellon 2010a, 2010b) and marsh bedstraw was observed during vegetation surveys conducted in 2011 (NPS 2011b) in an emergent wetland area bisected by the existing transmission line. As stated for other herbaceous special-status plant species, reed meadowgrass and marsh bedstraw should not require vegetation maintenance, but disturbance may occur during vegetation management for other, incompatible plant species. Impacts on reed meadowgrass and marsh bedstraw would be expected to be adverse under alternative 1.

Stiff club moss was observed during vegetation surveys conducted in 2011 (NPS 2011b) in scrub shrub and forested wetland habitat in the ROW. As a low-growing species, stiff club moss should not require vegetation maintenance, but disturbance may occur during vegetation management for other, incompatible plant species. Impacts on stiff club moss would be adverse under alternative 1.

The white heath aster has been documented along the Delaware River (NPS 1986, 106) but communications with DEWA park staff indicate that the white heath aster is located near but not in the study area (Mellon 2010a, 8). The species was not detected during the field surveys conducted along the alternative 1 alignment (Mellon 2010a; NPS 2011b) and it is unlikely that this plant species is present in the existing B-K Line ROW.

Cumulative Impacts

Cumulative impacts on special-status species inside the study area would be adverse, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the beneficial and adverse impacts on special-status species as a result of alternative 1 are combined with other past, present, and reasonably foreseeable projects in the study area, an adverse cumulative impact would be expected. Alternative 1 would not alter the level of impact.

Conclusion

The overall impacts on special-status aquatic species from transmission line activities under alternative 1 are presented in table 48.

TABLE 48: ALTERNATIVE 1 IMPACTS ON SPECIAL-STATUS AQUATIC SPECIES

Species	Impacts from Clearing and Construction	Impacts from Maintenance and Presence of Transmission Line
Freshwater mussels	No impact	Maintenance activities in the ROW with the implementation of BMPs are unlikely to affect surface waters in the ROW
Bridle shiner	No impact	Maintenance activities include the implementation of BMPs; the bridle shiner could avoid temporary disturbances to surface water

The overall impacts on special-status terrestrial invertebrate species from transmission line activities under alternative 1 are presented in table 49.

TABLE 49: ALTERNATIVE 1 IMPACTS ON SPECIAL-STATUS TERRESTRIAL INVERTEBRATE SPECIES

Species	Impacts from Clearing and Construction	Impacts from Maintenance and Presence of Transmission Line
Arogos skipper	No impact	Potential beneficial impact because vegetation maintenance activity would maintain and could expand suitable habitat (herbaceous) that supports this species
Mitchell's satyr	No impact	No impact on Mitchell's satyr because this species is extirpated from New Jersey, currently restricted to a few locations in Michigan and Indiana, and is unlikely to be present in the study area; potential beneficial impact because vegetation maintenance activity would maintain suitable habitat (fen)

The overall impacts on special-status bird species from transmission line activities under alternative 1 are presented in table 50.

TABLE 50: ALTERNATIVE 1 IMPACTS ON SPECIAL-STATUS BIRD SPECIES

Species	Impacts from Clearing and Construction	Impacts from Maintenance and Presence of Transmission Line
Great blue heron Osprey Bald eagle Cooper's hawk Northern goshawk Red-shouldered hawk Barred owl	No impact	Adverse impacts from maintenance activities, electrocution, collisions from existing line, and maintenance activities
Virginia rail Veery Black-throated green warbler Cerulean warbler	No impact	Adverse impacts from maintenance activities; no impacts from collision and electrocution
Golden-winged warbler	No impact	Adverse impacts from vegetation maintenance in ROW during breeding season, but overall beneficial impacts from the possible creation of additional habitat in the ROW; no impacts from collision and electrocution

The overall impacts on special-status reptiles and amphibians from transmission line activities under alternative 1 are presented in table 51.

TABLE 51: ALTERNATIVE 1 IMPACTS ON SPECIAL-STATUS REPTILE AND AMPHIBIAN SPECIES

Species	Impacts from Clearing and Construction	Impacts from Maintenance and Presence of Transmission Line
Bog turtle Wood turtle	No impact	Adverse impacts from maintenance activities and human activity, including introduction of invasive species
Eastern box turtle	No impact	Adverse impacts during maintenance activities from disruption of basking, foraging, and nesting as well as introduction of invasive species
Northern copperhead	No impact	Adverse impacts from maintenance and human activities from disturbance of denning, foraging, and breeding as well as introduction of invasive species
Timber rattlesnake	No impact	Adverse impacts on denning, foraging, and breeding habitat from maintenance activities as well as introduction of invasive species
Northern fence lizard	No impact	Adverse impacts during maintenance activities from disruption of basking, foraging, and nesting as well as introduction of invasive species
Longtail salamander	No impact	Adverse impacts during maintenance, including introduction of invasive species

The overall impacts on special-status mammal species from transmission line activities under alternative 1 are presented in table 52.

TABLE 52: ALTERNATIVE 1 IMPACTS ON SPECIAL-STATUS MAMMAL SPECIES

Species	Impacts from Clearing and Construction	Impacts from Maintenance and Presence of Transmission Line
Bobcat	No impact	Adverse impacts from maintenance and operation of existing line
Small-footed bat Northern myotis Indiana bat	No impact	Adverse impacts from tree removal in areas with potential bat foraging or roosting habitat

The overall impacts on special-status plant species from transmission line activities under alternative 1 are presented in table 53.

TABLE 53: ALTERNATIVE 1 IMPACTS ON SPECIAL-STATUS PLANT SPECIES

Species	Impacts from Clearing and Construction	Impacts from Maintenance and Presence of Transmission Line
A-sedge Downy willow-herb Small-headed rush Brook lobelia Carolina grass-of-Parnassus Bog goldenrod Shrubby cinquefoil	No impact	Some wetland areas may require vegetation management, resulting in adverse impacts on these species from disturbance as well as introduction of invasive species
Clinton's wood fern	No impact	No impact (not likely to be present in ROW)
Reed meadowgrass Marsh bedstraw Stiff club moss	No impact	Some wetland areas may require vegetation management, resulting in adverse impacts on these species from disturbance as well as introduction of invasive species
White heath aster	No impact	No impact (not likely to be present in ROW)

Common to All Action Alternatives

Removal of Existing Structures: All action alternatives (2, 2b, 3, 4, and 5) would involve the removal of all or a portion of the B-K Line, as described in chapter 2.

Vegetation Clearing: The ROWs would be cleared of vegetation for the construction of the new double 500-kV transmission line for alternatives 2 through 5, which would affect wetlands. Alternatives 2, 3, 4, and 5 include clearing up to 350 feet; the ROW would be extended up to 175 feet from either side of the centerline of the existing ROW. Under alternative 2b, the applicant proposes to operate the S-R Line within the existing ROW. The NPS anticipates that the applicant would require additional area for construction; therefore, it is estimated that under alternative 2b, the applicant would expand the ROW to the extent of their deeded property rights, which ranges from 100 feet to 380 feet. The property rights are currently being researched through deed research and ground surveys and will be updated as applicable in the final EIS. For alternative 2b, the ROW would be cleared on either side of the centerline to an appropriate width based on the deeded property rights. Clearing would be complete for all action alternatives, with the exception of the 50-foot buffer near intermittent streams/wetlands and the 100-foot buffer near perennial waterways such as the Delaware River (PPL and PSE&G 2008, 7).

Construction Components: Construction activities are described in detail in chapter 2; the activities that would affect listed species if these areas cannot be avoided include site preparation; construction of access roads, tower foundations, crane pads, wire pull locations, and pulling and splicing sites; and the use of heavy equipment and staging areas. These activities could disturb special-status species directly as well as affecting existing and potential habitat that supports special-status species.

Illegal Collection: Illegal collection of special-status plants and animals currently poses a threat to these species. Construction and maintenance of access roads could provide access to areas that contain these species, allowing for a greater threat of collection.

Alternative 2

Special-status Aquatic Species: A total of four special-status (state-listed) aquatic species are known to be present or have the potential to be found in the proposed ROW under alternative 2: three freshwater mussels (yellow lampmussel, creeper, and alewife floater) and one fish species, bridle shiner (NJENSP 2010a, 2; PFBC 2010a, 1; Horwitz et al. 2008, 75). These aquatic species could be affected by vegetation removal and construction activities. The removal of vegetation near surface waters could alter habitat conditions by reducing land-based food sources, increasing water temperatures, changing light attenuation, and exposing streambanks and shorelines to erosion. Excavation and grading activities could increase runoff in the watershed, resulting in increased inputs of sediment to surface waters inhabited by special-status aquatic species. Impacts on the bridle shiner and special-status mussels from increased sedimentation, including turbidity and suspended solids in the water column, could alter and thereby reduce bottom habitat, smother mussels as well as the eggs and larvae of bridle shiner, and interrupt or impair the feeding, respiration, or reproductive activities of bridle shiner and mussels. The use of construction equipment could result in the introduction of contaminants such as fuel or oil to surface waters due to leaks or spills, which could result in acute or chronic effects on special-status species including decreased growth, disturbed reproductive cycles, or mortality. The construction of access roads and spur roads that could necessitate stream crossing structures could result in adverse impacts on mussels located directly in the construction area as a result of direct mortality from crushing by vehicles and equipment. Freshwater mussels, including downstream populations, could also be affected because stream crossing structures could block access to host-fish species, restrict the transport of food particles, and alter geomorphic and hydraulic processes that provide suitable habitat conditions. Stream crossing structures could be installed in the tributary streams in the alternative 2 alignment, including Big Bushkill Creek, Sand Hill Creek, and Van Campen Brook. Preconstruction surveys would be necessary to determine whether any special-status mussel species exist in these tributaries and any mussels found could be relocated out of the construction zone prior to construction activity. The construction of the transmission line across the Delaware River (MDSR) would not include stream crossing structures.

Following construction, activities would include maintenance of vegetation at least annually according to the applicant’s NPS-approved vegetation management plans. Impacts to special-status aquatic species would be the same as described for alternative 1, increased sedimentation and turbidity. Under alternative 2, control of invasive plant species near surface waters would include the use of NPS-approved herbicides safe for application in aquatic environments. To minimize impacts from construction activities, forested buffers around streams and other water bodies would generally be left intact, sediment control devices would installed, and disturbed areas would be revegetated following construction activities.

Special-status Terrestrial Invertebrate Species: Two butterfly species, the Arogos skipper and the Mitchell’s satyr, could be present along alternative 2. Clearing and construction activities along the alternative 2 alignment would result in the physical removal of vegetation that could include plant communities that could support the Arogos skipper. Vegetation clearing would be nearly complete in the resulting 350-foot corridor as well as for the access roads and spur roads, tower foundations, crane pads, and pulling and splicing sites that would be constructed. Avoidance of sensitive areas, as described in the "Vegetation Clearing" section of chapter 2, would occur to the extent practicable. During the period of analysis for this EIS, the vegetation maintenance of the ROW would occur at least annually to maintain low vegetation growth, which may result in the creation of additional habitat suitable for colonization by the Arogos skipper. If these areas become colonized by the Arogos skipper and conservation measures are implemented, a beneficial impact could occur.

The Arnott Fen wetland complex contains suitable habitat for the Mitchell's satyr. Although no new towers would be placed in the Arnott Fen wetland complex, new towers would be constructed on either side of the fen, which would require extensive excavation and blasting activities adjacent to the fen. Blasting and excavation could potentially alter the hydrology of Arnott Fen, which could indirectly affect the plant species that grow there. Additionally, access roads would be built through wetlands that are part of the Arnott Fen wetland complex, which would degrade wetland functions and values and potentially allow invasive plant species to colonize the fen. The greatest threat to the Mitchell's satyr is habitat destruction, including invasion by nonnative, invasive plants that threaten the fens on which the butterfly depends (USFWS 2010d, 1). However, because this butterfly is extirpated from its historical range in New Jersey and is only found in 13 locations in Michigan and 2 locations in Indiana (USFWS 2010d, 1), it is unlikely to be present in the study area.

Special-Status Birds: A total of 13 special-status (state-listed) bird species have been observed or have the potential to be affected under alternative 2: great blue heron, osprey, northern harrier, bald eagle, Cooper's hawk, northern goshawk, red shouldered hawk, Virginia rail, barred owl, veery, black-throated green warbler, cerulean warbler, and golden-winged warbler.

Neotropical migrant species and special-status raptor species that use forested habitat could be adversely affected by the loss of trees as a result of linear clearing beyond the width of the existing ROW, including the loss of potential nesting habitat. Migrant and potential summer resident species such as veery, cerulean warbler, and black-throated green warbler could be adversely affected by the clearing of forested habitat. Nests may be lost due to clearing, abandoned by adults because of disturbance, or found by scavengers or predators when exposed as a result of clearing; however, this would be minimized though the seasonal restriction on tree cutting.

Six raptor species (osprey, northern harrier, Cooper's hawk, northern goshawk, red shouldered hawk, and barred owl) could be present as migrant, resident, or seasonally present species in habitats being cleared under alternative 2. As forest-dwelling and potentially forest-nesting species, Cooper's hawk, northern goshawk, red shouldered hawk, and barred owl could all nest in forested tracts along the length of the ROW. The amount of forest edge habitat would effectively remain the same and opportunistic predators and passerine brood parasites (brown-headed cowbirds) could be expected to continue to affect nesting success for nesting species present along edge habitat. The northern harrier is a ground-nesting species that uses densely vegetated fields or marsh habitat, although it is primarily a migrant through the study area. A 1,000-foot buffer surrounding identified nest areas would be established prior to construction activities to minimize adverse impacts. The corridor, as proposed under alternative 2, would provide a slightly larger foraging area for all migrant, resident, or seasonally present special-status raptor species.

If the corridor, as proposed under alternative 2, was maintained as scrub shrub habitat and not grassland habitat, it could expand the amount of successional habitat for golden-winged warbler, resulting in a beneficial impact. Although ROW clearing would not occur during the nesting season, adverse impacts on the golden-winged warbler would occur from disturbance as described in alternative 1. These impacts would be offset by the creation of additional scrub shrub habitat available to this species in the new ROW, although this habitat may not be immediately available.

Forested and emergent wetland areas as well as riparian areas adjacent to the Delaware River are present in the ROW and would be avoided to the extent practicable under alternative 2. Forested wetlands, emergent wetlands, and riparian areas can be used by state-listed bird species. Both the Virginia rail and the great blue heron are known to nest in wetlands and areas adjacent to wetlands along the alternative 2 alignment. An access road is proposed in the wetland where these species are present, and a tower is also proposed in a wetland area that supports herbaceous vegetation. If vegetation in these areas, especially tall trees that offer the potential for use by great blue herons, is removed, the great blue heron would be adversely affected. Potential nesting and foraging habitat for Virginia rail could be affected when herbaceous wetland vegetation is permanently lost from the construction of one tower foundation and associated crane pad.

In addition to the loss of habitat, during site preparation and the construction of the transmission line under alternative 2, all special-status bird species may be affected by noise and construction activities, which would result in temporary disturbance or displacement from habitats. Construction-related activity in the area could affect bird behavior, including foraging and breeding, in the ROW and adjacent habitats. Helicopters would potentially be used during construction activities to string the transmission line, as described in chapter 2. Due to the linear nature of the project, helicopter activities in most cases would move frequently and would occur in a limited section of the ROW, so noise would not continue for lengthy periods at any one tower location. Individual birds may temporarily avoid areas during helicopter use but the majority of the special-status bird species could be expected to return to their usual habitats when helicopter activity has ceased. In addition, in the context of the regional abundance of habitat outside the study area that may be used by special-status bird species, the short duration of helicopter use at any one location would attenuate adverse effects. Any temporary noise impacts on special-status bird species that may occur from helicopter-aided construction would not be expected to reduce the populations below self-sustaining levels in or adjacent to the project area. In addition to noise from construction activities, the presence of project personnel could result in the disruption of breeding or nesting behavior such as incubating eggs or tending to nestlings. If birds attempt to relocate nesting territories during construction activities, they would expend time and energy in locating and defending new nesting territories that would otherwise be used for reproduction; this could result in lower productivity and nesting success until individuals establish new territories, which may not occur until the following nesting season. A seasonal restriction on tree clearing from March 15 through July 31 would prevent unauthorized take of nests and unfledged young protected under the Migratory Bird Treaty Act (USFWS 2010b); however, the seasonal restriction does not incorporate the nesting dates for bald eagles, which are discussed under “Bald Eagle” in this section. Because the seasonal restriction on tree clearing would be observed, the permanent and seasonally present nesting special-status species should not be forced to abandon nests or young. Any noise or disturbance impacts on special-status bird species that may occur from construction would not be expected to reduce the populations below self-sustaining levels in or adjacent to the project area.

Maintenance activities have the potential to disturb and temporarily displace special-status bird species using habitat in or near the ROW for nesting and/or foraging. The annual maintenance of the ROW would cause disturbance to occur throughout the period of analysis; however, it is expected that maintenance would not occur simultaneously along the entire length of the ROW.

Bald Eagle: The bald eagle is known to nest, roost, and forage along the Delaware River where the alternative 2 alignment crosses the river. The USFWS has stated in a 2010 letter that several active bald eagle nests are located along the eastern end of alternative 2 (USFWS 2010b), but there is also the potential for inactive or alternate nests (not used for breeding by eagles in a given breeding season) to be used (USFWS 2007a, 17). Additionally, a communal wintering eagle roost is located along the alternative 2 corridor (USFWS 2010b, 5) and the alignment also crosses bald eagle foraging habitat (USFWS 2010b). The implementation of alternative 2 would not be consistent with the Bald Eagle Guidelines.

Direct impacts on nesting bald eagles would primarily occur as a result of clearing and construction activities required to implement alternative 2. During the breeding season, bald eagles may be sensitive to human activities; however, not all eagles react in the same manner to disturbance. Some eagles may continue nesting activity while others may abandon nesting. Bald eagles may also react to disturbance differently at different stages of the breeding season (USFWS 2007a, 7). The most sensitive period is considered the time when bald eagles are courting and nest building. Clearing and construction during this period (generally the beginning of December to the end of February) could result in nest abandonment. During egg laying and incubation (generally the end of January to the end of April), the prolonged absence of adults can jeopardize eggs or young. From four to eight weeks after hatching, nest abandonment is less likely, but nestlings may miss feedings, potentially affecting their survival (end of March to end of June). From mid-May to the end of August, young eagles begin to gain flight capability and disturbance from clearing and construction in the vicinity of the nest may cause the young to flush from the nest prematurely, causing injury and death (USFWS 2007a, 8).

If nesting activity is observed before or during construction, additional protections of the nest site would occur as required in the Bald Eagle Guidelines (USFWS 2007a, 12). Specifically, to avoid disturbing nesting bald eagles, the guidelines recommend (1) keeping a distance between the activity and the nest (distance buffers), (2) maintaining preferably forested (or natural) areas between the activity and around nest trees (landscape buffers), and (3) avoiding certain activities during the breeding season. These guidelines would minimize potential impacts on nesting bald eagles. The distance and landscape buffers serve to minimize visual and auditory impacts and would be large enough to protect existing nest trees and provide replacement nest trees. The size and shape of the buffers vary depending on topography and other site characteristics, as well as on the historical tolerance by eagles of human activities in the area. The height of the nest above ground may also reduce the impacts from human activities; eagles with nests at higher elevations may be less prone to disturbance. Specific guidance for disturbance and landscape buffers should be determined through contact with the USFWS and would minimize potential impacts on nesting bald eagles (USFWS 2007a, 10). Nesting of bald eagles in the New Jersey and Pennsylvania area can generally be said to occur between December 1 and August 31; however, nesting chronology in the area would be verified through contact with the regional USFWS office and through NPS biologists (USFWS 2007a, 17).

Bald eagles have used the communal wintering roost site historically, as documented in records, and this roost site may be an important attribute contributing to the suitability of DEWA as a wintering area for bald eagles. Bald eagles rely on established roost sites because of their proximity to sufficient food sources. The Bald Eagle Guidelines recommend against placing transmission lines near communal roost sites (USFWS 2007a, 15); therefore, the implementation of alternative 2 would not be consistent with the Bald Eagle Guidelines and would result in the presence of taller towers and lines that could increase the potential for collision or electrocution of eagles moving to and from the existing roost site. Roosting eagles may also be affected by the removal of trees and disturbance from construction activities, including noise and human presence. Human activity near bald eagles can force eagles to abandon the immediate area, preventing local foraging and causing unnecessary expenditure of energy to forage elsewhere. Repeated intrusions into their wintering habitat can result in physiologic stress at a time when cold weather and reduced foraging opportunities can weaken individuals, making them susceptible to disease, and can lower the reproductive success of adults (USFWS 2007a, 8–9). Measures to protect roosting eagles would be adapted as needed. Consultation with USFWS would ensure that adverse impacts on roosting bald eagles would be avoided whenever possible. However, even though mitigation measures would be implemented responsibly, adverse impacts on the bald eagle are possible during construction activities that occur in the wintering eagle roost area and in foraging areas. Impacts would occur because individuals may temporarily avoid areas and the potential for negative impacts on feeding, reproduction, and resting would exist and could affect local population levels. Although the new double 500-kV transmission line would be constructed using APLIC standards and the best available deterrence technology to reduce the potential for impacts, alternative 2 is likely to adversely affect the daily foraging movements and winter roosting of bald eagles along the Delaware River.

Electrocution: As stated in alternative 1, eagles, hawks, barred owls, ospreys, and great blue herons have been electrocuted by transmission lines (APLIC 2006, 10, 31). Because the power lines proposed under alternative 2 are two 500-kV lines, it is unlikely that bird electrocution would occur. Bird electrocution typically occurs on power lines with voltages less than 60 kV, as described under "Common to All Alternatives" (APLIC 2006, ix). In order to minimize the potential for bird electrocution as a result of alternative 2, the applicant would meet or exceed the 2006 APLIC recommendations for reducing bird risks by employing the recommended horizontal and vertical separation as described in the Avian Protection Plan (ERM 2010) and using the current best available technology for minimizing the potential for electrocution. Therefore, the likelihood of electrocutions occurring at the proposed voltage, which is over 60 kV, would be considered low (APLIC 2006, 60). The proposed S-R Line would be constructed with the minimum clearances between phase conductors or between phase conductors and grounded hardware, which are sufficient to protect even the largest special-status bird species in the vicinity, including bald eagles, as recommended by APLIC (2006).

Power Line Collisions: Alternative 2 is not consistent with the Bald Eagle Guidelines, which state that communication towers and high-voltage transmission power lines should be sited away from bald eagle nests, foraging areas, and communal roost sites (USFWS 2007a, 15). Although the transmission lines would span the Delaware River under alternative 2 in the same area as the existing ROW, the new lines could affect special-status raptors (ospreys and bald eagles) that forage along the river due to the higher and more numerous transmission lines proposed under this alternative. Heavy-bodied, less agile birds or birds in flocks may lack the ability to quickly negotiate obstacles, making them more vulnerable to power-line collisions (APLIC 2011b). Additionally, the location of transmission lines close to bald eagle nesting areas would increase the likelihood of collisions for younger individuals that are less experienced fliers. Collisions most often occur with the overhead static wire, which may be less visible than energized conductors due to its smaller diameter (APLIC 2011b). To reduce bird collisions, a variety of mitigation techniques are proposed to make the proposed double 500-kV transmission line more visible to birds. In order to minimize the potential for bird collisions as a result of alternative 2, the applicant would develop an approved bird protection plan and through that document, meet or exceed the 2006 APLIC recommendations for reducing bird risks by employing various mitigation measures that are described in the bird protection plan. Kittatinny Ridge, as described in chapter 3, is a major north–south fall migration corridor for raptors and because of its north–south orientation provides ideal conditions for migrating hawks. Under alternative 2 larger, taller transmission lines crossing Kittatinny Ridge nearly perpendicularly in the study area could create a bird collision hazard. Electrocution and collision with the new, higher line would be possible, for the bald eagle, northern harrier, osprey, great blue heron, barred owl, Cooper's hawk, northern goshawk, and red shouldered hawk.

Special-status Reptiles and Amphibians: The special-status reptile and amphibian species that may be affected by alternative 2 include bog turtle, timber rattlesnake, northern fence lizard, wood turtle, eastern box turtle, northern copperhead, and longtail salamander. In general, removing vegetation along the corridor, the construction of access roads and spur roads, and the construction of the transmission line could adversely affect the listed reptiles and amphibians. The removal of vegetation, specifically clearing of forested areas that would increase sun exposure and reduce forest canopy, would destroy or reduce preferred habitat of special-status reptile and amphibian species; habitat fragmentation would also result from vegetation clearing and access road construction. Reptiles and amphibians are typically active from March through November and most breeding occurs in early spring or summer, but they are generally not very mobile species and individuals (or eggs) may be crushed or killed as a result of their inability to avoid contact with construction vehicles, equipment, and materials during vegetation clearing and construction activities. During the heat of the day many reptiles and amphibians seek shelter under logs, rocks, or piles of leaves; therefore, the presence of individuals on site could be overlooked by equipment operators. Reptiles and amphibians are also small and typically camouflage themselves or blend in with the surrounding substrate. Specific impacts analyses by species are included in the discussions below.

Wood turtles and eastern box turtles are listed species in New Jersey and use forested, scrub shrub, and wetland habitats during different behaviors or stages of their life. Both species were observed in the alternative 2 corridor during the 2008–2011 surveys and have been documented foraging and nesting in or near the existing ROW. Wood turtles have varied home ranges across their geographic range, from less than 7 acres (3 hectares) to more than 69 acres (28 hectares), with smaller ranges being noted in Pennsylvania than in the northern limits of the species range in Canada (CRACM 2004, 5). Wood turtles mate underwater; once impregnated, the female travels away from the wetland area and excavates a nest in an upland site with scant vegetation and abundant sunlight. Nesting activities typically occur in May or June and hatchlings typically emerge in September. Wood turtles also use forested and scrub shrub habitat for foraging and basking and return to streams or other aquatic habitats to hibernate from November through March (CRACM 2004, 1). The New Jersey Landscape Project identified numerous areas of potential habitat for wood turtles along the proposed ROW and NJENSP (2010a) also identified the wood turtle as present in the proposed ROW. Eastern box turtles spend most of their lives in upland areas foraging, feeding, and nesting, but can sometimes be found in wetland areas. Nesting usually occurs in June or July, with hatchlings emerging in September. During the winter months eastern box turtles hibernate a few inches below the soil in forested areas (NHESP 2007, 1). The use of heavy machinery and other construction equipment and/or soil excavation activities may destroy turtle nests and crush or kill hibernating eastern box turtles; however, this would be kept to a minimum through the implementation of preconstruction surveys. Other protection measures would be implemented, including the use of handheld equipment instead of machinery and the implementation of seasonal restrictions during nesting and birthing seasons for turtles (typically between March and September); however, inadvertent crushing of nests or turtles by workers could still occur. Specifically for wood turtles, the use of barrier fencing along streams could also be implemented during construction to keep the turtles from entering construction sites. These mitigation measures would further reduce the risk of mortality during the winter months when wood turtles are in hibernation along streambanks away from construction areas.

The New Jersey Department of Environmental Protection (NJDEP) identified the timber rattlesnake and northern copperhead as present along the proposed ROW inside the study area; both species were observed during 2008–2011 surveys. Timber rattlesnakes can be found in the forested, scrub shrub, or rocky outcrops habitat along the alternative 2 alignment. Northern copperheads occupy a variety of habitats during the warm months, including emergent wetlands, areas along streams, and upland areas where foraging and basking occurs. For both snake species, a potential for direct mortality exists if individuals are struck by construction vehicles and equipment during construction in the ROW, although preconstruction surveys, construction monitoring, seasonal restrictions, exclusion fencing, and postconstruction habitat restoration and monitoring would reduce this risk. Blasting activities required for the installation of tower foundations could adversely affect den sites in the rocky outcrops. For tower locations inside the potential area of impact from blasting, alternative techniques, including drilling, would be evaluated to minimize the potential for impacts on dens. The applicant would be required to develop a buffer zone, an area beyond which blasting activities would not impact the geology and the dens. Preconstruction surveys and seasonal restrictions (no blasting between September and April, when timber rattlesnakes occupy dens) would also be implemented. Following construction, the dens would be monitored to determine whether dens were affected by construction activities. If impacts are documented during monitoring, additional mitigation could be required, including relocation of rattlesnakes, in consultation with the NPS. There is one known timber rattlesnake den location in the alternative 2 ROW inside the study area (Boder et al. 2005). The den is located close to the construction zone for a proposed tower and it is likely that snakes would be disturbed by the vibrations and noise associated with the blasting activities. If empty dens are destroyed by blasting activities it could result in eventual mortality for timber rattlesnakes or northern copperheads, because these species return to the same dens year after year and may be unable to find suitable overwintering areas if their original dens have been destroyed.

Northern fence lizards prefer open wooded areas, sunny grassy areas, and rock outcroppings for foraging and basking. Northern fence lizards are typically active May through September and this species was observed during the 2010-2011 vegetation surveys (NPS 2011b). During late spring, females lay eggs in loose soil. Impacts on northern fence lizards would result from the direct mortality of individuals from construction equipment. The removal of forested areas would destroy the preferred habitat of the northern fence lizard. In addition, the excavation of soil has the potential to destroy lizard nests.

Longtail salamanders and bog turtles spend the majority of their time in wetland habitats and have been observed in calcareous wetlands along the alternative 2 ROW inside the study area. Bog turtles inhabit a variety of wetland types throughout their range, but are usually found in small, open canopy, herbaceous sedge meadows and fens bordered by wooded areas. These wetlands are a mosaic of microhabitats that include dry pockets, saturated areas, and areas that are periodically flooded. Bog turtles depend on this diversity of microhabitats for foraging, nesting, basking, hibernation, and shelter (USFWS 2001, 12). Bog turtles typically spend most of their time in the wetland areas, using the upland areas only as travel corridors. Longtail salamanders and other amphibians sometimes travel to upland areas and find cover under moist logs or leaf piles. Blasting activities that would be required in limestone along the ROW could lead to fracturing that could alter groundwater systems, reducing the water supply to wetland areas over limestone geologic features along the ROW. The effects of blasting from the implementation of alternative 2 are not known; a blasting plan would be created and implemented prior to construction. In addition, postconstruction monitoring surveys would be required. Alterations of hydrology that in turn could adversely affect wetland habitat would contribute to adverse impacts on longtail salamanders and bog turtles associated with calcareous wetlands; impacts would also occur if bog turtles or longtail salamanders travel in the upland community, where there is a risk of direct mortality from contact with construction vehicles and equipment.

Additional habitat fragmentation resulting from the widening of the existing ROW inside the study area (as described in detail in previous sections of chapter 4) would occur from the removal of the forested habitat; however, vegetation would become reestablished and would be managed as permanent scrub shrub habitat in the ROW. Habitat along the edge of the ROW not required for the maintenance of the ROW would be allowed to revegetate and succeed to mature forest over time, but this would not occur within the period of analysis. Seasonal restrictions and other mitigation measures could be implemented to protect reptiles and amphibians from impacts during hand clearing of vegetation such as inadvertent crushing of nests, reptiles, or amphibians by workers.

The potential for direct mortality of bog turtles, which would be a take under the Endangered Species Act, would constitute an adverse impact on the bog turtle. Therefore, alternative 2 may be likely to adversely affect the bog turtle. Projects in and adjacent to bog turtle habitat can cause habitat destruction, degradation, and fragmentation. For example, soil compaction in wetland areas can affect hydrology and wetland function, and can degrade bog turtle habitat. Therefore, bog turtle conservation zones have been designated with the intent of protecting and recovering known bog turtle populations within the northern range of this species as described in the recovery plan for this species (USFWS 2001, appendix A) and previously described in chapter 3. Future coordination with appropriate Federal and State agencies would clarify the extent to which adverse effects to listed species would be likely to occur and would determine whether a BA would be required. The FEIS and the BA for this project will include more details concerning impacts to the bog turtle as appropriate.

Special-status Mammals: Four special-status mammal species, the bobcat and three bats (Indiana bat, small-footed bat, and northern myotis), have the potential to be present in the corridor of alternative 2. The Pennsylvania Game Commission has stated that alternative 2 is located outside the buffers (habitat that could support the bat) of the northern myotis (PGC 2010c).

If bobcat dens are near new areas being cleared, bobcats may temporarily or permanently leave their territories to avoid construction activity. This could lead to perceptible or measurable changes in behavior, den use, or the location or size of a territory. Adverse impacts on bobcats that may occupy territory (dens) in the area would occur due to habitat disturbance during site preparation and construction activities. The regular maintenance of the ROW could cause periodic disturbance throughout the period of analysis. Bobcats would avoid the areas of activity and disturbance during maintenance but would continue to use the existing ROW as a corridor for movement and hunting and could be expected to maintain territories that may overlap with the ROW and the habitats along the transmission line.

No bat hibernacula were found that could be used by small-footed or Indiana bats (Sanders 2009). Indiana bats are known to hibernate in nearby counties, and it is possible that individuals from these wintering sites are present in DEWA during the breeding season (April through September). Summer habitat for special-status bat species is available along the corridor of alternative 2, and surveys conducted in the alignment of alternative 2 documented northern myotis but failed to detect the Indiana bat (Sanders 2009, 6). An observation of small-footed bats during field studies along the alternative 2 corridor provides the possibility that small-footed bats could be foraging in the area or using rock crevices as habitat in the area. As nocturnal foragers, bats feed mainly in the forest canopy, grabbing flying insects, and may concentrate in the open space of ROWs, trails, or over streams that provide travel and foraging corridors. Transmission line construction at several river and stream crossings under alternative 2 would be expected to have few impacts on bat foraging habitat. Summer habitat and foraging habitat for all three species of bats is present in the study area and could be affected by the removal of trees, which may contain roost sites or maternity colonies, during clearing and construction activities. The foraging activities of special-status bats would not be affected unless construction activities occurred at night. If construction occurred at night, noise and activity could deter foraging; however, the use of lights could attract bats to the arc of lighting in order to feed on insects attracted to the light. As stated under alternative 1, bat echolocation studies by researchers at East Stroudsburg University are currently underway. These studies are using the AnaBat SD II bat detector to assess populations, locations, and species distribution. Results will be used to update information on bat species presence and relative abundance in this EIS. Therefore, the impact analysis for bats could change based on the results of these surveys.

Due to potential impacts on summer habitat for special-status bat species, the applicant has specified that conservation measures would be implemented to ensure that the project would not be likely to adversely affect the Indiana bat (or the small-footed bat or the northern myotis). For example, seasonal restrictions would be followed in the applicant’s construction and restoration standards for the S-R Line project to reduce and avoid any unforeseen disturbance or injury to roosting Indiana bats from the construction of the project. Seasonal restrictions for the cutting of potential roost trees (trees with a DBH greater than 8.7 inches [22 centimeters]) would prohibit cutting between April 1 and September 30, when Indiana bats could be present. Both the small-footed bat and the northern myotis would also likely benefit from the seasonal restrictions for the protection of the Indiana bat. Mitigation that has been specified for impacts on forested habitat could also offset any unforeseen impacts on the Indiana bat resulting from the proposed project under alternative 2. Projects include the Hopatcong Forest Restoration Project and mitigation proposed along the Passaic River (USFWS 2010b). Mitigation is expected to benefit the Indiana bat as well as the small-footed bat and the northern myotis. Impacts associated with the loss of forest would be offset by the Hopatcong Forest Restoration Project as well as mitigation proposed along the Passaic River (USFWS 2010b).

Special-status Plants: A total of 12 special-status (state-listed) plant species have been observed or have the potential to be present in the habitats that have been mapped in the alternative 2 ROW and are described by habitat or presence in this section: A-sedge, downy willow-herb, small-headed rush, brook lobelia, Carolina grass-of-Parnassus, bog goldenrod, shrubby cinquefoil, Clinton’s wood fern, reed meadowgrass, marsh bedstraw, stiff club moss, and white heath aster.

Suitable habitat and special-status plant species (including A-sedge, downy willow-herb, small-headed rush, brook lobelia, Carolina grass-of-Parnassus, bog goldenrod, and shrubby cinquefoil) have been identified in open canopy wetland areas within the corridor of alternative 2 but has not been found at other locations in the alternative 2 study area during surveys (Mellon 2010a). The wetland habitats in the ROW have the potential to support a number of listed special-status plant species. Indirect adverse impacts on these special-status plants could occur from clearing and construction. These activities could facilitate the spread of invasive species through forest clearing and access road construction, and blasting could adversely affect wetland functionality through erosion and alteration of hydrology.

Plant surveys did not document the presence of Clinton’s wood fern in the study area under alternative 2 (Mellon 2010a); however, suitable habitat for Clinton’s wood fern is present in wetland areas that would be bisected by the alternative 2 alignment. Clinton’s wood fern has been found in the past in wetland areas surrounded by eastern hemlock in the study area (NPS 2009g, 2, 4) and could also be found outside wetland areas. It is possible that this species could be affected by the implementation of alternative 2 because some suitable habitat containing mature mixed forests may potentially be cleared. Mixed forest areas could contain the habitat requirements for Clinton’s wood fern. The development of access roads and the installation of towers would not affect the wetland area where suitable habitat is found, and vegetation maintenance would occur throughout the period of analysis; however, Clinton’s wood fern is low growing and therefore would be compatible with the applicant’s vegetation management plans. The loss of mature tree species that provide a canopy for this understory fern would particularly affect habitat for this species and would facilitate the spread of invasive species. However, following the initial clearing activities, it is possible that Clinton’s wood fern could be established in the corridor if suitable forested areas remain intact.

Reed meadowgrass was observed during surveys conducted in 2010 (Mellon 2010a, 2010b) and marsh bedstraw was observed during vegetation surveys conducted in 2011 (NPS 2011b) near wetland areas in the ROW. Reed meadowgrass was found in the ROW in a seepage area with other herbaceous wetland plants (Mellon 2010b). It is likely that both of these species would be directly affected under alternative 2 because the emergent wetland habitat, including the seepage area that supports reed meadowgrass and marsh bedstraw, is in an area that may be cleared to allow the construction of a tower. Indirect impacts on both plants could occur through vegetation maintenance, adjacent forest clearing, and access road construction, which may increase erosion in these areas and affect the functionality of the wetlands that support both species.

Stiff club moss was observed in scrub shrub and forested wetland habitat in the ROW during vegetation surveys conducted in 2011 (NPS 2011b). During construction and the widening of the ROW, vegetation removal (including incompatible species and trees) and ground disturbance could affect existing stems of stiff club moss and the surrounding habitat. Stiff club moss would also be disturbed by the construction of an access road that would be constructed through the species' habitat. Regular maintenance of the ROW is required to maintain low vegetation growth, including the removal of incompatible plant species.

White heath aster, although reported to be rare, has been found to be locally common in dry spots along the Delaware River, particularly in limestone ledge areas (NPS 1986, 106). This species has also been observed on limestone rocks in the forest adjacent to wetland areas (Mellon 2010a, 13). Communications with DEWA indicate that white heath aster grows near, but not in, the study area (Mellon 2010a, 8) and the species was not found during the field surveys conducted along the alternative 2 corridor (Mellon 2010a; NPS 2011b).

For all listed plant species, mitigation as described in appendix F would be employed to minimize and avoid impacts. Such mitigation includes monitoring areas to be avoided during construction, as identified during preconstruction surveys, and minimizing fugitive dust and runoff from construction sites (reducing sedimentation), which would reduce the potential adverse impacts on special-status plant species. Although mitigation techniques would be employed, adverse impacts on listed plants would still occur.

Cumulative Impacts

Cumulative impacts on special-status species inside the study area would be adverse, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the beneficial and adverse impacts on special-status species as a result of alternative 2 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected. Alternative 2 would not alter the level of impact.

Conclusion

The overall impacts on special-status aquatic species from transmission line activities under alternative 2 are presented in table 54.

TABLE 54: ALTERNATIVE 2 IMPACTS ON SPECIAL-STATUS AQUATIC SPECIES

Species	Impacts from Clearing and Construction	Impacts from Maintenance and Presence of Transmission Line
Freshwater mussels	Adverse impacts from temporary habitat changes due to construction and clearing; Adverse impacts from access roads due to possible direct mortality or loss of habitat	Adverse impacts from maintenance
Bridle shiner	Adverse impacts from construction and clearing	Adverse impacts from maintenance; bridle shiner could avoid temporary disturbances to surface water conditions

The overall impacts on special-status terrestrial invertebrate species from transmission line activities under alternative 2 are presented in table 55.

TABLE 55: ALTERNATIVE 2 IMPACTS ON SPECIAL-STATUS TERRESTRIAL INVERTEBRATE SPECIES

Species	Impacts from Clearing and Construction	Impacts from Maintenance and Presence of Transmission Line
Arogos skipper	Beneficial impact	Maintenance activity in the ROW may create suitable habitat for the Arogos skipper, allowing this species to colonize the ROW, resulting in beneficial impacts
Mitchell's satyr	No impact	No impact on the Mitchell's satyr because this species is only found in a few locations in Michigan and Indiana and is unlikely to be present in the study area

The overall impacts on special-status bird species from transmission line activities under alternative 2 are presented in table 56.

TABLE 56: ALTERNATIVE 2 IMPACTS ON SPECIAL-STATUS BIRD SPECIES

Species	Impacts from Clearing and Construction	Impacts from Maintenance and Presence of Transmission Line
Great blue heron	Adverse impacts from habitat loss and construction and from destruction of nesting habitat in wetland	Adverse impacts from maintenance activities, electrocution, and collision potential
Osprey Northern harrier Cooper's hawk Northern goshawk Red-shouldered hawk Barred owl	Adverse impacts from habitat loss and construction	Adverse impacts from maintenance activities, electrocution, and collision potential
Bald eagle	Adverse impacts from habitat loss and construction	Adverse impacts from maintenance activities, electrocution, and collision potential; younger birds would have a higher chance of collision if nest were close to transmission line; this alternative would not be consistent with the Bald Eagle Guidelines
Virginia rail	Adverse impacts from the potential destruction of nesting habitat in wetland	Adverse impacts from maintenance activities; no impacts from electrocution or collisions
Veery Black-throated green warbler Cerulean warbler	Adverse impacts from habitat loss and construction	Adverse impacts from maintenance activities; no impacts from electrocution or collisions
Golden-winged warbler	Adverse impacts from construction activities and creation of new habitat	Beneficial impacts of additional habitat; no impacts from electrocution or collisions

The overall impacts on special-status reptile and amphibian species from transmission line activities under alternative 2 are presented in table 57.

TABLE 57: ALTERNATIVE 2 IMPACTS ON SPECIAL-STATUS REPTILE AND AMPHIBIAN SPECIES

Species	Impacts from Clearing and Construction	Impacts from Maintenance and Presence of Transmission Line
Bog turtle	Adverse impacts from habitat loss/fragmentation; adverse impacts during construction activities; potential adverse impacts from direct mortality	Adverse impacts from maintenance and from construction and use of access roads
Wood turtle Eastern box turtle	Adverse impacts from direct mortality and nest destruction; adverse impacts from construction activities and habitat loss	Adverse impacts from maintenance and from construction and use of access roads
Northern copperhead Timber rattlesnake	Adverse impacts from direct mortality and destruction of overwintering areas; adverse impacts on habitat used for foraging and basking	Adverse impacts from maintenance and from construction and use of access roads
Northern fence lizard	Adverse impacts from direct mortality and nest destruction	Adverse impacts from maintenance and from construction and use of access roads
Longtail salamander	Adverse impacts from direct mortality and habitat loss/ fragmentation; adverse impacts during construction activities	Adverse impacts from maintenance and from construction and use of access roads

The overall impacts on special-status mammal species from transmission line activities under alternative 2 are presented in table 58.

TABLE 58: ALTERNATIVE 2 IMPACTS ON SPECIAL-STATUS MAMMAL SPECIES

Species	Impacts from Clearing and Construction	Impacts from Maintenance and Presence of Transmission Line
Bobcat	Adverse impacts from noise and disturbance during construction	Adverse impacts Adverse impacts from maintenance
Indiana bat Small-footed bat Northern myotis	Presence of winter hibernacula in corridor unknown; mitigation measures for Indiana bat could indirectly protect all bats	Adverse impacts; presence of winter hibernacula in corridor unknown

The overall impacts on special-status plant species from transmission line activities under alternative 2 are presented in table 59.

TABLE 59: ALTERNATIVE 2 IMPACTS ON SPECIAL-STATUS PLANT SPECIES

Species	Impacts from Clearing and Construction	Impacts from Maintenance and Presence of Transmission Line
A-sedge Downy willow-herb Small-headed rush Brook lobelia Carolina grass-of-Parnassus Bog goldenrod Shrubby cinquefoil	Adverse impacts from forest clearing, construction in wetland, and blasting that could affect wetland functions	Adverse impacts because wetlands may require vegetation maintenance
Clinton's wood fern	No direct impacts (fern not observed in studies); adverse impacts from forest clearing, construction, and blasting that could affect wetland functions	No impact (not likely to be present in corridor)
Reed meadowgrass Marsh bedstraw	Adverse impacts from construction of a tower in a wetland area	Adverse impacts because wetlands may require vegetation maintenance
Stiff club moss	Adverse impacts due to vegetation removal and access road construction	Adverse impacts because wetlands may require vegetation maintenance
White heath aster	No impact (not likely to be present in corridor)	No impact (not likely to be present in corridor)

Alternative 2b

Special-status Aquatic Species: A total of four special-status (state-listed) aquatic species (bridle shiner and three mussels: yellow lampmussel, creeper, and alewife floater) are known to be present or have the potential to be found in the proposed ROW for alternative 2b, as discussed under alternative 2. Due to the similar amount of access roads, impacts on habitat for aquatic species from the construction of access roads and crane pads would be similar to those under alternative 2. Impacts on the bridle shiner and freshwater mussel species include changes in water quality, alteration of bottom habitat, decreased growth, and interruption of feeding, respiration, and reproductive activities; freshwater mussels could also be smothered by sediment deposition, whereas bridle shiners should be able to relocate out of the construction area. Structures associated with proposed stream crossings could result in adverse impacts on special-status mussels from direct mortality of mussels in the construction area. Because the bridle shiner would be able to avoid construction areas, adverse impacts are expected as a result of sedimentation and alteration of water quality. Stream crossing structures could affect special-status freshwater mussels by potentially blocking access to host-fish species, restricting the transport of food particles, and altering geomorphic and hydraulic processes that provide suitable habitat conditions. Preconstruction surveys would be necessary to determine whether any special-status mussel species exist in the tributaries and any mussels found could be relocated out of the construction zone prior to construction activity to minimize impacts. Mitigation measures described in appendix F would include the use of BMPs to minimize soil erosion and sedimentation that could affect water quality and habitat suitability for aquatic special-status species. Construction of the transmission line across the Delaware River (MDSR) would not include stream crossing structures and would not affect freshwater mussel species.

Following construction, maintenance activities would be performed but would not occur in surface waters in the ROW and would generally not include the removal of vegetation near water bodies; it is also expected that bridle shiners could avoid temporary disturbances to surface water conditions. In addition, control of invasive plant species near surface waters would include the use of NPS-approved herbicides safe for application in aquatic environments. To minimize impacts from construction activities, forested buffers around the Delaware River would be left intact, sediment control devices would be installed, and disturbed areas would be revegetated.

Special-status Terrestrial Invertebrate Species: Clearing beyond the ROW would not be required under alternative 2b, but regular maintenance of the ROW would be required to maintain low vegetation growth. The herbaceous plant communities and grasses associated with Arogos skipper habitat would be compatible with vegetation requirements for the ROW and in the long term maintenance of the ROW may create additional suitable habitat for the Arogos skipper. It is possible that the ROW could be colonized by the Arogos skipper and conservation measures could be implemented for this species, resulting in a beneficial impact. As stated above for alternative 2, new towers would be constructed on either side of Arnott Fen, which is potential habitat for Mitchell's satyr. The extensive excavation and blasting activities adjacent to the fen would have indirect adverse impacts on the fen as a result of altered hydrology and could degrade wetland functions and values and potentially allow invasive plant species to colonize the fen. The greatest threat to the Mitchell's satyr is habitat destruction, including invasion by nonnative plants that threaten the fens on which the butterfly depends (USFWS 2010d, 1). However, because this butterfly is extirpated from its historical range in New Jersey and is only found in 13 locations in Michigan and two locations in Indiana (USFWS 2010d, 1), it is unlikely to be present in the alignment for alternative 2b.

Special-status Birds: Alternative 2b would remain inside the existing ROW, as described for alternative 1; impacts are analyzed for a total of 13 special-status (state-listed) bird species that have been observed or have the potential to be present in the ROW habitats. Neotropical migrant species and special-status raptor species that use forested habitat could be adversely affected by the loss of forested habitat as a result of clearing beyond the existing ROW, but the permanent loss of forested habitat would be considered small (4.5 acres) compared to other alternatives. Additional trees would be removed as danger trees if they are determined by the applicant to be a threat to the transmission line; however, the number of trees cannot be estimated, so impacts are unknown. Five forest-dwelling and potentially forest-nesting raptor species, the northern harrier, Cooper's hawk, northern goshawk, red shouldered hawk, and barred owl, could be present as migrant, resident, or seasonally present species in habitat being cleared under alternative 2b. The amount of forest edge habitat would effectively remain the same and opportunistic predators and passerine brood parasites (brown-headed cowbirds) could be expected to affect nest sites along the newly created edge habitat. Adverse impacts on the golden-winged warbler would also occur in scrub shrub habitat in the ROW during vegetation clearing if clearing occurs during the nesting season; current practices do not have a seasonal restriction. These impacts could be offset by the use of seasonal restrictions on clearing.

Forested and emergent wetland areas as well as riparian areas adjacent to the Delaware River are present in the ROW and would be avoided to the extent practicable under alternative 2b; very little forested habitat would be lost through vegetation clearing as a result of construction activities under alternative 2b. Both the Virginia rail and the great blue heron are known to nest in and adjacent to wetlands along the alternative 2b corridor. No access roads are proposed in the wetland where these species are present, but one tower would be placed in an herbaceous wetland area that could be used by great blue heron for foraging. Disturbance during vegetation maintenance could occur from human presence and activity, resulting in the temporary relocation of any foraging herons. Habitat for the Virginia rail includes herbaceous vegetation in wetlands, and due to the construction of one tower foundation and associated crane pad, potential Virginia rail habitat would be permanently lost during clearing and construction activities.

In addition to the loss of habitat, during site preparation and the construction of the transmission line under alternative 2b, all special-status bird species may be disturbed by noise and activities associated with construction that would result in temporary disturbance or displacement from habitats. Activity from construction in the area could disrupt bird behavior, including foraging and breeding, in the ROW and adjacent habitats. Helicopters would potentially be used during construction activities to string the transmission line, as described in chapter 2 and in alternative 2 in this chapter. Maintenance activities have the potential to disturb and temporarily displace special-status bird species using habitat in or near the ROW for nesting and/or foraging. Annual maintenance of the ROW would cause disturbance along the entire line and throughout the period of analysis.

Bald Eagle: The bald eagle is known to nest, roost, and forage along the Delaware River where the alternative 2b alignment crosses the river (the same location as for alternatives 1 and 2). As described for previous alternatives in this section, a communal wintering eagle roost is located along the alternative 2b ROW (USFWS 2010b, 5) and the ROW crosses bald eagle foraging habitat (USFWS 2010b). Like alternative 2, alternative 2b would be inconsistent with the Bald Eagle Guidelines because the larger, higher line would be located adjacent to bald eagle nest, foraging, and roost sites. Adverse impacts on the bald eagle would occur during construction activities in the area of the wintering eagle roost and foraging areas; individuals may temporarily avoid areas undergoing demolition and construction. Potential negative impacts from disturbance that would result in disruption of feeding, reproduction, and resting could occur and may affect local population levels. Maintenance would not require heavy equipment and the disturbance from maintenance activities would be less than that from clearing and construction activities. Bald eagles would be expected to respond negatively to construction and demolition activities under alternative 2b because disturbance from activities and human presence would affect foraging, roosting, resting, and potentially nesting behaviors, affecting local population levels. Overall, as a result of vegetation clearing and construction/demolition activities, adverse impacts on the bald eagle would be possible in the wintering eagle roost area and in foraging areas. The permanent presence and maintenance of the transmission line along the bald eagle roost site would result in impacts on the bald eagle and would be inconsistent with Bald Eagle Guidelines.

Electrocution: The potential for electrocution of special-status bird species such as the bald eagle, great blue heron, barred owl, and red shouldered hawk under alternative 2b would be similar to the potential under alternative 2. Under alternative 2b, the proposed transmission line would be completed according to APLIC (2006) standards and would use the current best available technologies for minimizing the potential for electrocutions. However, the potential for electrocution would still exist and could result in impacts on the bald eagle, osprey, great blue heron, barred owl, and special-status hawk species (Cooper’s hawk, northern goshawk, northern harrier, and red shouldered hawk).

Power Line Collisions: The alternative 2b alignment is located along a major north–south fall migration corridor for raptors and the newly constructed transmission lines would create a bird collision hazard where they are oriented in an east–west direction, nearly perpendicular to the line of flight. Migratory and resident special-status raptor species that could be affected by power line collisions include osprey, bald eagle, northern harrier, northern goshawk, Cooper’s hawk, red shouldered hawk, and barred owl. Great blue herons could also be affected by power line collisions. Additionally, the location of transmission lines close to bald eagle nests may increase the likelihood of collisions for younger individuals that are less experienced fliers. Bird collisions with power lines can be reduced and minimized through a variety of mitigation measures, including the application of bird-safe designs to new construction and retrofitting existing lines, as described in the APP (APLIC 2006, 7).

Electrocution and collision with the new, higher line would be possible for the following bird species: bald eagle, northern harrier, osprey, great blue heron, barred owl, Cooper's hawk, northern goshawk, and red shouldered hawk.

Special-status Reptiles and Amphibians: As described for alternative 2, a total of seven special-status reptiles and amphibians have been observed or have the potential to be present or use suitable habitats along the ROW that would also provide the alignment for alternative 2b. In general, impacts on the special-status species reptiles and amphibians as a result of alternative 2b would be less than those under alternative 2 because very little forested habitat would be permanently disturbed (4.5 acres) and minimal permanent wetland impacts would occur from tower foundation and crane pad construction. Destruction of wood turtle, northern fence lizard, and eastern box turtle nests could occur during excavation activities. Special-status reptile and amphibian species in areas near construction activities may be disturbed by the increase of noise and activity and individuals of some species would avoid areas that may have been habitually used for basking, foraging, breeding, and nesting. Impacts on bog turtles and longtail salamanders would be adverse due to the risk of mortality from clearing and construction activities as well as from equipment and vehicle strikes. Specifically for wood turtles, the use of barrier fencing along streams could be implemented during construction to keep the turtles from entering construction sites.

There is one timber rattlesnake den location in the ROW for alternative 2b (Boder et al. 2005). Because the snake den is close to the proposed tower location, where blasting would occur, it is likely that snakes would be disturbed by the vibrations and noise associated with the blasting activities. Blasting activities would not occur between September and April when timber rattlesnakes occupy dens. However, if empty dens are destroyed by blasting activities, it could result in eventual mortality for timber rattlesnakes as this species returns to the same dens year after year and may be unable to find suitable overwintering areas if their original dens have been destroyed.

Additional impacts on special-status reptiles and amphibians would occur from habitat fragmentation, as described under alternative 2, but these impacts would be less under this alternative because the majority of access roads and spur roads would be constructed in the existing ROW. Habitat fragmentation would create adverse impacts on the longtail salamander because the habitat required by the salamander provides cover and moisture; the maintenance of the ROW would result in more open and potentially drier conditions, limiting habitat for the longtail salamander. Protection measures, including the use of handheld equipment instead of machinery and the implementation of seasonal restrictions during nesting and birthing seasons for turtles and snake species (typically between March and September), could be implemented; however, inadvertent crushing of nests, turtles, or snakes by workers could still occur.

Special-status Mammals: The four mammal species (bobcat and three bats) previously discussed under alternative 2 have the potential to be present under alternative 2b. Impacts on bobcat as a result of alternative 2b would be the same as those described for alternative 2.

Summer habitat for all three species of bats is present in the study area; however, due to the small amount of forest habitat that would be removed (4.5 acres), the loss of trees and/or maternity colonies in trees would not be considered large enough to be adverse under alternative 2b.

Special-status Plants: As stated in chapter 3, suitable habitat for A-sedge, downy willow-herb, small-headed rush, brook lobelia, Carolina grass-of-Parnassus, bog goldenrod, and shrubby cinquefoil has been identified in open canopy wetland areas near the ROW used for the implementation of alternative 2b. No direct impacts from access roads would occur because the access road under alternative 2b was designed to entirely avoid this wetland area. It is possible that indirect impacts on these plant species could occur under alternative 2b from adjacent forest clearing and access road construction, which may increase erosion. Soil movement from erosion could affect the functions of the wetland that supports these species.

Additionally, the construction of two new towers adjacent to this wetland area would require blasting, which could result in alteration of the hydrology of the wetland and indirectly affect these listed plant species as described previously under alternative 2.

Clinton’s wood fern was not found in the existing ROW (Mellon 2010a), as described in alternative 2. Clinton’s wood fern has been found in the past in wetland areas surrounded by eastern hemlock (NPS 2009g, 2, 4) but could also be found outside wetland areas. Because the same ROW would be used for alternative 2b, it is unlikely that this species would be affected under this alternative. Some wetland vegetation in the ROW may require maintenance, but access roads and installation of towers would not affect the wetland area where suitable habitat is present. The loss of mature tree species in the ROW that provide a canopy for this understory fern could affect habitat for this species and would facilitate the spread of invasive species.

Reed meadowgrass was observed during surveys conducted in 2010 (Mellon 2010a, 2010b) and marsh bedstraw was observed during vegetation surveys (NPS 2011b) near wetland areas in the corridor of alternative 2b. Reed meadowgrass was found in the corridor tucked in a seepage area with other herbaceous wetland plants (Mellon 2010b). It is likely that this species would be directly affected under alternative 2b because the emergent wetland habitat that supports the reed meadowgrass and marsh bedstraw is in an area that may be cleared to allow the construction of a tower in the wetland area. Indirect impacts on both plant species could occur as a result of adjacent forest clearing, access road construction, and vegetation management, which may increase erosion and affect wetland functions in the habitat that supports reed meadowgrass and marsh bedstraw.

As described in alternatives 1 and 2, stiff club moss was observed during vegetation surveys conducted in 2010 and 2011 (NPS 2011b) in scrub shrub and forested wetland habitat in the ROW and would be similarly affected by vegetation removal and tree removal under alternative 2b. Stiff club moss would be disturbed by an access road that would be constructed through the habitat that supports this plant species. The regular maintenance of the ROW required to maintain low vegetation growth may affect this species, but the species is low growing and compatible with the applicant’s approved vegetation management plans.

Although white heath aster has been documented along the Delaware River and has been found to be locally common in dry spots along the Delaware River and on limestone rocks in the forest adjacent to wetland areas (Mellon 2010a, 13), it was not detected during surveys conducted in the alternative 2b ROW (Mellon 2010a; NPS 2011b). Communications with DEWA indicate that white heath aster grows near, but not in, the study area (Mellon 2010a, 8). It is unlikely that this plant species is present in the ROW for alternative 2b.

For all listed plant species, mitigation as described in appendix F would be employed to minimize and avoid impacts. Such mitigation includes monitoring areas to be avoided during construction, as identified during preconstruction surveys, and minimizing fugitive dust and runoff from construction sites (reducing sedimentation), which would reduce the potential adverse impacts on special-status plant species. Although mitigation techniques would be employed, impacts on listed plants would still occur.

Cumulative Impacts

Cumulative impacts on special-status species inside the study area would be adverse, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the beneficial and adverse impacts on special-status species as a result of alternative 2b are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected. Alternative 2b would not alter the level of impact.

Conclusion

The overall impacts on special-status aquatic species from transmission line activities under alternative 2b are presented in table 60.

TABLE 60: ALTERNATIVE 2B IMPACTS ON SPECIAL-STATUS AQUATIC SPECIES

Species	Impacts from Clearing and Construction	Impacts from Maintenance and Presence of Transmission Line
Freshwater mussels	Adverse impacts from temporary habitat changes due to construction and clearing; adverse impacts from access roads and possible direct mortality or loss of habitat	Adverse impacts from maintenance
Bridle shiner	Adverse impacts from construction and clearing	Adverse impacts from maintenance; bridle shiner could avoid temporary disturbances to surface water conditions

The overall impacts on special-status terrestrial invertebrate species from transmission line activities under alternative 2b are presented in table 61.

TABLE 61: ALTERNATIVE 2B IMPACTS ON SPECIAL-STATUS TERRESTRIAL INVERTEBRATE SPECIES

Species	Impacts from Clearing and Construction	Impacts from Maintenance and Presence of Transmission Line
Arogos skipper	Beneficial impact from possible creation of habitat	Maintenance activity in the ROW may create suitable habitat for the Arogos skipper, allowing this species to colonize the ROW, resulting in beneficial impacts
Mitchell's satyr	No impact	No impact on the Mitchell's satyr because this species is only found in a few locations in Michigan and Indiana and is unlikely to be present in the study area

The overall impacts on special-status bird species from transmission line activities under alternative 2b are presented in table 62.

TABLE 62: ALTERNATIVE 2B IMPACTS ON SPECIAL-STATUS BIRD SPECIES

Species	Impacts from Clearing and Construction	Impacts from Maintenance and Presence of Transmission Line
Great blue heron Osprey Northern harrier Cooper's hawk Northern goshawk Red-shouldered hawk Barred owl	Adverse impacts from construction and habitat loss	Adverse impacts from maintenance activities, electrocution, and collision potential
Bald eagle	Adverse impacts from construction and habitat loss	Adverse impacts from maintenance activities and electrocution and collision potential; younger birds would have a higher chance of collision if nest were close to transmission line

Species	Impacts from Clearing and Construction	Impacts from Maintenance and Presence of Transmission Line
Virginia rail	Adverse impacts from construction and habitat loss	Adverse impacts from maintenance activities
Veery Black-throated green warbler Cerulean warbler	Adverse impacts from construction and habitat loss	Adverse impacts from maintenance activities
Golden-winged warbler	Adverse impacts from construction activities and creation of new habitat	Beneficial impacts from maintenance activities and creation of additional habitat in the ROW

The overall impacts on special-status reptile and amphibian species from transmission line activities under alternative 2b are presented in table 63.

TABLE 63: ALTERNATIVE 2B IMPACTS ON SPECIAL-STATUS REPTILE AND AMPHIBIAN SPECIES

Species	Impacts from Clearing and Construction	Impacts from Maintenance and Presence of Transmission Line
Bog turtle	Adverse impacts from mortality if turtles enter construction areas; adverse impacts from loss of habitat; adverse impacts near construction areas, particularly from noise	Adverse impacts from maintenance
Wood turtle Eastern box turtle	Adverse impacts from direct mortality and nest destruction; adverse impacts near construction areas	Adverse impacts from maintenance
Timber rattlesnake	Adverse impacts from direct mortality and destruction of overwintering areas and impacts during foraging and basking near construction areas	Adverse impacts from maintenance
Northern copperhead	Adverse impacts from direct mortality and destruction of overwintering areas and adverse impacts during foraging and basking near construction areas	Adverse impacts from maintenance
Northern fence lizard	Adverse impacts from direct mortality and nest destruction	Adverse impacts from maintenance
Longtail salamander	Adverse impacts from mortality if salamanders enter upland areas, from habitat fragmentation, and from loss of habitat during construction; Adverse impacts near construction areas, particularly from noise	Adverse impacts from maintenance

The overall impacts on special-status mammal species from transmission line activities under alternative 2b are presented in table 64.

TABLE 64: ALTERNATIVE 2B IMPACTS ON SPECIAL-STATUS MAMMAL SPECIES

Species	Impacts from Clearing and Construction	Impacts from Maintenance and Presence of Transmission Line
Bobcat	Adverse impacts from noise and disturbance during construction	Adverse impacts from maintenance
Indiana bat Small-footed bat Northern myotis	Adverse impacts; presence of winter hibernacula in corridor unknown	Adverse impacts; presence of winter hibernacula in corridor unknown; mitigation measures would be undertaken

The overall impacts on special-status plant species from transmission line activities under alternative 2b are presented in table 65.

TABLE 65: ALTERNATIVE 2B IMPACTS ON SPECIAL-STATUS PLANT SPECIES

Species	Impacts from **Clearing and Construction**	Impacts from **Maintenance and Presence of Transmission Line**
A-sedge Downy willow-herb Small-headed rush Brook lobelia Carolina grass-of-Parnassus Bog goldenrod Shrubby cinquefoil	Adverse impacts from forest clearing, construction in wetland, and blasting that could affect wetland functions	Adverse impacts; wetlands may require vegetation maintenance
Clinton's wood fern	Species was not observed in corridor, but adverse impacts from forest clearing in suitable habitat	No impact (species is unlikely to be present in corridor)
Reed meadowgrass Marsh bedstraw	Adverse impacts from construction of a tower in a wetland area	Adverse impacts; wetlands may require vegetation maintenance
Stiff club moss	Adverse impacts from access road construction and clearing	Adverse impacts; wetlands may require vegetation maintenance
White heath aster	No impact (species is unlikely to be present in corridor)	No impact (species is unlikely to be present in corridor)

Common to Action Alternatives 3, 4, and 5

Restoration of the B-K Line: For alternatives 3, 4, and 5, the portion of the B-K Line between the Bushkill Substation and the eastern boundary of DEWA would be permanently removed and the ROW would be restored, as described in chapter 2. Although natural communities would not return to mature conditions in the period of analysis of this EIS, the process would begin and would create a beneficial impact.

Special-Status Terrestrial Invertebrate Species: Because no habitat for or presence of special-status terrestrial invertebrates exists along the alignments for alternatives 3, 4 and 5, special-status invertebrate species will not be discussed for these alternatives.

Alternative 3

Special-status Aquatic Species: Three special-status freshwater mussel species (yellow lampmussel, creeper, and alewife floater) have the potential to be present in open water areas in the proposed ROW under alternative 3; however, during consultation, PFBC did not specify the species as present in the Delaware River (PFBC 2010a, 1). Although no stream crossing structures would be constructed under alternative 3, vegetation removal and the construction of the transmission line could adversely affect freshwater mussels through changes in water quality, the alteration of bottom habitat (sedimentation), the smothering of mussels, decreased growth, and the interruption of feeding, respiration, and reproductive activities. Annual vegetation maintenance activities would not occur in surface waters in the ROW and would generally not include the removal of vegetation near water bodies. In addition, any control of invasive plant species near surface waters would include NPS-approved herbicides safe for application in aquatic environments. To minimize impacts from construction activities, forested buffers around the Delaware River would be left intact, sediment control devices would be installed, and disturbed areas would be revegetated.

Special-status Birds: The NJENSP identified four special-status bird species with the potential to be present in appropriate habitat along alternative 3: great blue heron, Cooper's hawk, red shouldered hawk, and barred owl. Only the great blue heron was observed in alternative 3 during the 2010 and 2011 vegetation surveys (NPS 2011b, 29). Documented bald eagle foraging areas along the Delaware River have been mapped in the vicinity of alternative 3 and are analyzed for impacts below. Additionally, special-status bird species discussed under alternative 2 that could be affected similarly by alternative 3 include the following: northern harrier, which could be present in open habitat such as the agricultural fields located adjacent to the Delaware River, particularly during migration; osprey, which could use riparian habitat along the Delaware River; northern goshawk, which could use forested areas in the alternative 3 corridor; and Neotropical migrants such as veery, cerulean warbler, and black-throated green warbler, which would also use forested areas as migrants and potentially as breeding species. The New Jersey Landscape Project also identified habitat for the golden-winged warbler along alternative 3 (Niles et al. 2008).

The alternative 3 ROW would traverse the Delaware River and Worthington State Forest inside DEWA. Tree removal and the expansion of successional habitat in the new ROW would permanently alter habitat along the route in Worthington State Forest. The widening of the ROW would further increase the fragmentation of habitat but would not significantly increase the amount of forest edge because the configuration would follow the edge of the existing ROW. After construction is completed, an undetermined portion of the ROW could be allowed to revegetate and only the width of the ROW necessary to maintain access roads and the transmission line would continue to be maintained. A portion of alternative 3 would also pass between two mowed/maintained agricultural areas on the western side of the Delaware River. The ROW in this area is currently 100 feet wide and the additional expansion of the ROW for alternative 3 could eliminate the wooded hedgerow between the fields, creating one large open expanse of maintained habitat. This enlarged open area may benefit the northern harrier, which forages in open fields. Special-status raptors that may hunt along the ROW, including the agricultural land, would continue to use these areas. These resident and migrant special-status raptor species include Cooper's hawk, red shouldered hawk, and barred owl. Riparian habitat composed of mature forest is present in alternative 3 and could support foraging and nesting habitat for the cerulean warbler; other forested areas could support the black-throated green warbler.

Forested and emergent wetland areas as well as riparian areas adjacent to the Delaware River are present in the study area and would be avoided to the extent practicable under alternative 3. However, great blue heron, bald eagle, red shouldered hawk, and cerulean warbler could be adversely affected by forest clearing in areas adjacent to the Delaware River and wetlands that are currently used for foraging or nesting. Black-throated green warbler could be adversely affected by the loss of forested habitat in more upland areas of alternative 3.

The existing B-K Line between the Bushkill Substation and the eastern boundary of DEWA would be removed and the ROW would be restored, as described in chapter 2. During site preparation and the construction of the transmission line under alternative 3, all special-status bird species may be disturbed by noise and construction activities that could result in temporary displacement from habitats. Helicopters could be used during construction activities to string the transmission line, as described in chapter 2. Construction impacts on special-status bird species would be the same as those under alternative 2 because individuals may temporarily avoid areas and there is a potential that noise would affect feeding, reproduction, resting, or other behavioral factors that may affect local population levels. Barred owls are particularly loyal to their territory year-round; therefore, if construction occurs in their territory, disturbance and displacement would adversely affect barred owls. A seasonal restriction on tree clearing from March 15 through July 31 would be in place under alternative 3 that would prevent unauthorized take of nests and unfledged chicks protected under the Migratory Bird Treaty Act (USFWS 2010b). Additionally, impacts on special-status bird species inside the study area would be expected from maintenance activities (including annual vegetation maintenance) that would occur throughout the period of analysis; localized disturbance from noise and activity would be expected to cause temporary disturbance to birds near the activity.

Bald Eagle: Bald eagles are known to nest along the Delaware River close to where alternative 3 crosses the river. An active bald eagle nest is located within 0.2 mile (1,056 feet) of the alternative 3 alignment (USFWS 2010b). There is no known wintering bald eagle communal roost in or near the alternative 3 ROW. To avoid collisions, the Bald Eagle Guidelines state that communications towers and high-voltage transmission power lines should be sited away from bald eagle nests, foraging areas, and communal roost sites (USFWS 2007a, 15). Because of the nearby nest, the new transmission line corridor would not be consistent with the Bald Eagle Guidelines. However, if nesting activity is observed before or during the proposed construction, additional protections of the nest site would occur as required in the Bald Eagle Guidelines (USFWS 2007a, 12). These guidelines would minimize the potential take of bald eagles, which could occur because human activity within 1,312 feet (400 meters) of eagles can force them to abandon the immediate area (Anthony and Isaacs 1989). Impacts from construction activities and noise would adversely affect nesting bald eagles; impacts on the bald eagle from habitat loss would be similar to those for other raptor species.

Electrocution: The potential for electrocution of special-status bird species such as the bald eagle, great blue heron, barred owl, and red shouldered hawk under alternative 3 would be similar to the potential for electrocution discussed under alternative 2. Under alternative 3, the proposed transmission line would be completed according to APLIC (2006) standards and would use the current best available technologies for minimizing the potential for electrocutions.

Power Line Collisions: Similar to alternative 2, alternative 3 would be located along a major north–south fall migration corridor for raptors, and the newly constructed transmission lines would create a bird collision hazard where they are oriented in an east–west direction. Migratory and resident special-status raptor species could be affected by power line collisions. Bird collisions with power lines can be reduced and minimized through a variety of mitigation measures that include applying bird-safe designs to new construction and retrofitting existing lines according to APLIC standards (APLIC 2006, 7) in the draft Avian Protection Plan.

Overall, electrocution and collision with the lines would be possible to the following bird species: bald eagle, osprey, great blue heron, barred owl, Cooper’s hawk, northern goshawk, red shouldered hawk, and northern harrier.

Special-status Reptiles and Amphibians: The special-status species that may be present in suitable habitat along the alternative 3 alignment include the same seven species of reptiles and amphibians described under alternative 2: bog turtle, wood turtle, eastern box turtle, northern fence lizard, northern copperhead, timber rattlesnake, and longtail salamander. The USFWS New Jersey Field Office states that potential habitat for the bog turtle is present in the proposed ROW for alternative 3 (USFWS 2010b) and the New Jersey Landscape Project identified areas of potential habitat for longtail salamander, northern copperhead, wood turtle, and eastern box turtle along the proposed alternative 3 alignment (Niles et al. 2008). Timber rattlesnakes were observed during the 2010 and 2011 vegetation surveys along a wetland area in the proposed ROW. There are several known timber rattlesnake den locations along the Kittatinny Ridge. However, no dens are located in the corridor of alternative 3; the closest den is located over 1,000 feet from the proposed corridor.

Generally, impacts on the special-status reptile and amphibian species would be similar to those under alternative 2. Species near construction areas during construction would be disturbed by the increased noise and activity in their vicinity. Some species could be restricted to certain habitats, which may alter basking, foraging, breeding, and nesting behaviors. For example, bog turtles typically spend most of their time in wetland areas, using upland areas as travel corridors only, and longtail salamanders sometimes travel in wetland areas and find cover under moist logs and leaves. Impacts on special-status reptile and amphibian species from disturbance, potential strikes from construction vehicles and equipment, and (for bog turtles and longtail salamanders) from restricted movement would occur and the risk of mortality would also occur. Additional impacts on special-status reptiles and amphibians would occur from habitat fragmentation, as described under alternative 2. Habitat fragmentation would specifically and adversely affect the longtail salamander because more open canopy scrub shrub habitat would be created, thus exposing salamanders to increased sun exposure and possibly drier conditions.

Under alternative 3, impacts on listed reptiles and amphibians from blasting are unknown because the locations of dens (timber rattlesnake and northern copperhead) and the locations of towers are currently unknown for alternative 3, and the extent of the underground den system at identified dens in DEWA is unknown. The NPS anticipates conducting surveys for timber rattlesnakes in spring 2012, but tower locations for alternatives 3, 4, and 5 are unknown for this EIS. To the extent possible, the placement of towers would avoid known locations of dens. The areal extent and intensity of vibrations caused by blasting depends on several factors, including rock type and blasting techniques. Blasting techniques have evolved for close spaces where the minimization of vibration impact is necessary (Lucca 2003). Prior to construction, a detailed blasting plan would be developed that describes the areal extent of impact from blasting and proposes measures to minimize the impact of vibrations caused by blasting. For tower locations inside the potential area of impact from blasting, alternate techniques, including drilling, would be evaluated to minimize the potential for impacts on the dens. The applicant would be required to develop a buffer zone, an area beyond which blasting activities would not impact the geology and the dens. Preconstruction surveys and seasonal restrictions (no blasting) between September and April, when timber rattlesnakes occupy dens, would also be implemented. Following construction, the dens would be monitored to determine whether dens were affected by construction activities. If impacts are documented during monitoring, additional mitigation could be required, including relocation of rattlesnakes, in consultation with the NPS. If empty dens are destroyed by blasting activities, it could result in eventual mortality for timber rattlesnakes or northern copperheads, because these species return to the same dens year after year and may be unable to find suitable overwintering areas if their original dens have been destroyed.

Annual vegetation maintenance would result in localized disturbance to any special-status reptile or amphibian species. Protection measures, including the use of handheld equipment instead of machinery and the implementation of seasonal restrictions during nesting and birthing seasons for turtle and snake species (typically between March and September), could be implemented; however, inadvertent crushing of nests, turtles, or snakes by workers could still occur. Specifically for wood turtles, the use of barrier fencing along streams could also be implemented during construction to keep the turtles from entering construction sites.

The potential for direct mortality of the bog turtle, which would be a take under the Endangered Species Act, would constitute a adverse impact on the bog turtle. Therefore, alternative 3 may be likely to adversely affect the bog turtle. As stated previously, future coordination with appropriate Federal and State agencies would clarify the extent to which adverse effects to listed species would be likely to occur and would determine whether a BA would be required. The FEIS and the BA for this project will include more details concerning impacts to the bog turtle as appropriate. Impacts could also include the destruction of turtle and lizard nests and snake dens used for hibernation during construction. During annual maintenance activities, impacts on special-status reptiles and amphibians would occur but only handheld equipment would be used; individuals of some species may be disturbed by noise and human activities.

Special-status Mammals: Four special-status mammal species, the bobcat and three bat species (Indiana bat, small-footed bat, and northern myotis), have the potential to be present in the corridor considered under alternative 3. Bobcats were observed in the alternative 3 corridor during the 2010 and 2011 vegetation surveys (NPS 2011b). Impacts on bobcats as a result of alternative 3 would be similar to those under alternative 2; bobcats that may occupy territory in or travel through the area would be affected by habitat disturbance during site preparation and construction activities. Daytime construction activities associated with vegetation clearing in the study area would be expected to have minimal impacts on the bobcat due to the crepuscular/nocturnal nature of the animal. Bobcats would continue to use the existing ROW as a corridor for movement and hunting and could be expected to maintain territories that may overlap with the ROW and the habitats along the transmission line.

It is likely that summer habitat for all three species of bats exists in the study area and would be affected through loss of trees and/or maternity colonies in trees. The closest potential Indiana bat cave, known as Coppermine (upper and lower), is approximately 1.7 miles from the centerline of the proposed ROW of alternative 3 and would not be affected by this project. Both small-footed bats and northern myotis were caught during mist netting surveys in Monroe County, Pennsylvania; northern myotis were also captured during mist netting surveys in Warren County, Pennsylvania (Sanders 2009, 6). The Pennsylvania Game Commission has stated that alternative 3 is located outside the buffers (habitat that could support the bat) of the northern myotis (PGC 2010c). Seasonal restrictions would be implemented to reduce and avoid any unforeseen disturbance or injury to roosting Indiana bats (USFWS 2010b). Both the small-footed bat and the northern myotis could also benefit from the seasonal restrictions described above for the Indiana bat. Current bat echolocation studies by researchers at East Stroudsburg University are underway. These studies are using the AnaBat SD II bat detector to assess populations, locations, and species distribution in the study area of alternative 3. Therefore, the impact analysis for bats could change based on the results of these surveys.

Special-status Plant Species: There are six special-status plant species that could be affected by alternative 3: the netted chainfern, prickly-pear cactus, marsh bedstraw, stiff club moss, American bittercress, and shore aster. The netted chainfern is proposed for listing as a Pennsylvania threatened species and was observed in the corridor of alternative 3 during surveys conducted in 2010 and 2011 (NPS 2011b). The PADCNR has suggested that the prickly-pear cactus, a Pennsylvania state rare species, has the potential to be present in alternative 3, although neither this plant nor potential habitat in the corridor was observed during the surveys conducted in 2010 and 2011 (NPS 2011b; PADCNR 2010f). NPS records have indicated that American bittercress and shore aster have been documented in the vicinity of alternative 3 and suitable habitat for both marsh bedstraw and stiff club moss was observed during vegetation surveys (NPS 2011b).

The netted chainfern could be affected under alternative 3 because the plant was observed in an area that would be cleared beyond the existing ROW and soil compaction resulting from construction activities could restrict the regeneration of the netted chainfern. The loss of mature tree species that provide a canopy for this understory fern would affect habitat for the fern by opening the canopy; however, following the initial clearing activities it is possible that netted chainfern could reestablish in the corridor.

Adverse impacts on prickly-pear cactus would be expected because suitable habitat may exist in areas that may be affected by clearing, construction activities, and vegetation maintenance; preconstruction surveys would avoid/minimize any unforeseen impacts from construction activities, including soil compaction and clearing. Because prickly-pear cactus is low growing, it would be compatible with the applicant’s vegetation maintenance programs.

Habitat that supports American bittercress, marsh bedstraw, stiff club moss, or shore aster could be cleared beyond the ROW under alternative 3. For all listed plant species, mitigation as described in appendix F would be employed to minimize and avoid impacts. Such mitigation includes monitoring areas to be avoided during construction, as identified during preconstruction surveys, and minimizing fugitive dust and runoff from construction sites (reducing sedimentation), which would reduce the potential adverse impacts on special-status plant species. Although mitigation techniques would be employed, impacts on listed plants would still occur.

Cumulative Impacts

Cumulative impacts on special-status species inside the study area would be adverse, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the adverse impacts on special-status species as a result of alternative 3 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected. Alternative 3 would not alter the level of impact.

Conclusion

The overall impacts on special-status aquatic species from transmission line activities under alternative 3 are presented in table 66.

TABLE 66: ALTERNATIVE 3 IMPACTS ON SPECIAL-STATUS AQUATIC SPECIES

Species	Impacts from Clearing and Construction	Impacts from Maintenance and Presence of Transmission Line
Freshwater mussels	Adverse impacts from temporary habitat changes due to construction and clearing	Adverse impacts from maintenance

The overall impacts on special-status bird species from transmission line activities under alternative 3 are presented in table 67.

Table 67: Alternative 3 Impacts on Special-status Bird Species

Species	Impacts from Clearing and Construction	Impacts from Maintenance and Presence of Transmission Line
Great blue heron	Adverse impacts from construction and habitat loss	Adverse impacts from maintenance activities and electrocution and collision potential
Osprey Bald eagle Northern harrier Cooper's hawk Northern goshawk Red-shouldered hawk Barred owl	Adverse impacts from construction and habitat loss	Adverse impacts from maintenance activities, electrocution, and collision potential
Veery Black-throated green warbler Cerulean warbler	Adverse impacts from construction and habitat loss	Adverse impacts from maintenance activities
Golden-winged warbler	Adverse impacts from construction and clearing but beneficial impacts from creation of new habitat	Beneficial impacts from maintenance of ROW and creation of new habitat

The overall impacts on special-status reptile and amphibian species from transmission line activities under alternative 3 are presented in table 68.

Table 68: Alternative 3 Impacts on Special-status Reptile and Amphibian Species

Species	Impacts from Clearing and Construction	Impacts from Maintenance and Presence of Transmission Line
Bog turtle	Adverse impacts from mortality if turtles enter construction areas; adverse impacts from loss of habitat; adverse impacts near construction areas, particularly from noise	Adverse impacts from maintenance
Wood turtle	Adverse impacts from direct mortality and nest destruction; adverse impacts near construction areas	Adverse impacts from maintenance
Eastern box turtle	Adverse impacts from direct mortality and nest destruction; adverse impacts near construction areas	Adverse impacts from maintenance
Northern copperhead	Adverse impacts from direct mortality and destruction of overwintering areas; adverse impacts during foraging and basking near construction	Adverse impacts from maintenance
Timber rattlesnake	Adverse impacts from direct mortality and destruction of overwintering areas; adverse impacts during foraging and basking near construction	Adverse impacts from maintenance
Northern fence lizard	Adverse impacts from direct mortality and nest destruction; adverse impacts near construction	Adverse impacts from maintenance
Longtail salamander	Adverse impacts from mortality if salamanders enter upland areas, from habitat fragmentation, and from loss of habitat during construction; adverse impacts near construction, particularly from noise	Adverse impacts from maintenance

The overall impacts on special-status mammal species from transmission line activities under alternative 3 are presented in table 69.

TABLE 69: ALTERNATIVE 3 IMPACTS ON SPECIAL-STATUS MAMMAL SPECIES

Species	Impacts from Clearing and Construction	Impacts from Maintenance and Presence of Transmission Line
Bobcat	Adverse impacts from noise and disturbance during construction	Adverse impacts from maintenance
Small-footed bat Northern myotis	Adverse impacts; it is unknown whether winter hibernacula or roosting or foraging habitat is found within proposed corridor	Adverse impacts; it is unknown whether winter hibernacula or roosting or foraging habitat is found in corridor; these species could benefit from mitigation measures to protect the Indiana bat
Indiana bat	Adverse impacts; it is unknown whether winter hibernacula or roosting or foraging habitat is found within the proposed corridor	Adverse impacts; it is unknown whether winter hibernacula or roosting or foraging habitat is found in corridor; mitigation measures would be implemented

The overall impacts on special-status plant species from transmission line activities under alternative 3 are presented in table 70.

TABLE 70: ALTERNATIVE 3 IMPACTS ON SPECIAL-STATUS PLANT SPECIES

Species	Impacts from Clearing and Construction	Impacts from Maintenance and Presence of Transmission Line
Netted chainfern	Adverse impacts from clearing activities	Fern could be reestablished after initial clearing
Prickly-pear cactus	Adverse impacts because suitable cactus habitat may exist in the corridor	Cactus is compatible with vegetation maintenance programs
American bittercress Shore aster Marsh bedstraw Stiff club moss	These species are unlikely to be present in corridor and mitigation measures would avoid/minimize any impacts	Same as clearing and construction impacts

Alternative 4

Special-status Aquatic Species: Inside the study area, the proposed ROW under alternative 4 crosses Mountain Run, a first order intermittent stream (contains water seasonally). Because Mountain Run is not a perennial stream that would support aquatic special-status species, no federally or state-listed aquatic species are expected to be present in the study area.

Special-status Birds: The alternative 4 corridor provides potential habitat for nine resident and migratory special-status bird species due to the deciduous habitat and forested wetlands located along the ROW. These species include the bald eagle, Cooper's hawk, northern goshawk, red shouldered hawk, and barred owl. Additionally, the veery and three species of warblers (golden-winged warbler, black-throated green warbler, and cerulean warbler) could be migrants that would use suitable habitat in the alternative 4 alignment. No federally listed bird species have been identified or have the potential to be present in the corridor for alternative 4.

Because alternative 4 is located along the edge of DEWA, the forests are more fragmented by adjacent land use and infrastructure than those that border other alternatives. Tree removal and the expansion of successional habitat in the new ROW would further increase the fragmentation of habitat; however, it would not significantly increase the amount of forest edge because the configuration would follow the existing ROW edge. As stated for alternatives 2 and 3, golden-winged warbler could benefit from the early successional stages of the revegetation process. Special-status raptor species that may hunt along the ROW would continue to use these areas. Mature forests are present in alternative 4 and could support Neotropical migrants (special-status warbler species) as well as summer resident special-status species. The use of forested habitat by special-status bird species for resting, foraging, or nesting could be adversely affected by the loss of forested habitat as a result of clearing to widen the existing ROW. No documented nests or roosts for special-status bird species are known to be present in the alternative 4 alignment; however, as forest-dwelling species, red shouldered hawk, Cooper's hawk, barred owl, and Neotropical migrant warblers could nest in the forested areas along the existing alignment, and the disturbance and clearing associated with alternative 4 could affect nest success and the viability of the young of these special-status bird species. Seasonal restrictions (March 1 to July 31) recommended by USFWS should protect the special-status bird nests, eggs, and young and prevent the unauthorized take of nests, eggs, and unfledged chicks protected under the Migratory Bird Treaty Act (USFWS 2010b). No direct mortality of eggs, young, or adults would occur as a result of clearing activities because trees would not be removed during the nesting season.

The existing B-K Line from the Bushkill Substation to the eastern boundary of DEWA would be removed and restored, as described in chapter 2. Similar to the impacts described under alternatives 2 and 3, adverse impacts under alternative 4 would occur from the noise and human activity associated with construction activities. Helicopters could be used during construction activities to string the transmission line, as described in chapter 2. Noise and activity could alter bird behavior, including foraging, roosting, and breeding, in the ROW and adjacent habitats. Birds are highly mobile and can avoid or leave an area to forage elsewhere; however, additional expenditure of energy is involved. Nonetheless, because the disturbance would be localized and temporary and habitat for foraging is widely available, construction activities would not be expected to adversely affect special-status bird species. The majority of the special-status bird species would have the ability to return to the area when the construction activity has ended, resulting in only limited disturbance. In addition, impacts from maintenance activities (including annual vegetation maintenance) would occur throughout the period of analysis; localized disturbance from noise and activity would be expected to cause temporary disturbance to birds near the activity.

Bald Eagle: The alternative 4 alignment would not cross the Delaware River inside the study area and would not affect known winter roost, foraging, or nest areas for the bald eagle. Therefore, this alternative would be consistent with the Bald Eagle Guidelines (USFWS 2007a). If bald eagle nesting activity is observed before or during construction, additional protection of nest sites would be required according to the Bald Eagle Guidelines (USFWS 2007a, 12). Therefore, similar to the other birds described above, adverse impacts from habitat loss and from construction would occur as a result of alternative 4.

Electrocution: The potential for the electrocution of special-status bird species such as the bald eagle, barred owl, and red shouldered hawk under alternative 4 would be similar to the potential for electrocution described under alternatives 2 and 3. The potential for electrocution of special-status bird species as resident, seasonally present, or migrant species from perching on poles/wires would still exist, but the transmission line would be constructed to APLIC guidelines as described under alternative 2.

Power Line Collisions: The transmission line route proposed in alternative 4 would have a generally north–south trending orientation and as such would be unlikely to affect migrating birds because the lines are parallel to, rather than perpendicular to, the north–south line of flight for seasonal migrants. The alternative 4 alignment inside the study area does not cross the Delaware River where there are known bald eagle winter roost, nest, or foraging sites and is consistent with Bald Eagle Guidelines (USFWS 2007a). As a result, there would be less opportunity for bald eagles to collide with power lines. Migrating raptors could encounter transmission lines crossing their flight path along Kittatinny Ridge in the study area. Under alternative 4, there is less potential for collisions with transmission lines compared to alternatives 2 and 3 for the bald eagle, Cooper’s hawk, northern goshawk, and barred owl.

Electrocution and collision with the line would be possible but unlikely for the bald eagle, barred owl, Cooper’s hawk, northern goshawk, and red shouldered hawk due to the north–south orientation of the transmission line, which would be parallel (not perpendicular) to the flight path of most migrating birds.

Special-status Reptiles and Amphibians: Inside the study area of alternative 4, only three special-status reptiles and amphibians are considered for analysis because the proposed line would be in Pennsylvania only. These species include the bog turtle, northern fence lizard, and timber rattlesnake. The impacts on and presence of the New Jersey state-listed reptile and amphibian species, including wood turtle, eastern box turtle, northern copperhead, and longtail salamander, along alternative 4 are generally discussed under reptiles and amphibians in the “Landscape Connectivity and Wildlife” section because the study area for the transmission line proposed under alternative 4 is not in New Jersey.

Northern fence lizards were observed along alternative 4 during the 2010 and 2011 vegetation surveys (NPS 2011b). PFBC identified the timber rattlesnake as having the potential to be present within the boundaries of NPS lands in appropriate habitat crossed by alternative 4; however, no dens are known to be present inside the study area (PFBC 2010a). The NPS anticipates conducting surveys for timber rattlesnakes in spring 2012, but tower locations for alternative 4 will not be known for this EIS. Wetland habitat along the proposed ROW could contain preferred habitat for the bog turtle. Surveys would be conducted to confirm the presence of the species prior to construction.

During construction activities, similar to alternatives 2, 2b, and 3, adverse impacts on the northern fence lizard and timber rattlesnake could occur from the implementation of alternative 4. Impacts would result from the direct mortality of individuals in habitats undergoing clearing and construction due to the use of construction vehicles and equipment that could inadvertently crush individuals. Additional impacts on the northern fence lizard would occur from the destruction of nests resulting from soil excavation.

To the extent possible, the placement of towers would avoid known locations of timber rattlesnake dens. All mitigation and monitoring measures described for alternatives 2, 3b, and 3 would be implemented under alternative 4. If impacts are documented during monitoring, additional mitigation could be required, including the relocation of rattlesnakes, in consultation with the NPS.

Impacts on the bog turtle would be adverse during construction activities from associated noise, the presence of project personnel, and dust, all of which could result in temporary disturbances of the bog turtle. Direct mortality during construction activities is possible. As described under alternative 2, habitat fragmentation would occur from the removal of the forested habitat; however, vegetation would become reestablished and would be managed as scrub shrub habitat. The potential for direct mortality of the bog turtle, which would be a take under the Endangered Species Act, would constitute an impact on the bog turtle. Therefore, alternative 4 may be likely to adversely affect the bog turtle. As stated previously, future coordination with appropriate federal and State agencies would clarify the extent to which adverse effects to listed species would be likely to occur and would determine whether a BA would be required. The FEIS and the BA for this project will include more details concerning impacts to the bog turtle as appropriate. During maintenance activities, overall impacts on the timber rattlesnake and bog turtle would be occur, but only handheld equipment would be used during vegetation management at regular intervals. Some species may be disturbed by noise and human interaction.

Following construction, the operation and maintenance of the transmission line would include the maintenance of vegetation at least annually at regular intervals. Maintenance activities would include the trimming of vegetation using hand tools such as chainsaws and pruners. Temporary localized disturbance from maintenance activities and human presence would occur on special-status reptiles and amphibians; however, inadvertent crushing of nests, reptiles, or amphibians by workers could still occur.

Special-status Mammals: Four special-status mammals have the potential to be present in the study area for alternative 4: the bobcat and three species of bats (Indiana bat, small-footed bat, and northern myotis). Of these four mammal species, only the northern myotis has been documented in the vicinity of the alternative 4 alignment. Impacts on bobcat under alternative 4 would result from temporary noise disturbance associated with construction and human activities. If bobcat dens are in the vicinity of new areas being cleared, bobcats may temporarily or permanently leave their territories to avoid construction activity. This could lead to perceptible or measurable changes in the behavior of bobcats and changes to bobcat dens or habitat but would not be expected to reduce the populations in or adjacent to the project area below self-sustaining levels.

Northern myotis were caught during mist netting surveys in Monroe County, Pennsylvania; however, the survey did not include Northampton County (Sanders 2009, 6). The closest potential Indiana bat cave, known as Cold Air Cave, is located approximately 2.4 miles from the centerline of the proposed ROW of alternative 4 and would not be affected by this project. (Previous surveys also identified a male small-footed bat at the Cold Air Cave). Surveys were not conducted for bat hibernacula or bat foraging areas in or near the ROW for alternative 4. As noted for the other alternatives, bat echolocation studies are underway and results will be used to update the information on bat species presence and relative abundance in this EIS. The impact analysis for bats could change based on the results of these surveys.

The Pennsylvania Game Commission has stated that the alternative 4 corridor is located within the buffer of the northern myotis (PGC 2010c), and northern myotis have been captured in the study area for alternative 4. However, transmission line construction at stream crossings under alternative 4 would be unlikely to affect bat foraging habitat because activities associated with construction would occur during daytime hours and no disturbance to foraging bats would occur. Disturbance to summer roost and maternity colony habitat could occur as a result of forest clearing during construction. Impacts on bat hibernacula would not be expected because no known hibernacula are present inside the study area for alternative 4. Alternative 4 is not likely to adversely affect the Indiana bat inside the study area. Detailed mitigation measures for bats under alternative 4 have not yet been determined, but would likely include seasonal restrictions for tree clearing because summer roost and maternity colony habitat could exist in forested areas. Bat surveys currently underway could update information on special-status bat species' presence and use of habitats inside the study area for alternative 4 and this impact analysis could change based on the results of the surveys.

Special-status Plants: There are seven special-status plant species that could be affected by alternative 4 in the study area: pasture rose, American holly, Susquehanna sand cherry, marsh bedstraw, stiff club moss, willow oak, and swamp dog-hobble. Pasture rose, observed in the ROW in DEWA during seasonal surveys conducted in 2010 (NPS 2011b), currently has an undetermined status in Pennsylvania, as this species is believed to be in danger of decline in Pennsylvania. Marsh bedstraw and willow oak were observed during vegetation surveys (NPS 2011b); stiff club moss was not identified during surveys but potential habitat exists along alternative 4. The remaining three special-status plant species were not observed in the study area but have the potential to be present at Totts Gap Natural Heritage Site (part of which is in the ROW for alternative 4).

Pasture rose, marsh bedstraw, and willow oak could be affected under alternative 4 during clearing to widen the existing ROW. If areas where these species have been observed (or where there is suitable habitat for stiff club moss) cannot be avoided or if soil compaction occurs that could affect a species' ability to recover after construction, adverse impacts to these plants are possible.

The western portion of Totts Gap Natural Heritage Site could be affected under alternative 4 because vegetation in this area would be cleared beyond the ROW. Totts Gap, composed of Totts Gap Natural Heritage Site and Totts Gap Swamp and it supports the Pennsylvania threatened American holly and the proposed Pennsylvania threatened Susquehanna sand cherry and swamp dog-hobble (Totts Swamp) (PATNC 2005a, 131). Although American holly, Susquehanna sand cherry, and swamp dog-hobble were not observed during vegetation surveys conducted in 2010 and 2011 (NPS 2011b), these special-status plant species do have the potential to be present in the alternative 4 ROW at Totts Gap and could be adversely affected by clearing and construction activities. Following the initial clearing activities it may be possible for these species to be reestablished in the ROW if present at Totts Gap Natural Heritage Site and if soil compaction does not occur. However, some specimens of these species may be subject to vegetation maintenance (cutting and trimming) because of their growth pattern as small shrubs and/or trees. The impacts as a result of clearing and construction activities as well as the maintenance and presence of the transmission line could be elevated if an entire listed plant population is lost during clearing activities because they may be subject to vegetation maintenance (cutting and trimming).

Cumulative Impacts

Cumulative impacts on special-status species inside the study area would be adverse, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the beneficial and adverse impacts on special-status species as a result of alternative 4 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected. Alternative 4 would not alter the level of impact.

Conclusion

The overall impacts on special-status aquatic species from transmission line activities under alternatives 4 and 5 are presented in table 71.

TABLE 71: ALTERNATIVE 4 AND 5 IMPACTS ON SPECIAL-STATUS AQUATIC SPECIES

Species	Impacts from Clearing and Construction	Impacts from Maintenance and Presence of Transmission Line
Freshwater mussels	No impact (not likely to exist in ROW)	No impact (not likely to exist in ROW)
Bridle shiner	No impact (not likely to exist in ROW)	No impact (not likely to exist in ROW)

The overall impacts on special-status bird species from transmission line activities under alternatives 4 and 5 are presented in table 72.

TABLE 72: ALTERNATIVE 4 AND 5 IMPACTS ON SPECIAL-STATUS BIRD SPECIES

Species	Impacts from Clearing and Construction	Impacts from Maintenance and Presence of Transmission Line
Bald eagle	Adverse impacts from construction and habitat loss	Adverse impacts from maintenance and electrocution and collision potential because north–south orientation of line would lessen potential for hazards
Cooper's hawk Northern goshawk Red-shouldered hawk Barred owl	Adverse impacts from construction and habitat loss	Adverse impacts from maintenance, electrocution, and collision potential
Veery Black-throated green warbler Cerulean warbler	Adverse impacts from construction and habitat loss	Adverse impacts from maintenance activities
Golden-winged warbler	Adverse impacts from construction and habitat loss	Beneficial impacts from maintenance activities and the possible creation of additional habitat in the ROW

The overall impacts on special-status reptile and amphibian species from transmission line activities under alternatives 4 and 5 are presented in table 73.

TABLE 73: ALTERNATIVE 4 AND 5 IMPACTS ON SPECIAL-STATUS REPTILE AND AMPHIBIAN SPECIES

Species	Impacts from Clearing and Construction	Impacts from Maintenance and Presence of Transmission Line
Bog turtle	If bog turtles are present in the corridor, adverse impacts from direct mortality if turtles enter construction areas; adverse impacts from construction activities nearby; adverse impacts from habitat fragmentation	Adverse impacts from vegetation maintenance activities
Timber rattlesnake	Adverse impacts from direct mortality; adverse impacts during foraging and basking near construction areas	Adverse impacts from vegetation maintenance activities
Northern fence lizard	Adverse impacts from direct mortality and nest destruction	Adverse impacts from maintenance in adjacent habitats

The overall impacts on special-status mammal species from transmission line activities under alternatives 4 and 5 are presented in table 74.

TABLE 74: ALTERNATIVE 4 AND 5 IMPACTS ON SPECIAL-STATUS MAMMAL SPECIES

Species	Impacts from Clearing and Construction	Impacts from Maintenance and Presence of Transmission Line
Bobcat	Adverse impacts from disturbance during construction	Adverse impacts from maintenance
Small-footed bat Northern myotis Indiana bat	Potential adverse; no known hibernacula are in corridor; mitigation would offset any potential adverse impacts on summer roosts and maternity colonies	Potential adverse impacts; no known hibernacula are in corridor

The overall impacts on special-status plant species from transmission line activities under alternatives 4 and 5 are presented in table 75.

TABLE 75: ALTERNATIVE 4 AND 5 IMPACTS ON SPECIAL-STATUS PLANT SPECIES

Species	Impacts from Clearing and Construction	Impacts from Maintenance and Presence of Transmission Line
Pasture rose American holly Susquehanna sand cherry Swamp dog-hobble Marsh bedstraw Willow oak Stiff club moss	Adverse impacts if species could not be avoided during clearing; impact could be elevated if entire population was lost during clearing activities	Adverse impacts because species are expected to reestablish in the corridor after the initial clearing; impact could be elevated if long-term changes to habitat preclude species' ability to recover

Alternative 5

Alternative 5 would follow the same route through DEWA and APPA as alternative 4; however, alternative 5 does not include the portion of the B-K Line from the Bushkill Substation to the western boundary of DEWA. This portion of the B-K Line does not have specific presence of special-status species and would have the same impacts as alternative 4. Therefore, impacts on special-status species under alternative 5 would be the same as those described above for alternative 4 (see table 71 through table 75).

Cumulative Impacts

Cumulative impacts on special-status species inside the study area would be adverse, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the beneficial and adverse impacts on special-status species as a result of alternative 5 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected. Alternative 5 would not alter the level of impact.

Conclusion

The impacts on special-status species under alternative 5 would be the same as those for alternative 4 as presented in tables 71 through 75.

Special-status Aquatic Species: No impacts would occur on federally or state-listed aquatic species (freshwater mussels and bridle shiner) because no permanent surface waters exist in the study area.

Special-status Bird Species: The loss of forest from vegetation clearing would affect the following bird species: veery, cerulean warbler, black-throated green warbler, bald eagle, Cooper's hawk, northern goshawk, red shouldered hawk, and barred owl. The golden-winged warbler could benefit through the creation of additional habitat in the ROW and shrub scrub habitat could provide additional foraging habitat for predatory raptors such as Cooper's hawk and red shouldered hawk. Construction activities and associated noise, particularly if helicopters were used, adversely affect all bird species as would ongoing maintenance. Electrocution and collision with the alternative 5 transmission line would be possible but unlikely to the bald eagle, barred owl, Cooper's hawk, northern goshawk, and red shouldered hawk due to the north–south orientation of the transmission line, which would be parallel (not perpendicular) to the flight path of most migrating birds.

Special-status Reptile and Amphibian Species: Adverse impacts on timber rattlesnake and northern fence lizard (Pennsylvania) could occur during construction activities due to direct mortality as a result of their inability to escape moving construction equipment and vehicles. Adverse impacts on bog turtles could occur during construction due to direct mortality. Impacts would also include the destruction of turtle and lizard nests and snake dens used for hibernation. Adverse impacts on the timber rattlesnake and bog turtle would occur from disturbance while the species are using habitats in proximity to construction areas. During vegetation maintenance, temporary, localized disturbance to all special-status reptiles and amphibians from maintenance activities (only handheld equipment would be used) and human presence would occur; however, inadvertent crushing of nests, amphibians, or reptiles by workers could still occur. Impacts from maintenance activities would also occur. Adverse impacts on the timber rattlesnakes from blasting could result if vibrations from blasting cause dens to collapse. At this time, the locations of dens and towers is unknown for alternative 5. The NPS anticipates conducting surveys for timber rattlesnakes in spring 2012, but tower locations for alternative 5 will not be known for this EIS. To the extent possible, the placement of towers would avoid known locations of dens and prior to construction, a detailed blasting plan would be developed that describes the areal extent of impact from blasting and proposes measures to minimize the impacts of vibrations caused by blasting. For tower locations inside the potential area of impact from blasting, alternate techniques, including drilling, would be evaluated to minimize the potential for impacts on dens. The applicant would be required to develop a buffer zone, an area beyond which blasting activities would not impact the geology and dens, and preconstruction surveys would be undertaken and barrier fencing would be used during construction. Following construction, the dens would be monitored to determine whether dens were affected by construction activities. If impacts are documented during monitoring, additional mitigation could be required, including the relocation of rattlesnakes, in consultation with the NPS.

The potential for direct mortality of the bog turtle, which would be a take under the Endangered Species Act, would constitute an impact on the bog turtle and alternative 5 may be likely to adversely affect the bog turtle. As stated previously, future coordination with appropriate Federal and State agencies would clarify the extent to which adverse effects to listed species would be likely to occur and would determine whether a BA would be required. The FEIS and the BA for this project will include more details concerning impacts to the bog turtle as appropriate.

Special-status Mammal Species: Adverse impacts would occur on the Indiana bat, small-footed bat, and northern myotis because there are no known winter hibernacula located in the alternative 5 corridor. Adverse impacts from disturbance of summer roost or maternity colony during clearing and construction could occur; however, seasonal restrictions would be in place to protect the Indiana bat and would also protect the small-footed bat and northern myotis. Adverse impacts from habitat disturbance during construction and from maintenance activities would occur on bobcats that may occupy territory along the ROW.

Special-status Plant Species: Adverse impacts would occur on the pasture rose, American holly, swamp dog-hobble, marsh bedstraw, willow oak, stiff club moss, and Susquehanna sand cherry from construction and clearing activities if impacts on the species could not be avoided. Adverse impacts would occur on these species as a result of maintenance activities because it is possible that these plant species could reestablish in the ROW after clearing activities; American holly and Susquehanna sand cherry could be subject to occasional trimming and cutting during maintenance.

RARE AND UNIQUE COMMUNITIES

In this section, impacts on rare and unique communities are evaluated. A rare or unique community is a subset of an ecosystem that is recognized for its contribution to biological diversity—locally, regionally, or globally. Rare and unique communities include sites identified by the DEWA GMP (NPS 1987), county natural areas inventories, and state natural heritage programs. Rare and unique communities often support more than one rare species.

A rare or unique natural community results from a combination of physical and biotic features that create a distinct site. The geology and hydrology of a site determine the vegetation that grows there, which in turn influences the wildlife that use the habitat. Because all the components of a rare or unique community are interconnected, impacts on one resource, such as geology, would affect the entire community and change its composition and viability. The elimination of any rare or unique community would represent a considerable loss with far-reaching consequences.

METHODOLOGIES

Rare and unique communities were identified through various resources, including the DEWA GMP (NPS 1987), NJDEP GIS layers for natural heritage priority sites (NJDEP 2007), and natural area inventories for Monroe, Northampton, and Pike counties, Pennsylvania (PATNC 1990, 1991a, 1999, 2005). An impact on any one resource of a community has the potential to create a chain reaction and affect other resources in the community. Therefore, rare and unique communities were assessed from the ground up. This means that impacts on the resources that create or influence the characteristics of the community were analyzed first. The effects of these impacts were then used to assess the impacts on other resources in the community. Because rare and unique communities can encompass nearly all types of natural resources, the evaluation of impacts on rare and unique communities considered potential effects on natural resources, such as the interruption of geologic processes, the loss of vegetation, the spread of invasive plant and animal species, changes in ecological integrity, the loss of or changes in wetland functions, and changes in population integrity. Specific impacts on individual resources may be found in the appropriate sections of this chapter. Impacts on rare and unique communities reflect impacts on applicable resources found in a specific rare or unique community.

STUDY AREA

The study area for rare and unique communities includes the ROW for each alternative and any area outside the ROWs where necessary pulling and splicing sites and access road development are proposed or would be expected. Because the location of the S-R Line outside the study area cannot be determined at this time, the indirect impacts on rare and unique communities cannot be evaluated per alternative. The potential impacts outside the study area are generally addressed; however, further surveys would be required prior to construction of the S-R Line.

CUMULATIVE IMPACTS COMMON TO ALL ALTERNATIVES

The rare and unique communities in NPS lands are protected from major development and are maintained through NPS programs. However, existing ROWs, roads, and trails fragment the habitats, thereby reducing the quality of the habitat. Although the B-K Line predates the establishment of DEWA, the stricter vegetation maintenance standards put forth by NERC have increased the impact on vegetation from the maintenance of the ROW. Additionally, rare and unique communities are currently under pressure from a number of stressors, including habitat loss and degradation, development, pollution, toxic chemicals, invasive species, pests, disease outbreaks, habitat fragmentation, and wildfires, making them highly vulnerable to additional impacts such as climate change (NABCI 2010, 44). Actions and activities in the foreseeable future contribute to the decline of rare and unique communities through ground disturbance, the temporary and permanent removal of vegetation, the disturbance and mortality of wildlife, and the potential colonization by invasive species. Past, present, and reasonably foreseeable activities that would have beneficial or adverse impacts on rare and unique communities inside and outside the study area are listed below and discussed under each alternative as applicable. Projects with the potential to have cumulative impacts both inside and outside the study area are described in detail in appendix H.

Projects Inside the Study Area

Because rare and unique communities are individual, distinct microhabitats within larger habitats, cumulative impacts are analyzed based on the projects that have affected, are affecting, or would affect the rare and unique communities directly. Several projects could affect one or more of the rare and unique communities inside the study area, because these projects are parkwide. Adverse impacts on rare and unique communities could result from illegal activities such as ORV use, plant and wildlife collection, hunting/poaching, and woodcutting. These activities could create ground disturbance, the direct loss or mortality of plants and wildlife, and the loss of habitat. Beneficial impacts would result from parkwide invasive species control programs, the DEWA prescribed burn program, and the Wildlife Habitat Incentive Program. These programs work to control invasive species and improve or restore wildlife habitat.

Arnott Fen: The present parkwide activities and programs inside the study area would result in adverse cumulative impacts on Arnott Fen. No other past, present, or reasonably foreseeable projects in the study area have affected, are affecting, or would affect Arnott Fen.

Delaware River Riparian Corridor: Current parkwide activities and programs and the past, present, and reasonably foreseeable recreational improvement, development, and utility projects listed below would result in adverse cumulative impacts in the Delaware River riparian corridor inside the study area.

- Delaware River bridge projects would improve the Delaware Water Gap Toll Bridge and would create beneficial impacts on water resources through erosion control measures.
- The I-80 weigh station would upgrade the weigh station, resulting in the disturbance of wetland areas for construction and long-term stormwater management and erosion control measures.
- The Metropolitan Edison removal of unused power poles and transformers would benefit the Delaware River riparian corridor by allowing previously cleared and maintained areas to revegetate and succeed naturally, which would reduce habitat fragmentation and increase interior habitat.
- Metropolitan Edison vegetation management and tree removal would maintain utility ROWs, which would resist the natural process of succession, reduce available interior habitat, alter natural habitat, and aid in the colonization of invasive plant species.
- The construction of facilities for Turtle Beach produced adverse impacts on soils, vegetation, and water quality. This project would reduce, but would not eliminate, impacts to species of special concern.
- The restoration of flood damaged river campsites would prevent soil erosion and compaction and restore habitat, resulting in beneficial impacts.

Eastern Hemlock Stands: Current parkwide activities and programs and the following current habitat preservation project would result in adverse cumulative impacts on eastern hemlock stands inside the study area.

- The management of hemlock stands in DEWA works to control invasive plant species and control infestations of invasive insect species, resulting in beneficial impacts on eastern hemlock stands.

Hogback Ridge: Current parkwide activities and programs and the following past recreational improvement project would result in adverse cumulative impacts on Hogback Ridge inside the study area.

- The McDade Trail realignment dismissed the alternative of routing the McDade Trail over Hogback Ridge. An alternate alignment was chosen to avoid the Hogback's sensitive wildlife and vegetation, and parking areas and social trails were eliminated to reduce visitor use that would adversely impact these resources.

Kittatinny Ridge: Current parkwide activities and programs and the following past and present utility and habitat protection projects would result in adverse cumulative impacts on the Kittatinny Ridge inside the study area.

- The relocation of the Appalachian Trail near the Columbia Gas Transmission Company pipeline crossing resulted in vegetation clearing, which fragmented habitat and disturbed wildlife.
- The Columbia Gas Transmission Company pipeline upgraded an existing natural gas pipeline that traverses DEWA, affecting natural resources through ground disturbance, vegetation loss, habitat fragmentation, the alteration of habitat, the disturbance of wildlife, and potential colonization by invasive plant species.
- Current IBA and IMA programs are working to protect critical habitat, benefiting wildlife and reducing loss of vegetation and habitat fragmentation.

Minsi Lake / Bear Swamp: Current parkwide activities and programs inside the study area would result in adverse cumulative impacts. No projects in the study area have affected, are affecting, or would affect Minsi Lake / Bear Swamp.

Totts Gap Natural Heritage Site: Current parkwide activities and programs and the following past utility project would result in adverse cumulative impacts on Totts Gap Natural Heritage Site inside the study area.

- The Columbia Gas Transmission Company pipeline upgraded an existing natural gas pipeline that traverses DEWA, affecting natural resources through ground disturbance, vegetation loss, habitat fragmentation, the alteration of habitat, the disturbance of wildlife, and potential colonization by invasive plant species.

Van Campen Brook Riparian Area: Current parkwide activities and programs and the following reasonably foreseeable development projects would result in adverse cumulative impacts on the Delaware River riparian corridor inside the study area.

- The Old Mine Road South rehabilitation would repair pavement along Old Mine Road and would improve sediment and erosion control.
- The repair of failing Watergate Dam #10 would rehabilitate the dam and would decrease impacts on water and aquatic resources through sediment and erosion control.

Overall, the effects of past, present, and reasonably foreseeable projects would result in overall adverse cumulative impacts on rare and unique communities inside the study area.

Projects Outside the Study Area

Outside the study area, projects that would result in adverse cumulative impacts on rare and unique communities could include any that would have impacts on any of the elements of these communities, such as geology, vegetation, hydrology, and connectivity. Cumulative projects that could adversely affect rare and unique communities outside the study area include the following road and utility projects: the Marcellus shale natural gas drilling; the Columbia Gas Transmission Company pipeline (replacement of an existing gas pipeline); the Tennessee Gas Line Proposal (addition to an existing gas pipeline); the FERC relicensing of Yards Creek Generating Station (relicensing power plant); the Marshalls Creek traffic relief project (new bypass route); the PFBC natural gas leasing and water access programs; the PPL proposal for a 138/12 kV substation (opens up additional areas to electric transmission); the US Route 209 rehabilitation and replacement of Toms Creek Bridge (road and bridge repair); Martins Creek Power Plant (contaminated water spill); wind turbines in northeastern Pennsylvania; and transportation improvement and replacement projects in Pennsylvania and New Jersey.

Proposed residential and commercial developments in New Jersey and Pennsylvania would also cause adverse impacts on vegetation. Beneficial impacts on vegetation would result from the following projects: the DEWA prescribed burn program; Pennsylvania's weed eradication program; the Wildlife Habitat Incentive Program; and IBA/IMA programs. Nongovernmental organizations such as The Nature Conservancy work toward identifying and preserving land that contains rare or unique features or key habitat for plants and wildlife. The beneficial effects of many of the listed programs are dependent on the availability of funding for specific projects, which could vary throughout the period of analysis; therefore, the level of benefit resulting from implementation of any project is also variable. Despite land protection and conservation outside the study area, land in the 10 counties of New Jersey and Pennsylvania that are part of this analysis is subject to continued development that would result in further loss, alteration, and fragmentation of habitat, including rare and unique communities. Cumulative impacts on rare and unique communities outside the study area would be adverse.

IMPACTS OF THE ALTERNATIVES ON RARE AND UNIQUE COMMUNITIES

Common to All Alternatives

Vegetation Maintenance: PPL and PSE&G have separate vegetation management plans because they are distinct utility companies working in two states; however, vegetation maintenance would occur annually at a minimum. The details of the vegetation management plans as well as clearing techniques are explained in chapter 2.

Invasive Species: Under all action alternatives, invasive plant and wildlife species have the potential to spread and colonize as a result of vegetation removal, disturbance, and the spread of cleared vegetation through mulching. Monitoring programs for invasive plant species and mitigation for invasive wildlife species are described in the "Vegetation" section of this chapter.

Natural Heritage Programs: NJNHP and PNHP were created to identify critically important areas to support the conservation of biological diversity. These programs are based on the occurrence and locations of native plant and animal, natural community, and geologic resources, with a focus on rare and endangered species. While natural heritage sites do not cover the entire known habitat for endangered and threatened species, they work to conserve critical habitat (NJDEP 2008e; PNHP n.d.)

Mitigation Measures: Mitigation measures would help reduce impacts from construction, operation, and maintenance activities both inside and outside the study area. Mitigation measures for rare and unique communities include those measures that would protect the resources within the community. The complete list of mitigation measures for physical and natural resources are discussed in chapter 2 and appendix F.

Outside the Study Area: Outside the study area, regardless of which alternative is selected, the transmission line could pass through Carbon, Lackawanna, Luzerne, Monroe, Northampton, Pike, and Wayne counties in Pennsylvania and Morris, Sussex, and Warren counties in New Jersey. These counties are largely undeveloped and contain a variety of rare and unique communities. The counties in Pennsylvania contain 58 types of communities that range from vulnerable to critically imperiled, and the counties in New Jersey contain 22. The rare and unique communities are presented in appendix C. Additionally, The Nature Conservancy protects eight preserves in Pennsylvania and eight in New Jersey. The Nature Conservancy restricts the activities that are allowed on the preserves, which adds to the conservation of rare and unique communities outside the study area.

The clearing, construction, and vegetation maintenance activities outside the study area would be consistent with those described for inside the study area; however, the direct impacts outside the study area cannot be determined, as described in the introduction of this chapter. In addition, specific resource impacts outside the study area cannot be identified until the route is chosen by the applicant. Once this decision is reached, additional surveys would be required to determine the impacts of the selected route on rare and unique communities.

Outside the study area, indirect adverse impacts on rare and unique communities from vegetation clearing, the construction of the transmission line, the operation and maintenance of the transmission line, vegetation maintenance, and the potential spread of invasive species would be adverse.

Cumulative impacts on rare and unique communities outside the study area would be adverse, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the adverse impacts on rare and unique communities outside the study area are combined with other past, present, and reasonably foreseeable projects outside the study area, an overall adverse cumulative impact would be expected.

Alternative 1: No Action

Rare and unique communities that exist along the alternative 1 alignment include Arnott Fen, Delaware River riparian corridor, eastern hemlock forests, Hogback Ridge, Kittatinny Ridge (including talus slope), and Van Campen Brook riparian area. These communities are discussed in the following sections. To arrive at an overall impact and an overall cumulative impact for all the communities in each alternative, the impact on each community as well as the diversity and extent of rare and unique community types along each alternative was considered.

Arnott Fen: As stated in the “Rare and Unique Communities” section of chapter 3, Arnott Fen is a globally imperiled community that is unique in part due to the underlying limestone bedrock. Because no construction activities would be included under alternative 1, there would be no impacts on the geologic features and the groundwater associated with Arnott Fen.

In the existing ROW, Arnott Fen and the surrounding wetland complex area contain a diverse vegetation community including species of conservation concern. Most of the plant species in the ROW are herbaceous and are compatible with the applicant’s specifications for vegetation clearing and control (PPL 2010a, 12). Vegetation control measures such as mowing and herbicide use are not currently employed in Arnott Fen and would not be necessary for maintenance under alternative 1. However, incompatible shrubs and small trees such as red maple are also present in the fen and would be hand cleared as part of vegetation management. This maintenance would affect Arnott Fen both beneficially (by keeping the fen open and controlling succession into a wooded wetland) and adversely (by damaging plant species, facilitating the spread of invasive species, and affecting wildlife species through disturbance or direct mortality). Conservation measures would be employed to protect the rare species, such as seasonal restrictions, herbicide restrictions, and the implementation of the invasive species guidelines from the vegetation maintenance plans.

Under alternative 1, the Arnott Fen community would continue to provide suitable habitat for a range of wildlife, including several wildlife species of conservation concern, because the habitat would be maintained by the applicant through NPS-approved vegetation maintenance and would not be altered by construction activities. Mobile wildlife species may be adversely affected by noise and human activity during vegetation management in adjacent areas. Mobile species could be driven out of the habitat, but it is expected that individuals of these species would return to the fen and the surrounding habitats when maintenance is complete. Additionally, nests and eggs of wildlife could be damaged or destroyed during maintenance activities; however, these impacts could be mitigated through seasonal restrictions, as described in appendix F.

Impacts on the Arnott Fen community would result from vegetation maintenance and indirect adverse impacts on wildlife under alternative 1, the no-action alternative.

Delaware River Riparian Corridor: The Delaware River riparian corridor extends approximately 0.25 mile on either side of MDSR. For alternative 1, the Delaware River riparian corridor includes a buffer along the western shore of the Delaware River in Pennsylvania at the base of Hogback Ridge. Because steep slopes occur on either side of the Delaware River, the existing towers are positioned on the tops of the ridges and the transmission lines span the river. The Delaware River riparian corridor is recognized as critical habitat for breeding, wintering, and/or migrating songbirds, waterfowl, and wading birds (NPS 2009g, 5). The riparian corridor contains an active bald eagle communal winter roost and provides important foraging habitat for bald eagles (NPS 2009g, 6).

Vegetation would be maintained throughout this area, except for a 100-foot buffer adjacent to the river on both sides (PPL and PSE&G 2008, 7), resulting in adverse impacts to floodplain forest. Vegetation maintenance would halt the natural succession of the vegetation communities in the ROW, resulting in adverse impacts. Additionally, noise and human activity in adjacent areas during maintenance could disturb wildlife. Mobile wildlife species may be displaced from the Delaware River riparian corridor during vegetation management activities, but it is expected that individuals of these species would return to the area when maintenance is complete.

Due to impacts on wildlife, adverse impacts would be expected on the Delaware River riparian corridor community under alternative 1.

Eastern Hemlock Forests: Along the alternative 1 alignment, eastern hemlocks grow in habitats designated as eastern hemlock forests, eastern hemlock / northern hardwood forests, and dry eastern hemlock / oak forests; occasionally, eastern hemlock trees are found in eastern white pine forests. Because of current vegetation management along the alternative 1 alignment, eastern hemlocks only grow in the forests that border the ROW, not in the ROW itself. Vegetation management would continue under alternative 1, preventing the trees from growing in the ROW. Continued vegetation management would occasionally remove trees from the ROW and remove of danger trees from outside the ROW, adversely affecting hemlock forests. While certain species of plants are associated with hemlock forests, the removal of an occasional tree would not affect population viability. Ground disturbance sustained during vegetation maintenance, especially removal of danger trees, would facilitate the spread of invasive plant species, such as Japanese barberry. Under the applicant's current vegetation management plans, invasive species are not controlled and their spread is not monitored. Additionally, if the pruning of mature eastern hemlocks is done incorrectly, it would cause damage to the trees, potentially allowing the hemlock woolly adelgid and elongate hemlock scale to establish in pruned trees and damage them. Despite monitoring programs, the invasive hemlock woolly adelgid has caused damage to the eastern hemlocks of DEWA and infestation levels were high in 2007 and 2008, causing decline, mortality, and low growth levels (NPS 2008g, IV-83).

Direct mortality and disturbance to wildlife associated with eastern hemlocks would result from the occasional removal of these trees during vegetation management, but the impact would not be great enough to threaten the viability of a population. Indirect impacts on wildlife species that use eastern hemlock forests would result during vegetation maintenance from human disturbance and noise.

Adverse impacts on the eastern hemlock forest community under alternative 1 would result from effects on vegetation and wildlife.

Hogback Ridge: The woodlands of Hogback Ridge encompass 216 acres of forest that are bisected by the existing 230-kV transmission line. The uniqueness of the Hogback results from a combination of limestone bedrock, topographic features, and landscape setting overlooking the Delaware River. Hogback Ridge supports a diversity of vegetation, including eastern hemlock / northern hardwood forest and rare lichens, which are uncommon in DEWA. The Hogback was considered such an important area for the park, that the NPS relocated the McDade Trail at large cost to protect it from increased intrusion. Under alternative 1, the vegetation in the existing ROW through Hogback Ridge is currently, and would continue to be, maintained as scrub shrub habitat, which is not the natural condition for this unique natural community. Therefore, the vegetation in Hogback Ridge would remain bisected by the existing ROW, and periodic maintenance would keep the ROW in an early successional stage. Historically, very little maintenance has taken place and the existing ROW is surrounded by forested areas limiting the impact of the cleared ROW especially in Pennsylvania.

Hogback Ridge contains priority hemlock stands that are treated under an NPS program to suppress invasive plant species (NPS 2007e, I-10–I-11). Under the applicant’s current vegetation management plans, the spread of invasive species is not monitored; without further control, invasive species would continue to grow and spread. Vegetation maintenance would create some disturbance in the ROW, which could facilitate the spread of invasive species.

The woodlands of Hogback Ridge support an abundance of wildlife, including red-headed woodpecker, spotted turtle, northern ringneck snake, wood frog, upland chorus frog, and several species of conservation concern (NPS 2009g, 3; NPS 2011g; NPS 2005e). Wildlife that use Hogback Ridge would be affected by vegetation maintenance as described in the “Landscape Connectivity, Wildlife Habitat, and Wildlife” section of this chapter: increased predation following maintenance activities when the ROW is cleared of vegetation; mortality of less mobile species; increased nest predation; and disturbance from human activity and noise. These impacts on wildlife and migratory birds from continued operation and vegetation management under alternative 1 would be adverse. Conversely, some species prefer edge and scrub shrub habitats and would benefit from the continued maintenance of the ROW as scrub shrub habitat.

Alternative 1 would adversely impact the Hogback Ridge community through the continued operation and maintenance of the transmission line, which would affect the geology, vegetation, and wildlife resources in the community.

Kittatinny Ridge: Under alternative 1, the existing ROW cuts through Kittatinny Ridge perpendicularly along the alternative 1 alignment; the vegetation in the existing ROW is currently, and would continue to be, maintained as scrub shrub habitat that bisects mature forest habitat, which is not the natural condition for this unique community. Without maintenance, the existing ROW would succeed to one continuous forest. Continued periodic maintenance of the existing ROW under alternative 1 would continue to result in a linear scrub shrub community bisecting the forested area of Kittatinny Ridge.

Periodic vegetation maintenance would not likely be necessary in the talus slope community during the period of analysis due to the sparseness of vegetation growth. However, the applicant would have the right to maintain vegetation in the ROW if necessary for the safety of the line. Vegetation maintenance in talus slope communities would adversely affect the vegetation through disturbance and displacement of soils and plants during clearing activities. Talus slope habitat by nature is unstable and the vegetation communities in talus slope communities are easily disturbed and delicate due to the thin and dry soils.

While vegetation maintenance would create disturbance in the ROW, impacts from further colonization by invasive species would be minimized when the mitigation measures discussed in appendix F are employed.

Wildlife species observed in the talus slope community include reptiles such as common garter snake, five-lined skink, and one species of conservation concern (NPS 2005e). A variety of small mammals, birds, and invertebrates are also expected to use the habitat. Wildlife that use the habitat of Kittatinny Ridge and talus slope communities would be affected by vegetation maintenance as described for Hogback Ridge: increased predation following maintenance activities when the ROW is cleared of vegetation; mortality of less mobile species; increased nest predation; and disturbance from human activity and noise. Conversely, some species prefer edge and scrub shrub habitats and would benefit from continued maintenance of the ROW as scrub shrub habitat. Detailed descriptions of impacts on wildlife are described in the “Landscape Connectivity, Wildlife Habitat, and Wildlife” section of this chapter.

The existing transmission lines present the potential of bird collisions for migrating raptors. Raptors may also collide with wires when foraging along the ROW. Additionally, large birds of prey attempting to perch on poles can be electrocuted by wire-to-wire or conductor-to-ground connections.

As a result of the continued periodic maintenance of the existing ROW, the soils, vegetation, and wildlife of Kittatinny Ridge, and therefore the talus slope community, would be adversely affected under the continued operation and maintenance of alternative 1.

Van Campen Brook Riparian Area: Van Campen Brook riparian area, like Hogback Ridge, is an outstanding natural feature of DEWA. The ROW for alternative 1 intersects floodplain forest and associated wetlands that support special status wildlife. Some of the plant species in the Van Campen wetland complex and surrounding the stream are compatible with the applicant’s specifications for vegetation clearing and control; however, incompatible shrub and any small tree species would be removed by hand clearing. Periodic maintenance in the wetland complex would be required to maintain compliance with the NERC standards for vegetation maintenance. Land disturbance would result from vegetation maintenance; therefore, there would be potential impacts from further colonization by invasive plant species. Impacts would be minimized by mitigation measures described in appendix F.

The Van Campen Brook riparian area would continue to support animal species such as wild trout, Baltimore checkerspot butterfly, and three reptile and amphibian species of concern, because the habitat would not be altered by vegetation maintenance or construction activities. As described for Arnott Fen, these mobile wildlife species may be affected indirectly and adversely by human disturbance and noise during vegetation management in adjacent areas; however, it is expected that individuals of these species would return to the riparian area once maintenance is complete.

Under alternative 1, adverse impacts on the Van Campen Brook riparian area community would result due to indirect impacts on wildlife.

Cumulative Impacts

Cumulative impacts on rare and unique communities inside the study area would be adverse. When the overall adverse impacts on rare and unique communities as a result of alternative 1 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected. Alternative 1 would not alter the level of impact.

Conclusion

When considering the diversity of communities along the alternative 1 alignment as a whole, overall adverse impacts on the rare and unique communities under the no-action alternative would result. These adverse impacts would result from artificially maintaining scrub shrub habitat in the parks, which is not consistent with NPS protection of natural, scenic, and recreational resources. Additionally, there would be adverse effects on soils and wildlife. When the adverse impacts on rare and unique communities as a result of alternative 1 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected.

Common to All Action Alternatives

Removal of Existing Structures: All action alternatives (2, 2b, 3, 4, and 5) would include the removal of all or a portion of the B-K Line. This would include removal of the B-K Line structures, but the foundations for these structures would remain in place. For alternatives 2 and 2b, the S-R Line would be constructed along the same alignment, resulting in twice the number of tower foundations. For all alternatives, the removal of the structures would require the construction of access roads and/or spur roads along the B-K Line to allow access to and removal of the structures. The details of removing the existing transmission lines are discussed in chapter 2.

Vegetation Clearing: For the analysis of impacts on rare and unique communities, it was assumed that a 350-foot corridor would be cleared of vegetation for the construction of the new double 500-kV transmission line for alternatives 2, 3, 4, and 5. For alternatives 2, 3, 4, and 5, the corridor would be cleared 175 feet from the centerline of the existing ROW to either side. Under alternative 2b, the applicant proposes to operate the S-R Line within the existing ROW. The NPS anticipates that the applicant would require additional area for construction; therefore, it is estimated that under alternative 2b, the applicant would expand the ROW to the extent of their deeded property rights, which ranges from 100 feet to 380 feet. The property rights are currently being researched through deed research and ground surveys and will be updated as applicable in the final EIS. For alternative 2b, the ROW would be cleared on either side of the centerline to an appropriate width based on the deeded property rights.

In addition to vegetation clearing inside the ROW, areas outside of the ROW would also need to be cleared for all action alternatives to construct the access roads, spur roads, and pulling and splicing sites. Areas cleared for access roads (inside and outside the ROW) and tower foundations (inside the ROW) would be maintained permanently and would result in a permanent loss of vegetation. All other cleared areas would be seeded after construction with an NPS-approved conservation seed mixture appropriate to the local conditions. The area within the ROW maintained for operation is less than that which would be cleared for constructions. Areas both inside and outside the ROW that do not need to be maintained for operation of the S-R Line would be allowed to succeed to forested area over time. Because mature forest removed for construction would not be replaced within the 15-year analysis period covered by this EIS the impacts would be considered permanent.

Construction Components: Construction activities are described in detail in chapter 2; the activities that would affect rare and unique communities include the construction of access roads, tower foundations, crane pads, wire pull locations, pulling and splicing sites, and staging areas.

Alternative 2

Impacts on rare and unique communities in the study area would result from clearing and construction activities along the alternative 2 alignment such as blasting, excavation and grading, soil compaction, noise, and the physical removal of vegetation. Because alternative 2 would use the existing ROW discussed in alternative 1, the rare and unique communities that exist along the alternative 2 alignment are the same: Arnott Fen, Delaware River riparian corridor, eastern hemlock forests, Hogback Ridge, Kittatinny Ridge (including talus slope), and Van Campen Brook riparian area (see figure 43 in chapter 3). These communities encompass approximately 52% of the route in the study area are discussed in the following sections relative to alternative 2.

Arnott Fen: Approximately 4.1 acres of the 10.5-acre Arnott Fen would lie in the 350-foot corridor of the proposed ROW expansion under alternative 2. As described previously, the existing compatible plant species in the fen and a 50-foot buffer surrounding the fen would not be cleared to prepare for construction activities. However, some incompatible shrubs / small trees, such as red maple, exist in the fen and would be hand cleared for construction and as part of the vegetation maintenance programs. Under alternative 2, new towers would be placed in uplands on either side of the fen and an access road would cross this wetland outside of the ROW. One of these towers would be placed in the ROW approximately 120 feet from the perimeter of the fen. In order to install tower foundations, which may extend below grade 15 to 30 feet or more with a diameter of 6 to 9 feet, extensive excavation and blasting would be necessary. Under alternative 2, required blasting could cause limestone fracturing, which can lead to loss of groundwater flow to the surface. Details of blasting and excavation impacts can be found in the “Geology” and “Wetlands” sections of this chapter. Outside the ROW, Arnott Fen would be affected by the construction of an access road. At the site of the proposed road, a crossing exists, but it is not a road able to support heavy construction equipment. Therefore, fill would be necessary prior to creating a bridge across the fen using tack-welded plates and ramped timber mats. This proposed access road would result in the permanent loss or alteration of wetland functions and values. Because Arnott Fen exists as a distinct combination of physical and biotic features, if groundwater flow to the fen or function of the fen is altered, it would affect habitat supporting the unique vegetation and special-status plants and wildlife using this wetland. In turn, this shift in the vegetation would reduce the available resources for wildlife species that depend on the conditions currently found in the fen, including species of conservation concern.

Wildlife species that inhabit Arnott Fen may be adversely affected by noise and human activity associated with clearing, construction, and periodic vegetation management; however, disturbance from noise would be temporary, and direct mortality would be avoided by employing the mitigation measures described in appendix F.

Under alternative 2, adverse impacts on the Arnott Fen community would result from clearing, construction, and maintenance activities. Geology, wetland functions and values, vegetation, and wildlife would be affected.

Delaware River Riparian Corridor: Under alternative 2, new transmission towers would be placed atop the ridges on either side of the Delaware River and the lines would span the river. However, the riparian corridor extends approximately 0.25 mile on either side of MDSR, and two towers would be constructed in the riparian corridor. A 100-foot buffer on either side of the Delaware River would not be cleared in preparation for construction; however, the majority of the riparian corridor in the proposed ROW (approximately 19.6 acres) would require vegetation clearing.

Construction activities for the towers, access roads, and crane pads in the riparian corridor would result in impacts on geology, as described previously in this chapter. Construction on the Pennsylvania side of MDSR would take place in the fragile limestone bedrock of Hogback Ridge; impacts from construction in this area are discussed in detail for Hogback Ridge below.

During the operation of the transmission line, vegetation maintenance would be required in the new ROW. Under alternative 2, approximately 4.5 to 10.2 acres of previously mature forest would be maintained by mechanical and chemical means as scrub shrub habitat. Construction activities and vegetation maintenance would also create an avenue for the spread of invasive species; however, mitigation measures should minimize the impacts of invasive species. The portions of the ROW that required clearing only for construction would be restored; however, the restoration would not be complete within the analysis period of this EIS and would be hindered by soil compaction sustained during construction activities, as described in the “Vegetation” section.

Generally, wildlife would be affected by clearing and construction activities and vegetation maintenance through mortality, increased predation, and disturbance where wildlife inhabits the Delaware River riparian corridor. The details of impacts on wildlife are discussed in the “Landscape Connectivity, Wildlife Habitat, and Wildlife” section of this chapter.

The Delaware River riparian corridor along the alternative 2 alignment includes portions of a communal winter roost and foraging area for bald eagle. Disturbance from clearing and construction activities and maintenance activities would deter eagles from using the roosting site and the foraging area, but following the end of the disturbance, the eagles would likely return to the area. The S-R Line would contain more conductors and would be directly in the flight line used by eagles flying between the roost site and foraging area. Additionally, the transmission lines would bisect a winter roost. The removal of roost trees would result in displacement of bald eagles that could be permanent, depending on the amount of disturbance. See the “Special-status Species” section of this chapter for details on the effects of disturbance to bald eagles during clearing and construction activities and for potential mitigation measures.

Adverse impacts on the Delaware River riparian corridor community under alternative 2 would be expected, because geology, soils, vegetation, aquatic resources, water resources, wildlife, and special-status species in the riparian corridor would be affected.

Eastern Hemlock Forests: Approximately 19.1 acres of forest containing eastern hemlocks would be removed during the clearing of the 350-foot corridor under alternative 2. Most of the eastern hemlock forests are found along Hogback Ridge in eastern hemlock / northern hardwood forests that border the existing ROW. Along the alternative 2 alignment, eastern hemlock forests span the ROW in Hogback Ridge and the Van Campen Brook riparian area. The proposed ROW would further fragment these forests. The “Landscape Connectivity, Wildlife Habitat, and Wildlife” section of this chapter details the impacts of fragmentation from clearing for the proposed ROW. The development of access roads would cause a loss of vegetation and although the applicant’s proposed access roads would remain mostly in the proposed ROW, approximately 0.22 mile of access road would cut through undisturbed forest, resulting in an additional loss of approximately 0.42 acre of eastern hemlock forest.

After the double 500-kV transmission line is constructed, approximately 15.3 to 17.3 acres of mature eastern hemlock forest would be permanently altered and maintained as scrub shrub habitat. Cleared areas needed for construction but not for operation would be seeded with an NPS-approved conservation seed mixture and allowed to revegetate naturally; however, the restoration would not be complete within the analysis period of this EIS and would be hindered by soil compaction sustained during construction activities, as described in the “Vegetation” section.

Once the transmission line is operational, vegetation maintenance would be required in the new ROW, as previously described. This maintenance program would result in adverse impacts on the vegetation in the ROW because a permanently maintained scrub shrub habitat would continue.

All activities under alternative 2 would facilitate the spread of invasive plant species throughout eastern hemlock forests, especially clearing and construction because these activities would result in a significant amount of ground disturbance. However, with the mitigation measures described in appendix F, impacts would be limited. The invasive hemlock woolly adelgid and elongate hemlock scale are also a concern in hemlock forests. These insects could be inadvertently spread through mulching, the transport of mulch for use in other areas, and the transport of equipment used during vegetation removal. Trees that remain in place but are injured during construction activity would become more susceptible to new infestations. Monitoring and treatment (as part of the applicant’s vegetation management plans) would minimize the damage from infestations and would reduce the adverse affects of invasive insect species.

Any decline in the stability of hemlock forests would indirectly impact the aquatic resources of the parks. Eastern hemlock forests that border the ROW of alternative 2 extend to the edges of water bodies — eastern hemlock forests border Big Bushkill Creek for approximately 0.35 mile and Van Campen Brook for approximately 0.18 mile, and hemlocks also surround the wetlands of Hogback Ridge. If hemlock stand vitality decreases from the effects of invasive insect species, these water bodies would be indirectly affected by factors such as changes in temperature and a decline in the diversity of species.

Clearing and construction activities would directly and indirectly impact wildlife species through mortality, increased predation, and disturbance where wildlife inhabits eastern hemlock forests. Vegetation maintenance activities have the potential to disturb and temporarily displace wildlife species. Additionally, the removal of pure hemlock forests decreases the amount of habitat available to those wildlife species that prefer hemlocks. Competition for territory in areas of reduced hemlock-dominated habitat may permanently displace individuals of some wildlife species to other areas.

Under alternative 2, the construction, operation, and maintenance of the proposed double 500-kV transmission line would result in adverse impacts on the eastern hemlock forest community along the ROW, including impacts on geology, vegetation, aquatic resources, and wildlife resources in the community.

Hogback Ridge: Approximately 17.6 acres of Hogback Ridge would be encompassed by the 350-foot corridor for the construction of the proposed ROW under alternative 2, and nearly all of this acreage would initially be cleared in preparation for construction activities. Approximately 11.8 acres of mature forest would be cleared, the majority of which is eastern hemlock / northern hardwood forest, which is rare in DEWA. This clearing would further fragment Hogback Ridge. The Hogback Ridge woodlands cover approximately 216 acres but are part of a larger expanse of forested habitat that encompasses approximately 893 acres. The proposed ROW and continual vegetation maintenance would completely bisect the habitat in the Hogback Ridge woodlands, creating two sections of woodlands and reducing interior forest habitat. This fragmentation would affect forest interior–dwelling species such as wood thrush and scarlet tanager. Further details of fragmentation are discussed in the “Landscape Connectivity, Wildlife Habitat, and Wildlife” section of this chapter. The development of access roads would cause a permanent loss of vegetation along the linear routes of the roads. The applicant’s proposed access roads would remain mostly in the proposed ROW; however, 0.3 mile of access road would cut through undisturbed forest, resulting in an additional loss of approximately 0.7 acre of forest. This central location within the parks could essentially create a divided park into a north and south section.

Construction activities would include the installation of temporary features, such as crane pads and pulling and splicing sites, and permanent features, such as tower foundations and access roads. The placement of new tower foundations would require blasting and excavation, which would damage the underlying limestone bedrock of Hogback Ridge. Two towers are planned in the existing ROW on Hogback Ridge. The excavation and blasting of the limestone-based formations that underlie Hogback Ridge would cause the limestone to fracture from ground vibrations and the removal of rocks and minerals, which can ultimately lead to landform destruction. The effects of the construction activities of new towers on these formations are described in detail in the “Geology” section of this chapter. Although the impacts would be localized, soils would be permanently excavated and removed and the natural function of the soils would be lost in the selected areas.

The installation of temporary features such as crane pads and pulling and splicing sites would not require blasting; therefore, no impacts on the geologic formations of Hogback Ridge would be expected from the construction of these components. These features, as well as the construction of access roads and spur roads, would require excavation, grading, the placement of geotextile fabric, and installing and compacting gravel. Impacts would include soil compaction, the loss of some soil function, and an increase in soil erosion from grading, placing compacted gravel over the soil, and using heavy equipment and large vehicles on the access roads. After the double 500-kV transmission line is constructed, the proposed transmission line would require a 200- to 300-foot ROW to operate; therefore, approximately 4.9 to 9.9 acres of mature forest, including eastern hemlock forest, would be permanently altered and maintained as scrub shrub habitat. Impacts on eastern hemlock stands from alternative 2 activities are discussed in the previous section.

Following construction, all temporary sites disturbed during construction would be returned to preconstruction conditions and would be seeded with an NPS-approved conservation seed mixture and allowed to succeed back to forested habitat over time. However, the mature forest that would be removed for construction would not be replaced within the 15-year analysis period covered by this EIS and would be hindered by soil compaction sustained during construction activities, as described in the “Vegetation” section.

Once the transmission line is operational, vegetation maintenance would be required in the new ROW. Vegetation maintenance procedures would include pruning, herbicide application (with prior NPS approval), and occasional tree removal. This maintenance program would result in the permanent alteration of vegetation in the ROW and would permanently bisect forested areas on Hogback Ridge, contributing to the fragmentation of the wooded areas and the maintenance of an unnatural linear scrub shrub habitat along Hogback Ridge.

Vegetation maintenance would create some disturbance in the ROW, but impacts from further colonization by invasive species would be minimal because the mitigation measures described in appendix F would be implemented.

Clearing and construction activities would directly and indirectly impact wildlife species, including one amphibian and two bird species of conservation concern, through mortality, increased predation, and disturbance in the clearing and construction area in Hogback Ridge. The clearing of vegetation for construction and during maintenance activities has the potential to disturb and temporarily displace wildlife species. It is expected that mobile species would return to the area after activities have ceased and habitat has returned to the preferred condition. Impacts on wildlife would be minimized by mitigation measures such as seasonal restrictions and others discussed in appendix F.

The natural resources (geology, soils, vegetation, and wildlife) of Hogback Ridge would be adversely impacted with the implementation of alternative 2.

Kittatinny Ridge: Under alternative 2, mature forest would be cleared to prepare for construction, increasing fragmentation. Access roads would remain in the corridor in this area and would not require the removal of additional vegetation. The “Landscape Connectivity, Wildlife Habitat, and Wildlife” section of this chapter details the impacts of fragmentation from clearing for the proposed ROW.

Impacts on geology from constructing features such as tower foundations and wire pull sites would be minimal because the underlying geologic formations are stable. Impacts on soils would be localized; however, the blasting required for installation of this tower would indirectly affect the talus slope community. Disturbances to areas above talus slopes may change hydrologic regimes and increase sedimentation on the slopes (UMass 2000, 33). Adverse impacts to the talus community would also adversely affect special status species and other wildlife that depend upon the specialized habitat afforded by this community.

The talus slope community on Kittatinny Ridge along alternative 2 would likely not require clearing because the transmission line would span the community. If vegetation maintenance were needed in talus slope communities, it would adversely affect the vegetation through disturbance and displacement of soils and plants during clearing activities. Additionally, access roads would not be constructed in the talus slope community.

Vegetation maintenance would result in a permanently maintained scrub shrub habitat where mature forest currently stands. Due to the sparse vegetation growing in the talus and the steep topography, vegetation maintenance likely would not be needed in the talus slope community during the period of analysis. Maintenance would facilitate the spread of invasive species in and adjacent to the ROW along Kittatinny Ridge; however, this spread would be minimized if the mitigation measures outlined in appendix F are followed.

Each year, migratory Neotropical birds, especially raptors, use the air currents that form above Kittatinny Ridge for migration and use the habitats on the ridge for breeding, as described in the “Landscape Connectivity, Wildlife Habitat, and Wildlife” section of this chapter. The disturbance from construction and maintenance activities would deter birds from using Kittatinny Ridge for resting, feeding, and nesting; however, following the end of the disturbance the birds would likely return to the area. Migratory birds would be affected by the loss of habitat and disturbance from construction and maintenance activities. The modification to taller transmission structures with an increased number of conductors under alternative 2 has the potential to affect migrating raptors by increasing the risk of injury or mortality from collisions or electrocutions; however, the transmission line is proposed to be constructed using APLIC standards and would use the best available deterrence technology to minimize impacts.

Clearing and construction activities would directly and indirectly impact the wide variety of wildlife species that may use habitats along Kittatinny Ridge (including talus slope) through direct mortality, increased predation, loss of habitat, and disturbance, as previously discussed. In addition, periodic vegetation maintenance activities have the potential to disturb and temporarily displace wildlife species. It is expected that most individuals would return to the area after disturbance ceases and the appropriate habitat returns.

The Kittatinny Ridge community would be adversely impacted by the implementation of alternative 2 because geology, soils, vegetation, and wildlife would be affected.

Van Campen Brook Riparian Area: Approximately 7.5 acres of Van Campen Brook riparian area and wetland complex lie in the 350-foot corridor under alternative 2. Some of the plant species in the wetland are incompatible shrub / small tree species that would be removed by hand clearing for construction and maintenance activities and the construction of a new tower foundation and crane pad would result in the clearing of 0.3 acre of wetland vegetation. Van Campen Brook riparian area is underlain by Bloomsburg red beds, which is rated good for foundation stability; therefore, impacts on the geology of Van Campen Brook riparian area from blasting would be expected to be minimal. Additionally, as proposed, an access road would be built through the wetland. The road would result in 0.4 acre of permanent wetland impacts resulting from the placement of fill in order to construct the access road. A permanent loss in wetland functions or hydrology is expected.

In addition to the access road through the wetland complex in the ROW, another access road would be placed south of the ROW corridor, connecting Old Mine Road to the corridor; this road would require a crossing over Van Campen Brook. An existing bridge would need to be reinforced and widened to accommodate larger construction vehicles. The construction of new access roads would include grading, placing geotextile fabric, installing and compacting gravel, and using heavy machinery. Impacts would include soil compaction, the loss of some soil function, and an increase in soil erosion from grading, placing compacted gravel over the soil, and using heavy equipment and large vehicles on the access roads. Vegetation, including vegetation in the riparian corridor and the wetlands complex associated with Van Campen Brook, would be cleared to construct the road, resulting in a permanent loss of vegetation. Water quality and aquatic resources in Van Campen Brook, a wild trout spawning stream, would be indirectly affected by the removal of the vegetation buffering the brook, which would result in higher water temperatures and increased sedimentation.

Once the transmission line is operational, periodic vegetation maintenance would be required in the newly expanded ROW. Vegetation maintenance would require periodic cutting of non-compatible vegetation and danger trees, which would adversely affect special status species (as discussed in that section). Effects would be reduced through implementation of an NPS-approved vegetation management plan.

Access road construction activities under alternative 2 and periodic maintenance activities upon completion of construction would facilitate the potential spread of invasive species throughout Van Campen Brook riparian area, especially clearing and construction because these activities would result in a significant amount of ground disturbance. Impacts would be minimized if the mitigation measures outlined in appendix F are followed.

Clearing and construction activities would impact wildlife, including special-status species, through mortality, increased predation, and disturbance. Vegetation maintenance activities have the potential to disturb and temporarily displace wildlife species. Individuals would be expected to return to the area as disturbance ceases and appropriate habitat returns.

Alternative 2 would result in adverse impacts on the Van Campen Brook riparian area community, with impacts on geology, vegetation, wetland functions and values, and wildlife resources in the community.

Cumulative Impacts

Cumulative impacts on rare and unique communities inside the study area would be adverse. When the overall adverse impacts on rare and unique communities as a result of alternative 2 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected. Alternative 2 would not alter the level of impact.

Conclusion

Alternative 2, the applicant's proposed route, would create adverse impacts on rare and unique communities inside the study area. These adverse impacts would result from vegetation clearing, the construction of the proposed 500-kV transmission line, the deconstruction of the existing transmission line, the potential spread of invasive species, and vegetation management for operation of the S-R Line. Additionally, adverse impacts would result from artificially maintaining scrub shrub habitat by means of mechanical equipment and herbicides in the parks, which is not consistent with NPS protection of natural, scenic, and recreational resources. When the adverse impacts on rare and unique communities as a result of alternative 2 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected.

Alternative 2b

Inside the study area, alternative 2b, the applicant's alternate route, would follow the same alignment as alternative 2. As with alternative 2, rare and unique communities encompass approximately 52% of the route in the study area and include Arnott Fen, Delaware River riparian corridor, eastern hemlock forests, Hogback Ridge, Kittatinny Ridge (including talus slope), and Van Campen Brook riparian area (see figure 44 in chapter 3). The impacts on these rare and unique communities under alternative 2b would result from the same activities as those described for alternative 2; however, alternative 2b would require less vegetation clearing and the construction of two additional tower foundations and the access road locations are slightly different (see figure 6 in chapter 2). The additional towers and continued dispute over ROW rights could lead to more impairment from this alternative. The impacts on rare and unique communities from alternative 2b are discussed in the following sections.

Arnott Fen: Approximately 1.5 acres of the 10.5-acre Arnott Fen complex would lie in the existing ROW under alternative 2b. As described previously, only the incompatible shrubs / small trees (e.g., red maple) in Arnott Fen would be cleared for construction; all compatible herbaceous species would be retained in the fen and the surrounding 50-foot buffer. Under alternative 2b, new towers would be placed in uplands on either side of the fen. One of the two additional tower foundations would be placed approximately 156 feet west of Arnott Fen; to the east, a tower would be constructed approximately 207 feet from the perimeter of the fen. As described for alternative 2, the blasting required for the installation of the tower foundations could affect groundwater availability and quality, which would indirectly and adversely affect the wetland functions and values of Arnott Fen. Access roads were designed to avoid impacts on Arnott Fen under alternative 2b; therefore, no impacts from sedimentation during access road construction are expected. The impacts on vegetation and wildlife would be the same as those described for alternative 2.

Alternative 2b is expected to have adverse impacts on the Arnott Fen community from clearing, construction, and maintenance activities. Geology, wetland functions and values, vegetation, and wildlife would be affected.

Delaware River Riparian Corridor: Under alternative 2b, clearing for construction would remove approximately 14.7 acres of riparian corridor vegetation, including floodplain forest. The placement of the tower foundations, crane pads, and access roads in the Delaware River riparian corridor and their impacts would be the same as those described for alternative 2.

During the operation of the S-R Line, vegetation maintenance would be required in the new ROW. Under alternative 2b, approximately 3.1 to 5.2 acres of previously mature forest would be maintained by mechanical and chemical means as scrub shrub habitat. The removal of danger trees is a part of the applicant's vegetation maintenance plans. This portion of the vegetation maintenance could involve the removal of individual trees or larger patches of trees if they are determined to be a threat to the transmission line. The applicant's deeded property rights are limited to 100-feet wide for one-tenth of a mile within the Delaware River riparian corridor. It is anticipated that trees adjacent to the ROW in this area would be removed; however, the amount, and thus, the impact on the riparian corridor from this clearing cannot be determined at this time.

Construction activities and vegetation maintenance would also create an avenue for the spread of invasive species; however, mitigation measures should minimize the impacts of invasive species. The portions of the ROW that required clearing only for construction would be restored; however, the restoration would not be complete within the analysis period of this EIS and would be hindered by soil compaction sustained during construction activities, as described in the "Vegetation" section.

Generally, wildlife would be affected by clearing and construction activities and vegetation maintenance through mortality, increased predation, and disturbance where wildlife inhabits the Delaware River riparian corridor. The details of impacts on wildlife are discussed in the "Landscape Connectivity, Wildlife Habitat, and Wildlife" section of this chapter.

Impacts on wildlife (including roosting and foraging bald eagles) from construction, vegetation maintenance, and the number and configuration of the new lines would also be the same as alternative 2.

Under alternative 2b, adverse impacts on resources in the Delaware River riparian corridor would be expected. Geology, soils, vegetation, aquatic resources, water resources, wildlife, and special-status species in the riparian corridor would be affected.

Eastern Hemlock Forests: Under alternative 2b, the locations of the forests containing eastern hemlocks are the same as those described for alternative 2; approximately 5.0 acres of forest containing eastern hemlocks would be removed during the clearing in preparation for construction. The proposed access roads under alternative 2b would not require the removal of additional eastern hemlocks.

After the double 500-kV transmission line is constructed, approximately 1.1 to 2.5 acres of mature eastern hemlock forest would be permanently altered and maintained as scrub shrub habitat. Cleared areas needed for construction but not for operation would be seeded with an NPS-approved conservation seed mixture and allowed to revegetate naturally; however, the restoration would not be complete within the analysis period of this EIS and would be hindered by soil compaction sustained during construction activities, as described in the "Vegetation" section. The impacts on eastern hemlock forests from vegetation maintenance and the potential spread of invasive species would be the same as those described for alternative 2. The indirect adverse effects on aquatic resources and wildlife from removal of eastern hemlock forests would also be the same as previously described.

Any decline in the stability of hemlock forests would indirectly impact the aquatic resources of the parks. Eastern hemlock forests that border the ROW of alternative 2 extend to the edges of water bodies — eastern hemlock forests border Big Bushkill Creek for approximately 0.35 mile and Van Campen Brook for approximately 0.18 mile, and hemlocks also surround the wetlands of Hogback Ridge. If hemlock stand vitality decreases from the effects of invasive insect species, these water bodies would be indirectly affected by factors such as changes in temperature and a decline in the diversity of species.

Under alternative 2b, the construction, operation, and maintenance of the proposed double 500-kV transmission line would result in adverse impacts on the eastern hemlock forest community along the ROW, including impacts on geology, vegetation, aquatic resources, and wildlife resources in the community.

Hogback Ridge: Approximately 6.5 acres of Hogback Ridge would be encompassed by the existing ROW, which would be cleared of vegetation for construction activities under alternative 2b. The ROW is 100-feet wide along most of the length of Hogback Ridge, except where is widens near the Delaware River. Approximately 1.0 acre of mature forest would be removed during clearing activities under alternative 2b. The features of the transmission line under alternative 2b would differ from alternative 2 in Hogback Ridge; there would be an additional tower foundation and the access road locations would be different. The impacts from the construction, operation, and maintenance of the transmission line and vegetation maintenance would be the same as those described for alternative 2. The two alternatives would differ in the amount of area affected. The applicant’s proposed access roads under alternative 2b would remain mostly in the proposed ROW; however, 0.1 mile of access road would cut through undisturbed forest, resulting in an additional loss of approximately 0.2 acre of mature forest. Additionally, danger tree maintenance could result in the removal of a considerable number of trees along the edge of the ROW through Hogback Ridge where the ROW is 100 feet wide. The impact from removal of danger trees in this area cannot be determined at this time.

The implementation of alternative 2b would result in adverse impacts on natural resources (geology, soils, vegetation, and wildlife) of Hogback Ridge.

Kittatinny Ridge: Alternative 2b would require the clearing of vegetation along Kittatinny Ridge in the existing corridor for construction; however, less than an acre of mature forest would be cleared during this phase of the project. The features of the transmission line under alternative 2b would be the same as those described for alternative 2. The impacts would also be same. However, the removal of danger trees could affect a considerable number of trees, as the ROW through Kittatinny Ridge is limited to 150-feet wide.

The talus slope community on Kittatinny Ridge along alternative 2b would likely not require clearing because the transmission line would span the community. If vegetation maintenance were needed in talus slope communities, it would adversely affect approximately 5.8 acres of the vegetation through disturbance and displacement of soils and plants during clearing activities. Additionally, the impacts to wildlife, including migratory birds, would be the same as those described for alternative 2.

Adverse impacts on the Kittatinny Ridge community would result from the implementation of alternative 2b because geology, soils, vegetation, and wildlife would be affected.

Van Campen Brook Riparian Area: Approximately 6.7 acres of Van Campen Brook riparian area and wetland complex lie in the corridor under alternative 2b. The impacts from alternative 2b would be the same as those described for alternative 2, as the tower placements and the location of the access roads are the same in this area.

Adverse impacts on Van Campen Brook riparian area would be expected, with impacts on geology, vegetation, and wildlife resources in the community.

Cumulative Impacts

Cumulative impacts on rare and unique communities inside the study area would be adverse. When the overall adverse impacts on rare and unique communities as a result of alternative 2b are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected. Alternative 2b would not alter the level of impact.

Conclusion

Under alternative 2b, adverse impacts on individual rare and unique communities would result from vegetation clearing, the construction of the proposed 500-kV transmission line, the deconstruction of the existing transmission line, the potential spread of invasive species, and vegetation management for the operation of the S-R Line. Additionally, adverse impacts would result from artificially maintaining scrub shrub habitat by means of mechanical equipment and herbicides in the parks, which is not consistent with NPS protection of natural, scenic, and recreational resources. When the adverse impacts on rare and unique communities as a result of alternative 2b are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected.

Common to Alternatives 3, 4, and 5

Restoration of the B-K Line: Alternatives 3, 4, and 5 would require the removal of the portion of the B-K Line between the Bushkill Substation and the eastern boundary of DEWA. This portion of the line would be permanently removed and the ROW would be restored. The details of the removal and disposal of the existing conductors and structures are discussed in chapter 2. Vegetation in the existing ROW would be cleared and spur roads would be constructed for the removal process. In the existing ROW, approximately 53 acres of land within NPS boundaries would be cleared of vegetation. An additional 1.1 to 1.5 acres of vegetation in NPS lands but outside the ROW would be cleared to construct the access roads. The removal of the conductors and structures and chipping the foundations below the ground surface would cause ground disturbance. The use of heavy machinery during all these activities would cause further ground disturbance and soil compaction.

Following the deconstruction of the B-K Line, approximately 54 acres of land disturbed by clearing and construction of the spur roads and the ROW would be restored to original conditions to the greatest extent possible. These areas would be prepared by disking or tilling as needed to mitigate soil compaction. Following soil preparation, the areas would be seeded with an NPS-approved conservation seed mixture containing native species appropriate to the region and allowed to succeed naturally into forested habitat over the long term; however, soil compaction could hinder the restoration process and complete restoration of the ROW into mature forest would not occur within the period of analysis of this EIS. Although the natural communities would not return to mature conditions in the period of analysis of this EIS, the process would begin over 54 acres of previously disturbed area and would counteract the effects of clearing and construction under alternatives 3, 4, and 5.

Alternative 3

Rare and unique communities that exist along the alternative 3 alignment include the Delaware River riparian corridor, eastern hemlock forests, and Kittatinny Ridge (including talus slope) (see figure 45 in chapter 3). These communities are discussed in the following sections.

Delaware River Riparian Corridor: The alternative 3 alignment would cross the Delaware River approximately 5.3 miles south of the alternative 2 alignment and would affect the riparian area. The riparian corridor extends approximately 0.25 mile on either side of MDSR. Because of the route alternative 3 would follow, the Delaware River riparian corridor encompasses approximately 1.1 miles of the alignment.

A 100-foot buffer on either side of the Delaware River would not be cleared to prepare for construction; however, approximately 26.5 acres of mature forest would be cleared in the riparian area, including eastern hemlock forest (described in the following section). Construction activities would affect geology and soils through blasting, excavation, grading, and compaction. The Pennsylvania side of MDSR would include construction on fragile limestone bedrock. The details of impacts on geology are discussed earlier in this chapter.

Once the transmission line is operational, vegetation maintenance would be required in the new ROW, as described previously. Approximately 12.2 to 21.6 acres of mature forest would be maintained as scrub shrub habitat, halting natural succession. Generally, wildlife would be affected by clearing and construction activities and vegetation maintenance through mortality, increased predation, and disturbance where wildlife inhabits the Delaware River riparian corridor. The details of impacts on wildlife are discussed in the “Landscape Connectivity, Wildlife Habitat, and Wildlife” section of this chapter.

The Delaware River riparian corridor along the alternative 3 alignment includes bald eagle foraging areas. The disturbance from construction activities and maintenance activities would deter eagles from using the foraging areas, although following the end of the disturbance the eagles would likely return to the area. Approximately 0.83 mile of the proposed ROW in New Jersey parallels the Delaware River within 0.28 mile of the river. Activities in this portion of the ROW would further affect the bald eagles’ use of foraging habitat. The new, taller transmission lines bisect eagle foraging areas along the river, increasing the potential for mortality or injury from collisions. Although federal guidelines for bald eagles would be followed, all aspects of alternative 3 would result in adverse impacts on the population of bald eagles that use the Delaware River riparian corridor. See the “Special-status Species” section of this chapter for federal guideline details. The impacts on the bald eagle under alternative 3 differ from those under alternatives 2 and 2b because alternative 3 is not located adjacent to a bald eagle winter communal roost.

Adverse impacts on the Delaware River riparian corridor community under alternative 3 would occur because vegetation, aquatic resources, water resources, wildlife, and special-status species in the riparian corridor would be affected.

Eastern Hemlock Forests: Approximately 13.4 acres of eastern hemlock forests would be removed during the clearing of the 350-foot corridor under alternative 3. The applicant’s proposed access roads would remain mostly in the proposed ROW; however, 0.1 mile of access road would cut through undisturbed eastern hemlock forest, resulting in an additional loss of approximately 0.02 acre.

Impacts on eastern hemlock forests would be the same as those described for alternative 2. These forest communities would be affected by maintaining previously mature forest as scrub shrub; approximately 6.7 to 11.1 acres of mature eastern hemlock forest would be lost under alternative 3, which could adversely affect wildlife that use the habitat, including aquatic wildlife. Impacts would also result from the potential spread of invasive species and continued disturbance.

Under alternative 3, the construction, operation, and maintenance of the proposed double 500-kV transmission line would result in adverse impacts on the eastern hemlock forest community in the parks.

Kittatinny Ridge: The alternative 3 alignment would cross Kittatinny Ridge and talus slope habitat perpendicularly near APPA in Worthington State Forest and travel parallel to APPA along the portion of the alignment that borders DEWA on the east side of the park (see figure 45 in chapter 3). The talus slope habitats along the alternative 3 alignment contain mature forest with a nearly complete canopy. Approximately 17.8 acres of forested talus slope habitat would be cleared as part of the 350-foot corridor.

The impacts under alternative 3 would be similar to those for alternative 2. Localized adverse impacts on geology and soils would result from tower foundation and crane pad installation. However, talus slope communities may be permanently affected by blasting and the use of heavy equipment in this delicate habitat, especially in the portion of the alignment that runs along the border of DEWA in New Jersey.

Indirect impacts on vegetation resulting from changes in soils would occur in the talus slope forests, but not in the remainder of Kittatinny Ridge. Direct adverse impacts on vegetation would result from clearing the 350-foot corridor, the construction of temporary and permanent transmission line features, vegetation maintenance, and the threat of invasive species. Mature forest in the corridor through Kittatinny Ridge, including talus forests, would be permanently altered and would be maintained as scrub shrub habitat after the construction of the transmission line.

The alternative 3 alignment would pass just south of the Hawk Watch site at Raccoon Ridge. Migratory birds would be affected by the loss of habitat during migration and the breeding season, especially by disturbance from construction and maintenance activities, and increased potential for collisions with the transmission line; however, the transmission line would be constructed according to APLIC standards and the best available deterrence technology would be used. Other wildlife that use Kittatinny Ridge would be directly and indirectly affected through mortality, increased predation, and disturbance, as described for alternative 2.

Alternative 3 would adversely affect the soils, geology, vegetation, and wildlife of Kittatinny Ridge and talus slope communities.

Cumulative Impacts

Cumulative impacts on rare and unique communities inside the study area would be adverse. When the overall adverse impacts on rare and unique communities as a result of alternative 3 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected. Alternative 3 would not alter the level of impact.

Conclusion

Under alternative 3, adverse impacts on rare and unique communities would be expected and would result from vegetation clearing, the construction of the proposed 500-kV transmission line, the deconstruction of the existing transmission line, the potential spread of invasive species, and vegetation management for the operation of the S-R Line. Additionally, adverse impacts would result from artificially maintaining scrub shrub habitat by means of mechanical equipment and herbicides in the parks, which is not consistent with NPS protection of natural, scenic, and recreational resources. When the impacts on rare and unique communities as a result of alternative 3 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected.

Alternative 4

Rare and unique communities that exist along the alternative 4 alignment include eastern hemlock forests, Kittatinny Ridge (including talus slope), Minsi Lake / Bear Swamp, Totts Gap Natural Heritage Site, and Totts Gap Swamp (see figure 46 in chapter 3). These communities are discussed in the following sections.

Eastern Hemlock Forests: There are eastern hemlock forests along the B-K Line from the Bushkill Substation to the western boundary of DEWA under alternative 4. Approximately 1.9 acres of this forest would be cleared in preparation for construction activities. This eastern hemlock forest would not be affected by access roads, tower foundations, crane pads, wire pulls, or pulling and splicing sites.

The eastern hemlock forest borders Big Bushkill Creek for approximately 0.35 miles in the expanded ROW under alternative 4. Approximately 1.3 acres of hemlock forest would be removed during the initial clearing, and approximately 0.32 to 1.0 acre of mature eastern hemlock forests would be permanently altered and maintained as scrub shrub habitat after the construction of the transmission line. Impacts on the hemlock forests in this portion of alternative 4 would result from the initial clearing and annual vegetation maintenance and would be similar to those discussed for alternative 2. However, a smaller area would be affected and construction activities would not be performed in the immediate area of the eastern hemlock forests.

Under alternative 4, the construction, operation, and maintenance of the proposed double 500-kV transmission line would result in adverse impacts on the eastern hemlock forest community along the ROW, including impacts on vegetation and wildlife resources in the community.

Kittatinny Ridge: The alternative 4 alignment would cross Kittatinny Ridge and talus slope perpendicularly near APPA. The impacts would be similar to those for alternative 2. Localized adverse impacts on geology and soils would result from tower foundation and crane pad installation. Due to the instability of the talus slope soils, any activity that disturbs the talus slope communities would potentially damage the soils and alter the vegetation community. Direct adverse impacts on vegetation would result from clearing the 350-foot corridor, the construction of temporary and permanent transmission line features, vegetation maintenance, and the colonization by or spread of invasive species. Mature forest in the ROW through Kittatinny Ridge would be permanently altered and maintained as scrub shrub habitat after the construction of the transmission line. Migratory birds would be affected by the loss of habitat during migration and the breeding season, especially by disturbance from construction and maintenance activities, and increased potential for collisions with the transmission line; however, the transmission line would be constructed according to APLIC standards, and the best available deterrence technology would be used. Other wildlife that uses Kittatinny Ridge would be directly and indirectly affected through mortality, increased predation, and disturbance (see the “Landscape Connectivity, Wildlife Habitat, and Wildlife” section of this chapter for details on impacts on wildlife).

The Kittatinny Ridge and talus slope communities would experience adverse impacts with the implementation of alternative 4 because the geology, soils, vegetation, and wildlife in the communities would be affected.

Minsi Lake / Bear Swamp: Inside the study area, the alternative 4 alignment would cross through two portions of Minsi Lake / Bear Swamp along the boundary. These two natural areas of statewide significance encompass 4,099 acres and make up a corridor that contains valuable wildlife habitat. The alternative 4 alignment would traverse approximately 0.74 mile of Minsi Lake / Bear Swamp, resulting in the clearing of approximately 19.5 acres of forest in this community in preparation for construction activities.

Geology and soils would be affected during construction activities; these impacts have been described in the respective sections of this chapter. Vegetation would be affected through clearing and construction activities as well as vegetation maintenance activities. Approximately 8.51 to 15.9 acres of mature forest would be permanently altered and maintained as scrub shrub habitat after the construction of the transmission line. Cleared areas needed for construction but not operation would be seeded with an NPS-approved conservation seed mixture and allowed to revegetate naturally; however, the restoration would not be complete within the analysis period of this EIS.

All clearing, construction, and vegetation maintenance activities would directly and indirectly impact wildlife species through mortality, increased predation, and disturbance in Minsi Lake / Bear Swamp. The impacts on wildlife are described in detail in the “Landscape Connectivity, Wildlife Habitat, and Wildlife” section of this chapter. Minsi Lake / Bear Swamp provides excellent breeding habitat for amphibians in and around the vernal pools. Due to the increase in sun exposure and reduced forest canopy after clearing and construction, preferable amphibian habitat would be reduced. The vegetation clearing could also prevent amphibians from migrating to breeding locations. Because the alternative 4 alignment would traverse Minsi Lake / Bear Swamp near the outer edges of the community, the impacts on amphibian habitat would be expected to be minimal. However, Minsi Lake / Bear Swamp benefits from forest buffer and forest fragmentation would cause degradation of the habitat.

The natural resources (vegetation, landscape connectivity, and wildlife) of Minsi Lake / Bear Swamp would experience adverse impacts with the implementation of alternative 4.

Totts Gap: Totts Gap is composed of Totts Gap Natural Heritage Site and Totts Gap Swamp in Northampton County, Pennsylvania (PATNC 2005a, 43), and encompasses approximately 893 acres. Approximately 10.9 acres of this would be cleared as part of the proposed ROW. Under alternative 4 Totts Gap Road, which runs through Totts Gap, would be used to gain access to the ROW, and widening of the road would not be necessary. No impacts from the use of the road would be expected. Approximately 0.31 mile of new access roads would extend into Totts Gap, resulting in 0.58 acre of permanent vegetation loss.

The construction of temporary and permanent transmission line features would adversely affect Totts Gap. Impacts on geology from constructing features such as tower foundations and wire pull sites would be minimal because the underlying geologic formation, Shawangunk formation, is stable. Excavation impacts on soils would be localized. The proposed transmission line would require a 200- to 300-foot ROW to operate; therefore, approximately 5.7 to 9.7 acres of the Totts Gap forest would be permanently altered and maintained as scrub shrub habitat by mechanical and chemical means after construction of the double 500-kV transmission line.

Following construction, all temporary sites disturbed during construction, as well as unnecessary portions of the access roads, would be returned to preconstruction conditions, revegetated with an NPS-approved conservation seed mixture, and allowed succeed back to the forested habitat over time. However, the mature forest that would be removed for construction would not be replaced within the 15-year analysis period covered by this EIS and would be hindered by soil compaction sustained during construction activities, as described in the “Vegetation” section.

During the operation of the S-R Line, periodic vegetation maintenance would be required in the new ROW, as previously described. This maintenance program would result in adverse impacts on the vegetation in the ROW because the maintenance would continue to contribute to the unnatural condition of a permanently maintained scrub shrub habitat.

No invasive species have been recorded in Totts Gap in the proposed 350-foot ROW. The implementation of the mitigation measures outlined in appendix F would reduce the potential for invasive species to colonize the area.

Wildlife species observed in Totts Gap in the proposed ROW of alternative 4 include various birds, raptors, amphibians, reptiles, and invertebrates (NPS 2011b). Clearing and construction activities would directly and indirectly affect wildlife species through mortality, increased predation, and disturbance throughout Totts Gap. Vegetation maintenance activities have the potential to disturb and temporarily displace wildlife species.

Under alternative 4, the construction, operation, and maintenance of the proposed double 500-kV transmission line would adversely impact Totts Gap Natural Heritage Site and Totts Gap Swamp.

Cumulative Impacts

Cumulative impacts on rare and unique communities inside the study area would be adverse. When the overall adverse impacts on rare and unique communities as a result of alternative 4 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected. Alternative 4 would not alter the level of impact.

Conclusion

Under alternative 4, adverse impacts on the individual rare and unique communities inside the study area would be expected from vegetation clearing, the construction of the proposed double 500-kV transmission line, the deconstruction of the existing transmission line, the potential spread of invasive species, and vegetation management for the operation of the S-R Line. Additionally, adverse impacts would result from artificially maintaining scrub shrub habitat by means of mechanical equipment and herbicides in the parks, which is not consistent with NPS protection of natural, scenic, and recreational resources. When the adverse impacts on rare and unique communities as a result of alternative 4 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected.

Alternative 5

Alternatives 4 and 5 would follow the same route through DEWA and APPA, with the exception of the 0.89-mile section from Bushkill Substation to the western boundary of DEWA; therefore, alternative 5 would not affect eastern hemlock forests. The alternative 5 alignment would cross Kittatinny Ridge (including talus slope), Minsi Lake / Bear Swamp, Totts Gap Natural Heritage Site, and Totts Gap Swamp, and the impacts would be the same as those described for alternative 4, adverse.

Cumulative Impacts

Cumulative impacts on rare and unique communities inside the study area would be adverse. When the overall adverse impacts on rare and unique communities as a result of alternative 5 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected. Alternative 5 would not alter the level of impact.

Conclusion

Under alternative 5, adverse impacts on the individual rare and unique communities inside the study area would be expected from vegetation clearing, the construction of the proposed 500-kV transmission line, the deconstruction of the existing transmission line, the potential spread of invasive species, and vegetation management for operation of the S-R Line. Additionally, adverse impacts would result from artificially maintaining scrub shrub habitat by means of mechanical equipment and herbicides in the parks, which is not consistent with NPS protection of natural, scenic, and recreational resources. When the impacts on rare and unique communities as a result of alternative 5 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected.

CULTURAL RESOURCES

This section discusses the impacts from the alternatives on the cultural resources in the study area, including archeological resources, historic structures, and cultural landscapes.

Federal actions that have the potential to affect cultural resources are subject to a variety of laws. The NHPA is the principal legislative authority for managing cultural resources associated with federal projects. Generally, section 110 of the act requires federal agencies to establish preservation programs for the identification, evaluation, and nomination of historic properties to the National Register of Historic Places (National Register). Section 106 of the act requires all federal agencies to consider the effects of their actions on cultural resources listed on or determined eligible for listing on the National Register. Such resources are termed historic properties. Federal agencies must minimize harm to historic properties that would be adversely affected by a federal undertaking. Agreement on how to mitigate adverse effects on historic properties is reached through consultation with the SHPO; the Tribal Historic Preservation Officer, if applicable; and the Advisory Council on Historic Preservation (ACHP) as necessary.

Through this legislation, the NPS is charged with the protection and management of cultural resources in its custody. This is further implemented through Director's Order 28: Cultural Resource Management and its supplement, Director's Order 28A Archeology (NPS 1998b); NPS Management Policies 2006 (NPS 2006); and the 2008 "Servicewide Programmatic Agreement among the NPS, the Advisory Council, and the National Conference of State Historic Preservation Officers." These documents charge NPS managers with avoiding, or minimizing to the greatest degree practicable, adverse impacts on park resources and values. Although the NPS has the discretion to allow certain impacts in parks, that discretion is limited by the statutory requirement that park resources and values remain unimpaired, unless a specific law directly provides otherwise. This impact analysis is designed to comply with the requirements of NEPA and Section 106 of the NHPA (36 CFR Part 800), Protection of Historic Properties.

ACHP regulations for implementing section 106 require that effects on cultural resources be identified and evaluated by determining the APEs, or the area of geographic study; identifying cultural resources present in the APE that are either listed on or eligible for listing on the NRHP; applying the criteria of adverse effect on these historic properties; and considering ways to avoid, minimize, or mitigate adverse effects on them.

Under the ACHP regulations a determination of no effect, no adverse effect, or adverse effect must be made for NRHP-listed or NRHP-eligible cultural resources located in the APE. A determination of no effect is made when it is found that no cultural resources are present or there are cultural resources present but the undertaking would have no effect upon them. A determination of no adverse effect results when there is an effect on a resource but it would not diminish the characteristics of the cultural resource that qualify it for inclusion in the NRHP. An adverse effect occurs when an impact alters any characteristic of a cultural resource that qualifies it for inclusion in the NRHP. Adverse effects also include reasonably foreseeable effects caused by the proposal that would occur later, be farther removed in distance, or be cumulative (36 CFR 800).

CEQ regulations and Director's Order 12 call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact. Any resultant reduction in the intensity of an impact due to mitigation, however, is an estimate of the effectiveness of mitigation under NEPA only. Cultural resources are nonrenewable resources, and adverse effects generally consume, diminish, or destroy the original historic materials or form, resulting in a loss if integrity of the resource that can never be recovered. Therefore, although actions determined to have an adverse effect under section 106 of the NHPA may be mitigated, the effect remains adverse.

A section 106 summary is included in the impact analysis section for archeological resources, historic structures and cultural landscapes. The section 106 summary is an assessment of the effect of the undertaking (implementation of the alternative) only on cultural resources listed on or eligible for the NRHP, based on the criteria of effect and criteria of adverse effect found in the regulations of the Advisory Council.

After a preferred alternative is chosen, a finding of effect for the preferred alternative will be completed and included in the Final EIS.

ARCHEOLOGICAL RESOURCES

METHODOLOGIES

Information on potential archeological resources was obtained in two ways, through background research and field survey. The former involved the study of existing reports, site files, and other relevant available data. Information was gathered from DEWA facilities, the Pennsylvania state historic preservation office (SHPO) and New Jersey Historic Preservation Office (NJ HPO), and from reports and data supplied by the applicant. A Phase IB archeological field survey included surface reconnaissance and the excavation of shovel test units placed along measured transects across the project alternatives. Per Pennsylvania SHPO field work guidelines (New Jersey has none), a 15-meter shovel test interval was employed, with a single transect following the approximate centerline of the corridors for each alternative. Slopes in excess of 15% were not shovel tested but were surface inspected for artifacts or rock shelters. This approach may be considered standard procedure for linear project areas.

STUDY AREA

The APE is determined as the geographic area in which an undertaking may directly or indirectly cause an alteration in the character or use of historic properties (36 CFR 800.16[d]) and is described in the "Cultural Resources" section of chapter 3. The designated APE for archeological resources includes only landscape lying with the parks' boundaries. Because the APE is defined by cultural resources boundaries (versus specific geographic areas, as in other resource topics), this section is structured differently than others.

CUMULATIVE IMPACTS COMMON TO ALL ALTERNATIVES

An assessment of cumulative impacts on cultural resources is required by both the CEQ and NHPA. Cumulative impacts on archeological resources would include the disturbance or destruction of potential archeological resources, which would lead to the further depletion of the archeological record and knowledge base in DEWA, MDSR, and APPA. Archeological sites are nonrenewable resources and are therefore finite in number. Past, present, and reasonably foreseeable activities that would have beneficial or adverse impacts on archeological resources in the parks and inside and outside the study area are discussed in following sections and summarized under each alternative as applicable.

Projects Inside the Study Area

Inside the study area, projects that would result in adverse cumulative impacts on archeological resources include the following road, development, and utility projects: I-80 weigh station (facility upgrade), sustainable comfort stations, New Jersey Swim Beach (Turtle Beach), McDade Trail realignment, and Northeast Supply Link Expansion – Palmerton Loop. These projects have involved or would involve ground disturbance, which could permanently alter or destroy archeological resources. Additionally, illegal activities such as the collection of artifacts and illegal ORV use would result in the loss of archeological resources. Other park activities would also result in adverse impacts on archeological resources: the issuance of special use permits related to visitor use, incidental business permits / commercial visitor services, agricultural leases, and parkwide invasive species control programs. The PADOT SR 2001 road project would have adverse impacts on archeological resources. Projects that have created or would create beneficial impacts on archeological resources include the rehabilitation of Childs

Park, the regrading of six historic buildings, hazardous structure demolition/deconstruction, and the stabilization and repair of damaged structures. These projects would preserve and/or rehabilitate historical structures with associated archeological deposits or significant landscape features that support archeological sites inside the study area and protect architectural resources through BMPs. Because the presence, extent, and location of archeological resources are largely unknown, cumulative impacts inside the study area would be adverse.

Projects Outside the Study Area

Outside the study area, projects including utility projects and other development projects have the potential to adversely affect archeological resources. Projects with adverse impacts include local residential development adjacent to the parks, the Appalachian Trail relocation near the Columbia Gas Transmission Company pipeline crossing, the Dominion/Allegheny Power 500-kV transmission line project, the Potomac-Appalachian Transmission Highline ROW, the Northeast Supply Link Expansion – Palmerton Loop, the Federal Energy Regulatory Commission relicensing of Yards Creek Generating Station, Marcellus shale natural gas drilling, PFBC natural gas leasing and water access programs, and residential development. These projects have caused or could cause a substantial change in the significance of archeological resources outside the study area. Projects outside the study area are somewhat mitigated by a variety of conservation and open space plans that provide beneficial impacts on archeological resources. Cumulative impacts on archeological resources outside the study area would be adverse because the presence and extent of archeological resources are largely unknown.

IMPACTS OF THE ALTERNATIVES ON ARCHEOLOGICAL RESOURCES

Due to the nature of archeological projects, the presence or absence of archeological sites in any region cannot be known before initiating an archeological field investigation. Accordingly, the impacts on potential archeological resources cannot be known beforehand. If an adverse effect on an archeological resource is identified, all efforts would be made to mitigate that adverse effect before proceeding with landscape-disturbing activities.

Common to All Alternatives

Mitigation Measures: Mitigation measures would reduce impacts from construction, operation, and maintenance activities for all action alternatives and are described in chapter 2 and appendix F. In project areas where archeological resources are located, mitigation could include preserving the sites in place by avoiding the disturbance or destruction of potential resources. Site areas might be cordoned off and deliberately avoided by construction activities, thereby preserving the potential resource for future scientific study.

Outside the Study Area: Outside the study area, regardless of which alternative is selected, the transmission line could pass through Carbon, Lackawanna, Luzerne, Monroe, Northampton, Pike, and Wayne counties in Pennsylvania and Morris, Sussex, and Warren counties in New Jersey. The archeological resources in these counties are discussed in the “Archeological Resources” section of chapter 3.

The clearing, construction, and vegetation maintenance activities outside the study area would be consistent with those described for inside the study area; however, the impacts outside the study area would be indirect. The direct impacts from the construction of the transmission line outside the study area generally cannot be determined, as described in the introduction of this chapter. Additionally, the specific resources that would be affected by the transmission line outside the study area cannot be identified until the route is chosen by the applicant. Upon this decision, additional surveys would be required to determine whether archeological resources would be affected along the selected route.

Outside the study area, systematic archeological surveys have not been undertaken. Accordingly, the nature and number of potential archeological resources are not known for these areas. However, the S-R Line could affect potential resources. Outside the study area, indirect adverse impacts on archeological resources would result from vegetation clearing and maintenance associated with the no-action alternative. Under all action alternatives, indirect impacts on potential archeological resources cannot be determined yet; however, impacts are expected to be adverse. Cumulative impacts on archeological resources outside the study area would be adverse, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the indirect adverse impacts on archeological resources as a result of activities outside the study area are combined with other past, present, and reasonably foreseeable projects outside the study area, an overall adverse cumulative impact would be expected.

Alternative 1: No Action

Under the no-action alternative, the existing ROW currently crosses known archeological sites. The ROW would not be widened under alternative 1; however, the continued operation of the existing transmission line would require periodic vegetation maintenance including pruning and removal of vegetation in the ROW. These ongoing activities could create impacts on archeological sites from soil disturbance, artifact displacement and movement, artifact breakage (e.g., ceramic vessels, glass), disturbance of cultural features such as firepits and foundation remnants, and the exposure of the newly denuded landscape to potential erosion. Adverse impacts on potential archeological resources would continue in the existing ROW because no actual excavation or large-scale earthmoving would be involved in vegetation maintenance.

Cumulative Impacts

Past, present, and reasonably foreseeable projects inside the study area would have adverse cumulative impacts on archeological resources, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the impacts on archeological resources as a result of alternative 1 are combined with the other projects inside the study area, an overall adverse cumulative impact would be expected. Alternative 1 would not alter the level of impact.

Conclusion

Alternative 1, the no-action alternative, would result in the continued operation of the existing transmission line with regular vegetation maintenance. There would be adverse impacts on the archeological sites in alternative 1 due to physical impacts from the maintenance of vegetation along the existing ROW. When analyzed together with past, present, and future projects, the cumulative impacts under this alternative would be expected to be adverse.

Alternative 2

The APE for alternative 2 would consist of the existing power line corridor, any expansion areas along the corridor, and any access roads or other construction facilities along the corridor (the APE for archeological resources includes only landscape lying within the parks' boundaries).

Inside the study area, a Phase IB archeological survey conducted by Louis Berger Group, Inc. on behalf of the applicant identified 3 archeological sites within the bounds of the alternative 2 corridor that would be directly affected by construction activities; 22 additional sites were identified but these would not be affected by construction (Berger 2010b). Two sites date to the prehistoric period and the third to the historic period. The sites have not been evaluated for significance and possible eligibility for listing in the National Register of Historic Places (national register) (i.e., a Phase II evaluation) and it is unknown whether the sites constitute archeological resources. An assessment of possible effects on these sites under alternative 2 is developed under the assumption that the sites are significant archeological resources.

If transmission line construction and/or maintenance activities impinge on the site of an archeological resource and disturbance to the site landscape is unavoidable, then the effect would be considered adverse. The degree to which the effect is adverse would depend on the nature, extent, and location of the construction disturbance. The amount of soil disturbance (surface disturbance, actual earth-moving or excavation) is a key factor in the analysis.

Specific kinds of impacts that may be anticipated for alternative 2 would include the removal and clearing of vegetation along the proposed ROW. Impacts on the site surface would create adverse impacts on archeological resources, if present. In order to install the transmission towers, excavation would be needed to a depth of 15 to 30 feet. Blasting would be used to excavate the ground material to the required depth. If an archeological site were located in the area of excavation, impacts could include full physical removal or destruction.

Significant archeological resources would be avoided to the greatest extent possible. If archeological resources could not be avoided, an appropriate mitigation strategy would be developed in consultation with the appropriate state historic preservation officer and, as necessary, American Indian tribes. If during construction previously unknown archeological resources are discovered, all work in the immediate vicinity of the discovery would be halted until the resources could be identified and documented and, if the resources cannot be preserved in situ, an appropriate mitigation strategy developed. In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act (25 USC 3001) of 1990 would be followed.

The construction of access roads would include the removal of vegetation, the placement of gravel, and grading. Impacts on archeological resources would occur due to the earthmoving activities at the site. The operation of the existing transmission line would require periodic vegetation maintenance including the pruning and removal of vegetation in the ROW. These ongoing activities could create adverse impacts on archeological sites. Types of impacts could include soil disturbance, artifact displacement and movement, artifact breakage (e.g., ceramic vessels, glass), disturbance to cultural features such as firepits and foundation remnants, and the exposure of the newly denuded landscape to erosion.

Overall, the potential for adverse impacts from alternative 2 activities exists; however, it is unknown whether the sites identified during the Phase IB archeological survey are significant.

Section 106 Summary

Although the application of the Advisory Council criteria of adverse effects (36 CFR 800.5, “Assessment of Adverse Effects”) has not been completed, it is prudent to anticipate that impacts could occur on archeological resources. As discussed in detail in the preceding paragraphs, adverse impacts could be anticipated. Accordingly, the NPS has concluded that the implementation of alternative 2 could have an *adverse effect* on archeological resources.

Cumulative Impacts

Past, present, and reasonably foreseeable projects inside the study area would have adverse cumulative impacts on archeological resources, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the impacts on archeological resources as a result of alternative 2 are combined with the other projects inside the study area, an overall adverse cumulative impact would be expected. Alternative 2 would not alter the level of impact.

Conclusion

The implementation of alternative 2 could have adverse impacts on potential archeological resources. As discussed, the nature and severity of the impact would depend on the nature and extent of physical disturbance to the archeological resources in the alternative alignment. The cumulative effects of activities under alternative 2, coupled with other past, present, and future projects noted, could constitute adverse cumulative impacts.

Alternative 2b

Inside the study area, the alternative 2b alignment would follow the same route as described for alternative 2; however, under alternative 2b, the ROW would only be cleared to the extent of the applicant's deeded property rights. The APE for alternative 2b would consist of the existing power line corridor, any expansion areas along the corridor, and any access roads or other construction facilities along the corridor; the APE for archeology includes only landscape lying within the parks' boundaries.

Three archeological sites (2 sites dating to the prehistoric period and 1 dating to the historic period) within the bounds of the alternative 2b corridor could be directly affected by construction activities; 22 additional sites were identified, but these would not be affected by construction, as described for alternative 2. Proposed access roads to be constructed for alternative 2b would differ slightly in the Arnott Fen area; however, the one different access road would be in an area of low archeology potential according to the Phase IB report (Berger 2010b, 11).

Under alternative 2b, the potential for impacts from clearing, construction, operation, and vegetation maintenance activities, as well as the assessment of impact levels, would be the same as those described for alternative 2. Overall, adverse impacts could occur on archeological resources, however; it is unknown whether the sites identified during the Phase IB archeological survey are significant.

Section 106 Summary

Although the application of the Advisory Council criteria of adverse effects (36 CFR 800.5, "Assessment of Adverse Effects") has not been completed for this alternative, it is prudent to anticipate that impacts could occur on archeological resources. As discussed in detail in the preceding paragraphs, adverse impacts could be anticipated. Accordingly, the NPS has concluded that the implementation of alternative 2b could have an *adverse effect* on archeological resources.

Cumulative Impacts

Past, present, and reasonably foreseeable projects inside the study area would have adverse cumulative impacts on archeological resources, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the impacts on archeological resources as a result of alternative 2b are combined with the other projects inside the study area, an overall adverse cumulative impact would be expected. Alternative 2b would not alter the level of impact.

Conclusion

The implementation of alternative 2b could have adverse impacts on potential archeological resources. As discussed, the nature and severity of the impact would depend on the nature and extent of physical disturbance to the potential archeological resource in the alternative alignment. The cumulative effects of alternative 2b, coupled with other past, present, and future projects noted earlier, could constitute adverse cumulative impacts.

Alternative 3

The APE for alternative 3 would consist of the existing power line corridor as described in chapter 2, any expansion areas along the corridor, and any access roads or other construction facilities along the corridor; the APE for archeology includes only landscape lying within the parks' boundaries. However, due to access limitations, archeological surveys were not conducted within the boundaries of Worthington State Forest, which represents approximately 1.7 miles of the alternative 3 alignment within NPS boundaries.

Inside the study area, a Phase IB archeological survey conducted by JMA identified one archeological site within the bounds of the alternative 3 corridor (JMA 2011). The site dates to the historic period and appears to be a farmstead. The site contained a cellar hole measuring 23 feet by 14 feet (7 meters by 4.3 meters) and a related surface feature, located 75 feet (23 meters) north of River Road. A total of 273 artifacts were recovered, including a variety of whitewares and redwares, nails, and window glass; no brick was recovered. For all datable artifacts the mean date is 1896.

The site has not been evaluated for significance and possible eligibility for listing in the national register (i.e., a Phase II evaluation). Thus, because it is yet unknown whether the site constitutes an archeological resource, an assessment of possible effects on this site must be made under the assumption that the site is indeed a significant archeological resource.

The potential for impacts from clearing, construction, operation, and vegetation maintenance activities, as well as the assessment of impact levels, under alternative 3 are the same as those described for alternative 2. Overall, the potential for adverse impacts from alternative 3 activities exists; however it is unknown whether the sites identified during the Phase IB archeological survey are significant.

Section 106 Summary

Although the application of the Advisory Council criteria of adverse effects (36 CFR 800.5, "Assessment of Adverse Effects") has not been completed, it is prudent to anticipate that impacts could occur on archeological resources. As discussed in detail in the preceding paragraphs, adverse impacts could be anticipated. Accordingly, the NPS has concluded that the implementation of alternative 3 could have an *adverse effect* on archeological resources.

Cumulative Impacts

Past, present, and reasonably foreseeable projects inside the study area would have adverse cumulative impacts on archeological resources, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the impacts on archeological resources as a result of alternative 3 are combined with the other projects inside the study area, an overall adverse cumulative impact would be expected. Alternative 3 would not alter the level of impact.

Conclusion

The implementation of alternative 3 could have adverse impacts on potential archeological resources. As discussed, the nature and severity of the impact would depend on the nature and extent of physical disturbance to the potential archeological resources in the alternative alignment. The cumulative effects of alternative 3, coupled with other past, present, and future projects noted earlier, could constitute adverse cumulative impacts.

Alternative 4

The APE for alternative 4 would consist of the existing power line corridor, any expansion areas along the corridor, and any access roads or other construction facilities along the corridor through DEWA and APPA, as described in chapter 2; the APE for archeology includes only landscape lying within the parks' boundaries.

Inside the study area, a Phase IB archeological survey conducted by JMA identified one archeological site within the bounds of the alternative 4 corridor (JMA 2011). The site dates to the prehistoric period but cannot be more precisely dated yet. The site has not been evaluated for significance and possible eligibility for listing in the national register (i.e., a Phase II evaluation). Thus, it is yet unknown whether the site constitutes an archeological resource, and an assessment of possible effects on this site must be made under the assumption that the site is indeed a significant archeological resource.

The potential for impacts from clearing, construction, operation, and vegetation maintenance activities, as well as the assessment of impact levels, under alternative 4 are the same as those described for alternative 2. Overall, the potential for adverse impacts on archeological resources from alternative 4 activities exists; however, it is unknown whether the sites identified during the Phase IB archeological survey are significant.

Section 106 Summary

Although the application of the Advisory Council criteria of adverse effects (36 CFR 800.5, "Assessment of Adverse Effects") has not yet been done, it is prudent to anticipate that impacts could occur on archeological resources. As discussed in detail in the preceding paragraphs, adverse impacts could be anticipated. Accordingly, the NPS has concluded that the implementation of alternative 4 could have an *adverse effect* on archeological resources.

Cumulative Impacts

Past, present, and reasonably foreseeable projects inside the study area would have adverse cumulative impacts on archeological resources, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the impacts on archeological resources as a result of alternative 4 are combined with the other projects inside the study area, an overall adverse cumulative impact would be expected. Alternative 4 would not alter the level of impact.

Conclusion

The implementation of alternative 4 could have adverse impacts on potential archeological resources. As discussed, the nature and severity of the impact would depend on the nature and extent of physical disturbance to the potential archeological resources in the alternative alignment. The cumulative effects of alternative 4, coupled with other past, present, and future projects noted earlier, could constitute adverse cumulative impacts.

Alternative 5

Inside the study area, alternative 5 would follow the same route as alternative 4 through DEWA and APPA, except for a portion of the B-K Line from the Bushkill Substation to the western boundary of DEWA; the APE for archeology includes only landscape lying within the parks' boundaries. The Phase IB archeological survey (Berger 2010b) did not identify archeological resources in this portion of the B-K Line ROW; therefore, the adverse impacts inside the study area for alternative 5 would be the same as those described for alternative 4.

Section 106 Summary

Although the application of the Advisory Council criteria of adverse effects (36 CFR 800.5, "Assessment of Adverse Effects") has not yet been done, it is prudent to anticipate that impacts could occur on archeological resources. As discussed in detail in the preceding paragraphs, adverse impacts could be anticipated. Accordingly, the NPS has concluded that the implementation of alternative 5 could have an *adverse effect* on archeological resources.

Cumulative Impacts

Past, present, and reasonably foreseeable projects inside the study area would have adverse cumulative impacts on archeological resources, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the impacts on archeological resources as a result of alternative 5 are combined with other projects inside the study area, an overall adverse cumulative impact would be expected. Alternative 5 would not alter the level of impact.

Conclusion

The implementation of alternative 5 could have adverse impacts on potential archeological resources. As discussed, the nature and severity of the impact would depend on the nature and extent of physical disturbance to the potential archeological resources in the alternative alignment. The cumulative effects of alternative 5, coupled with other past, present, and future projects noted earlier, could constitute adverse cumulative impacts.

HISTORIC STRUCTURES

METHODOLOGIES

NEPA impacts and NHPA section 106 effects on historic structures are assessed with reference to guidance contained in 36 CFR 800 regarding historic properties. In general, an *adverse impact* or *effect* is recognized through a consideration of its ability to diminish or destroy the character-defining features of the historic structure, those features that convey the structure's significance. The ability of a structure to convey significance is known as integrity. As defined by the NPS, there are seven aspects of integrity: location, design, setting, materials, workmanship, feeling, and association. Five of these aspects (location, design, materials, workmanship, and association) relate mainly to physical impacts or effects, such as alteration or demolition of historic structures. Physical impacts or effects on historic structures are not anticipated under any of the proposed alternatives. Two of these aspects of integrity (setting and feeling) relate mainly to visual impacts or effects.

Setting is the physical environment of a historic structure, and *feeling* is a structure's expression of the aesthetic or historic sense of a particular period of time (NPS 1991b: 44–49). For many historic structures in village or farmstead contexts, the idyllic rural setting commonly associated with these resource types is a character-defining feature. Feeling, while closely associated with setting, is more subjective still and is discerned entirely through field investigation. While the aesthetic sense of a particular period can be fairly easily recognized on site by a trained professional, the historic sense of a particular period requires some imagination, especially if the period of significance of the historic structure predates one's life experience. While proximity and sight lines to proposed alignments necessarily factor into assessments of visual impacts and effects, the more subjective aspects of integrity are the driving considerations: whether the proposed undertaking would diminish the integrity of setting and feeling of identified historic structures, thus diminishing or destroying their character-defining features.

Existing Data Review: Historic structures were identified in several ways depending on their locations. For the portions of the APE associated with alternatives 1, 2, and 2b, information was drawn from the results of the cultural landscape investigation (JMA 2011). For the portions of the APE associated with alternatives 3, 4, and 5 within the parks' boundaries, where extensive previous investigation had occurred, the DEWA inventory of historic structures was consulted. This inventory included a GIS layer containing points identifying the location of each identified resource, and a database containing standardized information about the identity, location, status, type, and age of each resource. Information was extracted from the GIS layer and database to create field maps and structure lists. For the portions of the APE associated with alternatives 3, 4, and 5 outside the parks' boundaries, where little or no previous investigation had occurred, a reconnaissance survey was conducted to determine the presence of structures that met the 50-year age consideration (pre-1961) and integrity requirements of the national register (NPS 1991b). The Pennsylvania SHPO Cultural Resources Geographic Information System website and New Jersey HPO survey files were also reviewed to determine the presence and location of previously identified structures (Clark et al. 2011).

Field Investigation: Each identified historic structure was field checked to determine its presence or absence (standing or demolished), its state of integrity, and whether its landscape setting appeared to contribute to its historical and/or architectural significance. These notations were correlated with the findings of the cultural landscape study to identify structures that also contributed to one or more identified cultural landscapes. Structures were photographed using a Nikon D90 digital SLR (single lens reflex) camera with a NIKKOR 18–105 mm lens and a Nikon GP-1 GPS adapter. The GPS adapter allowed for a determination of precise locations and the precise measurement of distances between structures and alignments. In addition, photographs were taken from the vicinity of each structure toward the relevant alignment. A lens setting of 32 mm (equivalent to 50 mm on a standard 35 mm camera) allowed for an approximation of normal human eyesight relative to scale.

Impact/Effect Assessment: Possible impacts/effects were assessed through thoughtful consideration of proximity and probable sight lines from the historic structures to the alternatives, and the importance of the integrity of setting and feeling relative to appropriate NEPA impact and NHPA section 106 effect definitions. All potential impacts and effects on identified historic structures were anticipated to be visual.

STUDY AREA

The designated APE, as described in chapter 3, contains archeological resources, historic architectural resources, and cultural landscapes. Because the APE is defined by cultural resources boundaries (versus specific geographic areas as in other resource topics), this section is structured differently than others.

CUMULATIVE IMPACTS COMMON TO ALL ALTERNATIVES

An assessment of cumulative impacts on cultural resources is required by both the CEQ and NHPA. Existing and anticipated future projects at DEWA, MDSR, and APPA were identified to determine the potential cumulative impacts. Past, present, and reasonably foreseeable activities that have beneficial or adverse impacts on historic structures in the parks and inside and outside the study area are listed here and discussed under each alternative as applicable.

Projects Inside the Study Area

Inside the study area, the following projects would cause adverse changes to character-defining features of historic structures: PADOT SR 2001 (road reconstruction), the rehabilitation of road bridges throughout the parks in New Jersey and Pennsylvania, the repair of Watergate Dam #10, and hazardous structure demolition and deconstruction. Other projects or activities with adverse impacts include the PPL Electric Utilities Northeast Pocono reliability project, the PPL proposal for a 138/12-kV substation, existing utility towers within 5 miles, illegal ORV use, trespassing, vandalism, and arson. The proposed projects near APPA and other historic structures would have adverse impacts on such structures. Projects that would have a beneficial effect on historic structures include Delaware River bridge projects, the repair of historic stone culverts on Mountain Road, the rehabilitation of Childs Park, and the regrading of six historic building sites.

Inside the study area several past, present, and reasonably foreseeable actions analyzed are specific to historic structures. The proposed projects that preserve and/or rehabilitate historic buildings, structures, or landscape features inside the study area would have beneficial impacts on historic structures. For example, in the study area, the proposed stabilization and repair of Benjamin B. Van Campen Farm, Broadhead-Heller Farmstead, and Miller Farm would have beneficial impacts on these structures, provided the improvements are made in accordance with the secretary of the interior’s standards. Beneficial impacts would also result from comprehensive planning and management documents through BMPs to protect historic structures.

The combined beneficial and adverse impacts of the past, present, and reasonably foreseeable projects that could affect historic structures would result in an adverse cumulative impact on historic structures.

Projects Outside the Study Area

Outside the study area, utility projects and other development projects have the potential to cause adverse changes to character-defining features of historic structures, including PADOT SR 2001 (road reconstruction), the PPL Electric Utilities Northeast Pocono reliability project, the PPL proposal for a 138/12-kV substation; and existing utility towers within 5 miles. Several utility projects have the potential to cause adverse changes to character-defining features of historic structures; however, the impacts are unknown: the Northeast Supply Link Expansion – Palmerton Loop, the Dominion/Allegheny Power Transmission Line Project, and the Potomac-Appalachian Transmission Highline ROW. Projects that would have a beneficial effect include Pike County agricultural security areas. In addition, projects outside the study area are somewhat mitigated by a variety of conservation and open space plans that would have beneficial impacts on historic structures.

The impacts on historic structures from these projects outside the study area would be the same as those described for projects inside the study area, although the route is unknown outside the study area. Therefore, projects outside the study area could result in adverse cumulative impacts on historic structures, depending on the presence and extent of historic structures found along the route outside the study area.

IMPACTS OF THE ALTERNATIVES ON HISTORIC STRUCTURES

Section 106 effects are summarized by identified historic structure and alternative in tables 76 through 78 in the following sections. The identification numbers are taken from two sources, depending on how the information was collected. Historic structures located inside the park's boundary that were included in the DEWA historic structure inventory are listed by their assigned DEWA identification numbers. Historic structures located outside the park's boundary that were field surveyed are listed by arbitrarily assigned PA- or NJ- numbers.

Common to All Alternatives

Mitigation Measures: Mitigation measures would reduce impacts on historic structures from construction, operation, and maintenance activities for all action alternatives and are described in chapter 2 and appendix F.

Outside the Study Area: Outside the study area, regardless of which alternative is selected, the transmission line could pass through Carbon, Lackawanna, Luzerne, Monroe, Northampton, Pike, and Wayne counties in Pennsylvania and Morris, Sussex, and Warren counties in New Jersey.

Clearing, construction, and vegetation maintenance activities outside the study area would be consistent with those described for inside the study area; however, the impacts outside the study area would be indirect. The direct impacts from the construction of the transmission line outside the study area cannot be determined, as described in the introduction of this chapter. Additionally, the specific historic structures that would be affected by the transmission line outside the study area cannot be identified until the route is chosen by the applicant. Upon this decision, additional surveys would be required to determine whether historic structures would be affected along the selected route.

Outside the study area, the proposed transmission line could pass through the Pocono environmental heritage region, Delaware and Lehigh National Heritage Corridor, and Lackawanna Heritage Valley state and national heritage area. Because the location of the line outside the study area is not known, the presence and number of historic structures in visual proximity to any of the alternatives is undocumented.

Outside the study area, indirect adverse impacts on historic structures would result from vegetation clearing and maintenance associated with the no-action alternative. Under all action alternatives, indirect adverse impacts on historic structures would result from clearing, construction, and vegetation maintenance outside the study area. Cumulative impacts outside the study area would result in adverse impacts on historic structures, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the adverse indirect impacts on historic structures as a result of activities outside the study area are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected. The S-R Line project would not alter the level of impact.

Alternative 1: No Action

Inside the study area, under the no-action alternative the widening of the existing transmission line ROW would not occur. Currently, historic structures, including APPA, are located near the existing line, and the existing line has a direct visual impact. Annual vegetation maintenance as described in the applicant's vegetation management plans would result in the removal or loss of vegetation and would negate any visual mitigation to existing historic structures. Therefore, adverse impacts on historic structures would occur under alternative 1.

Cumulative Impacts

Cumulative impacts on historic structures from past, present, and reasonably foreseeable projects inside the study area would be adverse, as described previously in the "Cumulative Impacts Common to All

Alternatives" section. When the impacts on historic structures as a result of alternative 1 are combined with the other projects inside the study area, an overall adverse cumulative impact would be expected. Alternative 1 would not alter the level of impact.

Conclusion

Alternative 1, the no-action alternative, would result in the continued operation and maintenance of the existing transmission line. There would be adverse impacts on historic structures; the impacts from alternative 1 are based on visual effects from the removal of vegetation during maintenance activities. The effects of past, present, and reasonably foreseeable projects, when combined with the impacts on historic structures under alternative 1, would result in adverse cumulative impacts on historic structures inside the study area.

Common to All Action Alternatives

Removal of Existing Structures: All action alternatives (2, 2b, 3, 4, and 5) would involve the removal of all or a portion of the B-K Line, as described in chapter 2. During the removal and disposal of existing structures, visual impacts on historic structures would occur from dust production, the removal of the crane pads and equipment at wire pulling sites, the disassembly and removal of lattice towers, the creation of access roads, and the transportation of construction equipment to and from the decommissioning sites. Similar impacts would occur related to the construction of the new facilities. Access roads and spur roads would require clearing and grading and would affect historic structures in the immediate vicinity of the roads. After the completion of the transmission lines, access roads with gravel surfacing would continue to be maintained. Such actions would have adverse impacts on historic structures in DEWA and on APPA.

Vegetation Clearing: The ROWs would be cleared of vegetation for the construction of the new double 500-kV transmission line for alternatives 2 through 5. Alternatives 2, 3, 4, and 5 include clearing up to 350 feet; the ROW would be extended up to 175 feet from either side of the centerline of the existing ROW. Under alternative 2b, the applicant proposes to operate the S-R Line within the existing ROW. The NPS anticipates that the applicant would require additional area for construction; therefore, it is estimated that under alternative 2b, the applicant would expand the ROW to the extent of their deeded property rights, which ranges from 100 feet to 380 feet. The property rights are currently being researched through deed research and ground surveys and will be updated as applicable in the final EIS. For alternative 2b, the ROW would be cleared on either side of the centerline to an appropriate width based on the deeded property rights. Clearing would be complete for all action alternatives, with the exception of the 50-foot buffer near intermittent streams/wetlands and the 100-foot buffer near perennial waterways such as the Delaware River (PPL and PSE&G 2008, 7).

Section 106 Summary: NHPA section 106 regulations apply only to structures that meet the eligibility requirements of the national register. Therefore, the assessment of NHPA section 106 effects applies only to those historic structures that are listed in the national register or have been formally determined eligible for listing in the national register. Tables 76 – 78 list all of the historic structures identified in DEWA. The section 106 impacts are presented in these tables for the structures that are listed in the national register or are considered eligible for listing.

Alternative 2

Alternative 2 would have adverse impacts on 33 identified structures; none of these impacts would be physical. All impacts on historic structures would be visual and the severity of the impact would vary depending on how the viewshed of the historic structure is affected by the clearing and construction activities under alternative 2. Visual impacts would result from removal or loss of vegetation and from the sight of the larger transmission towers and more numerous conductors within the viewshed of the historic structures. The presence of the large towers and lines would diminish the integrity of setting, feeling, and association of numerous historic structures. Under alternative 2, the overall impact on historic structures would be adverse.

Section 106 Summary

Although the application of the Advisory Council criteria of adverse effects (36 CFR 800.5, “Assessment of Adverse Effects”) has not yet been done, it is prudent to anticipate that adverse impacts could occur on historic structures. Inside the study area, alternative 2 would have *no adverse effect* on 16 historic structures. Alternative 2 would have an *adverse effect* on 8 historic structures (table 76).

Cumulative Impacts

Cumulative impacts on historic structures from past, present, and reasonably foreseeable projects inside the study area would be adverse, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the impacts on historic structures as a result of alternative 2 are combined with the other projects inside the study area, an overall adverse cumulative impact would be expected. Alternative 2 would not alter the level of impact.

Conclusion

Alternative 2 would have an adverse effect on numerous historic structures through visual impacts. The visual impacts would be somewhat mitigated by the beneficial impacts associated with the planned improvements to several historic structures in the study area. When the impacts from alternative 2 are considered with the effects of other past, present, and future projects inside the study area, the cumulative impacts would be adverse.

Alternative 2b

The alternative 2b alignment would require two additional transmission towers within NPS boundaries; however, the visual impacts on historic structures would be considered the same. Therefore, the adverse impacts for alternative 2b would be the same as those described for alternative 2 and would be caused by the visual impacts of the new transmission line on the historic structures inside the study area.

Section 106 Summary

Although the application of the Advisory Council criteria of adverse effects (36 CFR 800.5, “Assessment of Adverse Effects”) has not yet been done, it is prudent to anticipate that adverse impacts could occur on historic structures. Inside the study area, alternative 2b would have *no adverse effect* on 16 historic structures. Alternative 2b would have an *adverse effect* on 8 historic structures (table 76).

TABLE 76: SUMMARY OF NEPA IMPACTS AND NHPA SECTION 106 EFFECTS ON HISTORIC STRUCTURES FOR ALTERNATIVES 2 AND 2B

ID	Name (Date)	Section 106 Effect
103	Newcomb House (1850)	*No adverse effect*
139	Copper Mine Inn Complex (1840)	*No adverse effect*
140	Sadie Van Campen House (1870)	
162	Calno School (1880)	
191	Horace Van Auken House (1880)	*Adverse effect*
197	Abraham Van Campen House / Zipser House (1900)	
198	Benjamin B. Van Campen Farm (1840)	*No adverse effect*
208	Owens Spring House (1840)	*Adverse effect*
216	Ralph G. Turn House/Greg Turn House (1914)	
242	Peters House (1840)	*No adverse effect*
247	Bushkill Dutch Reformed Church (1860)	*No adverse effect*
283	Shoemakers Cabin (1840)	*Adverse effect*
284	Watergate Complex (1950)	
294	Millbrook Schoolhouse (1840)	*Adverse effect*
296	E. L. Garris House / Elias Labar (1852)	*Adverse effect*
297	Sylvester Hill House (1850)	*Adverse effect*
327	Salamovka House / Losey Boardinghouse (1850)	*No adverse effect*
343	Rosenkrans House and Ferry (1800)	*No adverse effect*
455	John P. House Farmstead / Romaine Warner House (1900)	*No adverse effect*
464	Brodhead Farm / ”Wheat Plains” (1890)	*No adverse effect*
488	Richard Layton House / Delrusso House (1812)	*No adverse effect*
490	Cornelius Gunn House (1814)	*No adverse effect*
494	Oakley Stoll House (1835)	
525	Jacob Roe House (1812)	*No adverse effect*
527	Walpack Center Methodist Cemetery (1850)	*No adverse effect*
PA-63	Zion Lutheran Church (1851)	*No adverse effect*
PA-64	River Road Historic District (1744)	
PA-66/NJ-1	Appalachian Trail (1926, 1933)	*Adverse effect*
PA-68	Bushkill School (1925)	
PA-77	Hidden Lake Lodge (1940)	
PA-80	John Michael Farm (1875)	*No adverse effect*
NJ-3	Old Mine Road Historic District	*Adverse effect*
NJ-7	Pahaquarry Copper Mine District	*No adverse effect*

Cumulative Impacts

Cumulative impacts on historic structures from past, present, and reasonably foreseeable projects inside the study area would be adverse, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the impacts on historic structures as a result of alternative 2b are combined with the other projects inside the study area, an overall adverse cumulative impact would be expected. Alternative 2b would not alter the level of impact.

Conclusion

Alternative 2b would have adverse impacts on numerous historic structures. The presence of the large towers and lines would diminish the integrity of setting, feeling, and association of numerous historic structures. The impacts would be somewhat mitigated by the beneficial impacts associated with the planned improvements to several historic structures in the study area. When considered with the adverse effects of other past, present, and future projects inside the study area, the overall cumulative impacts from alternative 2b would be adverse.

Alternative 3

Inside the study area, alternative 3 would have a direct impact on 72 identified historic structures; none of these impacts would be physical, and none would be beneficial. All impacts on historic structures would be visual, as described for alternative 2. The presence of the large towers and lines would diminish the integrity of setting, feeling, and association of numerous historic structures. Under alternative 3, the overall impact on historic structures would be adverse.

Section 106 Summary

Although the application of the Advisory Council criteria of adverse effects (36 CFR 800.5, "Assessment of Adverse Effects") has not yet been done, it is prudent to anticipate that adverse impacts could occur on historic structures. Inside the study area, alternative 3 would have *no adverse effect* on 23 historic structures. Alternative 3 would have an *adverse effect* on 6 historic structures.

Cumulative Impacts

Cumulative impacts on historic structures from past, present, and reasonably foreseeable projects inside the study area would be adverse, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the impacts on historic structures as a result of alternative 3 are combined with the other projects inside the study area, an overall adverse cumulative impact would be expected. Alternative 3 would not alter the level of impact (table 77).

Conclusion

Alternative 3 would have adverse impacts on numerous historic structures. The visual impact would be somewhat mitigated by the beneficial impacts associated with the planned improvements to several historic structures in the study area. When considered with the adverse effects of other past, present, and reasonably foreseeable projects inside the study area, the overall cumulative impacts of alternative 3 would be adverse.

TABLE 77: SUMMARY OF NEPA IMPACTS AND NHPA SECTION 106 EFFECTS ON HISTORIC STRUCTURES FOR ALTERNATIVE 3

ID	Name (Date)	Section 106 Effect
37	Slateford Farm (1830)	
39	Munsch-Cyr Farm (1910)	
60	Old Delaware Water Gap Railroad Station	*No adverse effect*
103	Newcomb House (1850)	*Adverse effect*
139	Copper Mine Inn Complex (1840)	
140	Sadie Van Campen House (1870)	
162	Calno School (1880)	
171	Schoonover “Mountain House” (1860)	*No adverse effect*
172	Gristmill (1840)	
178/181	John Turn Farm (1815)	*No adverse effect*
191	Horace Van Auken House (1880)	*No adverse effect*
194	Van Campen Cemetery (1850)	
196	Moses Van Campen House / Miller House (1860)	
197	Abraham Van Campen House / Zipser House (1900)	
198	Benjamin B. Van Campen Farm (1840)	*No adverse effect*
201	De Pue Cemetery (1819)	
208	Owens Spring House (1840)	*No adverse effect*
216	Ralph G. Turn House / Greg Turn House (1914)	
236	Smith House / Costello House (1750)	*No adverse effect*
242	Peters House (1840)	*No adverse effect*
244	John Turn Store and Tinsmith Shop (1840)	*No adverse effect*
245	Bushkill Post Office / Ice Cream Parlor (1900)	
247	Bushkill Dutch Reformed Church (1860)	*No adverse effect*
250	Bushkill Fire Company / Methodist Church (1910)	
258	Ralph G. Turn Jr. House (1920)	
264	Dippre House (1920)	
282	Kinney-Hawkins House / Millbrook General Store (1860)	
283	Shoemakers Cabin (1840)	
284	Watergate Complex (1950)	*No adverse effect*
294	Millbrook Schoolhouse (1840)	*No adverse effect*
296	E. L. Garris House / Elias Labar (1852)	*No adverse effect*
297	Sylvester Hill House (1850)	*No adverse effect*
327	Salamovka House / Losey Boardinghouse (1850)	*No adverse effect*
340	Albert Knight Farm (1890)	
343	Rosenkrans House and Ferry (1800)	*No adverse effect*
PA-1	Unnamed farmstead (1850)	

ID	Name (Date)	Section 106 Effect
PA-2	Unnamed farmstead (1910)	
PA-3	Unnamed dwelling (1920)	
PA-4	Henry Transue Farm (1870)	
PA-5	Unnamed dwelling (1935)	
PA-6	Spring Hills Farm (1830)	
PA-7	Inwood (1800)	
PA-8	Cortwright-Meegan Farm (1856)	
PA-9	Egger Home (1880)	
PA-10	Unnamed dwelling (1920)	
PA-11	Unnamed dwelling (1930)	
PA-63	Zion Lutheran Church (1851)	*Adverse effect*
PA-64	River Road Historic District (1744)	
PA-65	Delaware Water Gap Historic District (1841)	*No adverse effect*
PA-66/NJ-1	Appalachian Trail (1926, 1933)	*Adverse effect*
PA-67	Delaware, Lackawanna and Western Railroad (1908)	*No adverse effect*
PA-68	Bushkill School (1925)	
PA-69	Ernest and Theresa Fleischman House (1947)	
PA-76	Cold Spring Farm Spring House	*No adverse effect*
PA-77	Hidden Lake Lodge (1940)	
PA-78	Emanuel and Juliette Wagenhouzen House (1923)	
PA-80	John Michael Farm (1875)	*Adverse effect*
PA-81	Laurel Hill School / Joseph Cain House (1850)	*No adverse effect*
NJ-2	Delaware Water Gap Slate Co. Historic District	*No adverse effect*
NJ-3	Old Mine Road Historic District	*Adverse effect*
NJ-4	Millbrook Village Historic District	*No adverse effect*
NJ-5	New York Susquehanna and Western RR Bridge	
NJ-6	Delaware Water Gap Toll Bridge	
NJ-7	Pahaquarry Copper Mine District	*No adverse effect*
NJ-9	Yards Creek Pumped Storage Electric Gen. Sta.	
NJ-10	Yards Creek Hydro-Power Tunnel and Penstock	
NJ-11	PA-NJ MD High Tension Electrical Interconnection	
NJ-12	Sussex County Bridge #318	
NJ-13	Sussex County Bridge #330	
NJ-14	John and Millicent Blake House (1960)	
NJ-16	Stanley and Louise Parr Property (1940)	
NJ-17	Ribble-Boehme Barn (1880)	

Alternative 4

Inside the study area, alternative 4 would have direct impacts on 27 identified historic structures; none of these impacts would be physical. All impacts on historic structures would be visual, as described for alternative 2. The presence of the large towers and lines would diminish the integrity of setting, feeling, and association of numerous historic structures. Under alternative 4, the overall impact on historic structures would be adverse.

Section 106 Summary

Although the application of the Advisory Council criteria of adverse effects (36 CFR 800.5, "Assessment of Adverse Effects") has not yet been done, it is prudent to anticipate that adverse impacts could occur on historic structures. Inside the study area, alternative 4 would have *no adverse effect* on 6 historic structures. Alternative 4 would have an *adverse effect* on 1 historic structure (table 78).

Cumulative Impacts

Cumulative impacts on historic structures from past, present, and reasonably foreseeable projects inside the study area would be adverse, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the impacts on historic structures as a result of alternative 4 are combined with the other projects inside the study area, an overall adverse cumulative impact would be expected. Alternative 4 would not alter the level of impact.

Conclusion

Alternative 4 would have adverse impacts on numerous historic structures through visual impacts. The presence of the large towers and lines would diminish the integrity of setting, feeling, and association of numerous historic structures. When considered with the adverse effects of other past, present, and future projects inside the study area, the overall cumulative impacts from alternative 4 would be adverse.

Alternative 5

The alignments for alternatives 4 and 5 would follow the same route through DEWA and APPA, except for the portion of the B-K Line from the Bushkill Substation to the western boundary of DEWA. The impacts for alternative 5 inside the study area would be the same as those described for alternative 4 and would result from visual effects. Under alternative 5, the overall impact on historic structures would be adverse.

Section 106 Summary

Although the application of the Advisory Council criteria of adverse effects (36 CFR 800.5, "Assessment of Adverse Effects") has not yet been done, it is prudent to anticipate that adverse impacts could occur on historic structures. Inside the study area, alternative 5 would have *no adverse effect* on 6 historic structures. Alternative 5 would have an *adverse effect* on 1 historic structure (table 78).

TABLE 78: SUMMARY OF NEPA IMPACTS AND NHPA SECTION 106 EFFECTS ON HISTORIC STRUCTURES FOR ALTERNATIVES 4 AND 5

ID	Name (Date)	Section 106 Effect
37	Slateford Farm (1830)	
39	Munsch-Cyr Farm (1910)	
60	Old Delaware Water Gap Railroad Station	No adverse effect
103	Newcomb House (1850)	No adverse effect
PA-12	Unnamed dwelling (1900)	
PA-13	Unnamed dwelling (1870)	
PA-14	Unnamed dwelling (1890)	
PA-15	Totts Gap Farm (1820)	
PA-16	Drake Farm (1800)	
PA-17	Tranquility Farm (1850)	
PA-64	River Road Historic District (1744)	
PA-65	Delaware Water Gap Historic District (1841)	No adverse effect
PA-66/NJ-1	Appalachian Trail (1926, 1933)	Adverse effect
PA-67	Delaware, Lackawanna and Western Railroad (1908)	No adverse effect
PA-71	Unnamed farmstead (1800)	
PA-81	Laurel Hill School / Joseph Cain House (1850)	No adverse effect
NJ-2	Delaware Water Gap Slate Co. Historic District	No adverse effect
NJ-5	New York Susquehanna and Western RR Bridge	
NJ-6	Delaware Water Gap Toll Bridge	
NJ-9	Yards Creek Pumped Storage Electric Generating Station	
NJ-10	Yards Creek Hydro-Power Tunnel and Penstock	
NJ-11	PA-NJ-MD High Tension Electrical Interconnection	
NJ-12	Sussex County Bridge #318	
NJ-13	Sussex County Bridge #330	
NJ-14	John and Millicent Blake House (1960)	
NJ-16	Stanley and Louise Parr Property (1940)	
NJ-17	Ribble-Boehme Barn (1880)	

Cumulative Impacts

Cumulative impacts on historic structures from past, present, and reasonably foreseeable projects inside the study area would be adverse, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the adverse impacts on historic structures as a result of alternative 5 are combined with the other projects inside the study area, an overall adverse cumulative impact would be expected. Alternative 5 would contribute an appreciable adverse increment to the overall cumulative impact.

Conclusion

Alternative 5 would have adverse impacts on numerous historic structures. The presence of the large towers and lines would diminish the integrity of setting, feeling, and association of numerous historic structures. When considered with the adverse effects of other past, present, and future transmission line projects inside the study area, the overall cumulative impacts from alternative 5 would be adverse.

CULTURAL LANDSCAPES

METHODOLOGIES

Existing Data Review: Cultural landscape resources were identified in two ways, depending on their locations: for portions of the APE within the DEWA boundary, where previous investigation has occurred, the DEWA database of cultural landscape inventories, the DEWA inventory of historic resources, and the DEWA list of contributing structures were used; for portions of the APE outside the parks' boundaries, where little or no previous investigation had occurred, a reconnaissance survey was conducted to determine the presence of properties that met the 50-year age consideration (pre-1961) and integrity requirements of the national register. The Pennsylvania SHPO Cultural Resources Geographic Information System website and New Jersey HPO survey files were also reviewed to determine the presence and location of previously identified resources both inside and outside the parks' boundaries.

Field Investigation: Initial efforts included a field survey of the resources including landscapes identified by DEWA as vulnerable to impacts from the proposed alternatives. Field work also clarified the extent of the current documentation of cultural landscapes. Field work helped verify location, setting, structures, landscape features, direct views to the existing transmission line corridors, physical proximity to the transmission line corridors, site spatial organization, topography, vegetation, small-scale features, conditions, and extant features that survive from the period of significance. Field observation also extended to the larger cultural landscape of the river corridor and the river valley, which continues to mirror the setting, feeling, and association of the earliest periods of habitation into the twentieth century.

Impact Assessment: In order for a cultural landscape to be listed in the national register, it must possess significance (the meaning or value ascribed to the landscape) and retain the integrity of those features necessary to convey its significance as well as meeting one or more of the national register criteria (36 CFR 63). The character-defining features in the identified cultural landscapes included spatial organization and land patterns, topography, vegetation, circulation patterns, water features, structures/buildings, and site furnishings and objects. Individual features were not examined alone, but in relationship to the overall landscape. The arrangement and interrelationships of the cultural landscapes' organizational elements and character-defining features provided the key to the determination of the potential impacts and effects of the proposed action presented in the project alternatives.

The cultural landscape resources in the APE were listed and organized by resource type, historical documentation, location and context, and tract number. The location of the resources was mapped according to the APE for each alternative. GIS overlays of vegetation and topography and viewshed analysis were also used in discerning the extent and type of potential effects and impacts (see cultural landscape resource tables in appendix J).

The method for assessing effects on cultural landscapes is designed to comply with requirements of both NEPA and section 106 of NHPA, and with implementing regulations 40 CFR 1500 and 36 CFR 800, respectively, while considering the differences between NEPA and NHPA language and recognizing that compliance with one does not automatically mean compliance with the other. Impacts and effects on identified cultural landscapes were anticipated to be visual and physical and for the period of analysis of 15 years.

STUDY AREA

The designated APE, as described in chapter 3, contains archeological resources, historic architectural resources, and cultural landscapes. Because the APE is defined by cultural resources boundaries (as opposed to specific geographic areas, as in other resource topics), this section is structured differently than others.

CUMULATIVE IMPACTS COMMON TO ALL ALTERNATIVES

An assessment of cumulative impacts on cultural resources is required by both the CEQ and NHPA. Existing and anticipated future projects at DEWA, MDSR, and APPA were identified to determine the potential cumulative impacts. Past, present, and reasonably foreseeable activities that would have beneficial or adverse impacts on cultural landscapes in the parks and inside and outside the study area are listed in the following sections and discussed under each alternative as applicable.

Projects Inside the Study Area

Inside the study area, projects that would result in adverse cumulative impacts on cultural landscapes through the alteration of character-defining features of cultural landscapes include the following utility and road projects: the I-80 weigh station, PADOT SR 2001, the rehabilitation of road bridges throughout the parks in New Jersey and Pennsylvania, the repair of failing Watergate Dam #10, the Tennessee Gas Line Proposal, the Columbia Gas Transmission Company pipeline, the PJM Interconnection Proposal, the PPL Electric Utilities Northeast Pocono reliability project, the PPL proposal for a 138/12-kV substation, and existing utility towers within 5 miles. Other development projects that could have adverse effects on cultural landscapes include the hazardous structure demolition/deconstruction of 230 structures; Kittatinny Point Visitor Center; New Jersey Swim Beach (Turtle Beach); McDade Trail realignment; and illegal ORV use, vandalism, trespassing, arson, and encroachment. Other projects that would have adverse impacts include the issuance of special use permits related to visitor use, incidental business permits / commercial visitor services, the DEWA prescribed-burn program, and the DEWA hazard fuel reduction program. Illegal woodcutting would have an adverse impact on cultural landscapes. Projects that would have beneficial impacts on the character-defining features of cultural landscapes include the following: the repair of historic stone culverts on Mountain Road, the stabilization and repair of damaged structures, and the rehabilitation of Childs Park. These projects would preserve and/or rehabilitate significant landscape features inside the study area and protect these landscapes. Inside the study area, cumulative impacts could be adverse.

Projects Outside the Study Area

Outside the study area, projects include other developments that have the potential to adversely affect cultural landscapes, including the Tennessee Gas Line Proposal, the Columbia Gas Transmission Company pipeline, the PJM Interconnection Proposal, the PPL Electric Utilities Northeast Pocono reliability project, the PPL proposal for a 138/12-kV substation, and existing utility towers within 5 miles. Other utility and development projects that may have an adverse impact include the Federal Energy Regulatory Commission relicensing of Yards Creek Generating Station, Marcellus shale natural gas drilling, Blue Mountain Ski Resort wind turbines, wind turbines in northeastern Pennsylvania, PFBC natural gas leasing and water access programs, Fernwood Casino, and residential development. The Alpine Rose Racetrack would have an adverse impact on cultural landscapes. Projects outside the study area that would have beneficial impacts on cultural landscapes include the following: the high-speed passenger train from northeast Pennsylvania to New York City, the New Jersey to Pennsylvania Lackawanna Passenger Rail cutoff, agricultural leases, Pike County agricultural security areas, and county and township open space and conservation plans. The overall cumulative impacts on cultural landscapes from these projects outside the study area would be would be adverse.

IMPACTS OF THE ALTERNATIVES ON CULTURAL LANDSCAPES

Common to All Alternatives

Mitigation Measures: Mitigation measures would reduce impacts on cultural landscapes from construction, operation, and maintenance activities for all action alternatives and are described in chapter 2 and appendix F.

Outside the Study Area: Outside the study area, regardless of which alternative is selected, the transmission line could pass through Carbon, Lackawanna, Luzerne, Monroe, Northampton, Pike, and Wayne counties in Pennsylvania and Morris, Sussex, and Warren counties in New Jersey. The clearing, construction, and vegetation maintenance activities outside the study area would be consistent with those described for inside the study area; however, the impacts outside the study area would be indirect. The direct impacts from the construction of the transmission line outside the study area cannot be determined, as described in the introduction of this chapter. Additionally, the specific resources that would be affected by the transmission line outside the study area cannot be identified until the route is chosen by the applicant.

Outside the study area, the S-R Line would pass through a variety of landscapes — some of which could be cultural landscapes — that have inherent national register eligibility but are as yet undocumented. Under the no-action alternative, the existing B-K Line ROW may have affected cultural landscapes in the surrounding area (specifically in the Pocono environmental heritage region, the Delaware and Lehigh National Heritage Corridor, and the Lackawanna Heritage Valley state and national heritage region) since its construction in the 1920s and may continue to do so. Any adverse impacts related to the existence of the existing transmission line would be adverse.

Outside the study area, the ROW width would be increased to 350 feet as it would be in the study area, with similar impacts. The transmission line would cross a variety of different types of publicly accessible protected areas, heritage areas, and historic resources. A wider ROW, taller structures, and additional access roads would have more impacts on identified or not yet identified or documented cultural landscapes both in heritage areas and outside heritage areas. Impacts could range from no noticeable change to the visual environment to areas where the ROW could cross a historic road corridor, trail, or district and/or cultural landscapes associated with farmsteads and villages. Impacts would be greatest if the ROW traverses a great distance through a heritage area such as the Pocono environmental heritage region, the Delaware and Lehigh National Heritage Corridor, or the Lackawanna Heritage Valley state and national heritage region. Adverse impacts would result from construction and from ongoing maintenance activities.

The effects of other projects would add to the impacts of the S-R-Line on cultural landscapes. Cumulative impacts on cultural landscapes outside the study area would be adverse, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the indirect adverse impacts on cultural landscapes as a result of activities outside the study area are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected.

Alternative 1: No Action

Under the no-action alternative, the no-action alternative would involve no new construction or appreciable changes to current conditions. The existing corridor, galvanized steel tower structures, and conductors would continue to be visible from cultural landscapes in DEWA and would continue to cross documented cultural landscapes in DEWA. The existing corridor and structures cross APPA and would remain part of the viewshed from APPA.

The existing transmission alignment intrudes on historic views, specifically at the Watergate Recreation Site, Otto Nehland House, Horace Van Auken Farmstead, Schoonover Farm, and Stone Spring Farm. Vegetation along the ROW and trees and shrubs related to the specific historic sites have increased in size and density since the alignment was installed in the 1920s, partially mitigating the transmission line’s visual intrusion into historic views. The size and scale of the existing alignment also disrupts character-defining features such as spatial organization and vegetation/open space patterns along historic road corridors, trail corridors, and historic districts. This is evident where the alignment crosses APPA, River Road (New Jersey), Old Mine Road Historic District, River Road (Pennsylvania), and Community Drive. Again, existing vegetation mitigates some of the visual disruption at these crossings. The existing transmission line is not visible from the remaining cultural landscapes identified in the study area because the viewing distance is so great that impacts would not be discernible or because vegetation and/or topographic features block potential views from the cultural landscape. Impacts on these landscapes would occur. In addition, the continued operation of the existing transmission line would require periodic maintenance, including the clearing of vegetation in the ROW. Access roads in the ROW would also require periodic maintenance to provide access for repairs and maintenance of the system. The systematic removal of existing vegetation that currently provides some visual mitigation for impacts on cultural landscapes would have adverse impacts associated with views from cultural landscapes. The overall impact on cultural resources under alternative 1 would be adverse.

Cumulative Impacts

Cumulative impacts on cultural landscapes from past, present, and reasonably foreseeable projects inside the study area would be adverse, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the impacts on cultural landscapes as a result of alternative 1 are combined with the other projects inside the study area, an overall adverse cumulative impact would be expected. Alternative 1 would not alter the level of impact.

Conclusion

Alternative 1, the no-action alternative, would result in the continued presence, operation, and maintenance of the existing transmission line route. The presence of the large towers and lines would diminish the integrity of setting, feeling, and association of numerous cultural landscapes. There would also be effects on cultural landscapes based on the visual effects from the removal of vegetation during maintenance activities. Overall, alternative 1 would result in adverse impacts to cultural landscapes. The effects of past, present, and reasonably foreseeable projects, when combined with the impacts on cultural landscapes under alternative 1, would result in overall adverse cumulative impacts on cultural landscapes inside the study area.

Common to All Action Alternatives

Removal of Existing Structures: All action alternatives (2, 2b, 3, 4, and 5) would involve the removal of all or a portion of the B-K Line, as described in chapter 2. During the removal and disposal of existing structures, adverse visual and physical impacts on cultural landscapes would occur from grading activities, dust production, the removal of the crane pads and equipment at wire pulling sites, the disassembly and removal of lattice towers, the creation of access roads, and the transportation of construction equipment to and from the decommissioning sites. Similar impacts would occur related to the construction of the new facilities. Access roads and spur roads would require clearing and grading and would affect cultural landscapes in the immediate vicinity of the roads. After the completion of the transmission lines, access roads with gravel surfacing would continue to be maintained. Such actions would have adverse impacts on cultural landscapes in DEWA and on APPA.

Vegetation Clearing: The ROWs would be cleared of vegetation for the construction of the new double 500-kV transmission line for alternatives 2 through 5. Alternatives 2, 3, 4, and 5 include clearing up to 350 feet; the ROW would be extended up to 175 feet from either side of the centerline of the existing ROW.

Under alternative 2b, the applicant proposes to operate the S-R Line within the existing ROW. The NPS anticipates that the applicant would require additional area for construction; therefore, it is estimated that under alternative 2b, the applicant would expand the ROW to the extent of their deeded property rights, which ranges from 100 feet to 380 feet. The property rights are currently being researched through deed research and ground surveys and will be updated as applicable in the final EIS. For alternative 2b, the ROW would be cleared on either side of the centerline to an appropriate width based on the deeded property rights. Clearing would be complete for all action alternatives, with the exception of the 50-foot buffer near intermittent streams/wetlands and the 100-foot buffer near perennial waterways such as the Delaware River (PPL and PSE&G 2008, 7).

Section 106 Summary

NHPA section 106 regulations apply only to properties that meet the eligibility requirements of the national register. Therefore, the assessment of NHPA section 106 effects applies only to those cultural landscapes that are listed in the national register or have been formally determined eligible for listing in the national register. NHPA section 106 effects are summarized by alternative in table 79. NHPA section 106 effects are summarized by resource in tables J1 through J4 in appendix J.

TABLE 79: SUMMARY OF NEPA IMPACTS AND NHPA SECTION 106 EFFECTS ON CULTURAL LANDSCAPES

Effect on Cultural Landscapes	Alternative				
	2	2b	3	4	5
No adverse effect	21	21	34	8	8
Adverse effect	30	30	10	4	4
Total resources listed or eligible	51	51	44	12	12

Alternative 2

The expansion and construction of new towers and the permanent loss of vegetation under alternative 2 would result in increased visual intrusion on cultural landscapes, as well as physical impacts, where the ROW corridor crosses the cultural landscapes inside the study area.

Analysis of topographic and vegetation conditions indicates that there are 31 cultural landscapes identified in the study area as having little to no view of the alternative 2 alignment. Impacts would not be discernible due to the distance from the cultural landscapes to the alignment or due to vegetation and topographic features blocking any potential views. These cultural landscapes include the Abraham Van Campen III site, Broadhead-Heller Farmstead, Calno Schoolhouse, Camp Ken-Etiwa-Pec, Camp

Mohican, Chado Farmstead, Camp Pahaquarra, Copper Mine Inn, Cornelius Gunn Farmstead, Dimmick's Ferry, Flatbrookville Bridge, Garris Mill site, George Nyce / J. Russell Eshback Farm, Haney's Mill site, Hidden Lake Lodge, Isaac Van Campen Inn, Jacob Roe House, John P. House Farmstead, John Stark Michael Farm, McManus House, Michael Cemetery, Newcomb House, Oakley Stoll Farmstead, Pahaquarry Copper Mines, Richard Layton Farmstead, Sadie Van Campen Farm, Smithfield Beach, Trieble-Rouch House, Van Scouder-Knight property, Walpack Center Historic District, and Zion Lutheran Church.

Twenty-three cultural landscapes were identified in the study area as having seasonal views or vistas of alternative 2. Impacts would not diminish the integrity of the cultural landscapes. These landscapes include Abraham Van Campen Farm, Benjamin B. Van Campen Farm, Blasi House, Bushkill Dutch Reformed Church, Bushkill School, Cold Spring Farm Spring House, Decker Ferry House, Fort Hynshaw, Gonzales Mill site, Grube Cemetery, John Turn Farm, Miller Farm, Minard-Hamilton Farmstead, Myers Farmstead, Pennsylvania Subdistrict Office, Peter's House and Garage, Ralph G. Turn Jr. Farmstead, Raymond Steele Gulf Gas Station, Salamovka, Smith-Rosenkrans House, St. John's Catholic Church, Van Auken Cemetery, and Van Campen Sawmill site. Impacts to these cultural landscapes would be adverse; however, the alignment is far removed from these cultural landscapes or so obscured during all but winter months by intervening topography and/or vegetation that the S-R Line is not readily noticeable.

Five cultural landscapes were identified in the study area for which impacts from alternative 2 would alter character-defining features of the landscapes and result in measurable changes, thus diminishing the overall integrity of the resources. Criteria for eligibility for listing in the national register such as location, setting, feel, and design would be threatened, but not enough to remove the resources from the national register or render them ineligible. These cultural landscapes would be traversed by the expanded ROW and towers. They include APPA, the Old Mine Road Historic District, River Road (Pennsylvania) Shawnee to Decker's Ferry, the River Road System (New Jersey), and US Route 209 (Community Drive to Spackman's Creek). Alignment crossings would disassociate these road and trail corridors from their rural vernacular surroundings, including the historic built features and field patterns that convey important associations. The alignment crossings would threaten the survival of numerous features established during the periods of significance along the margins of the road and trail alignments. Viewsheds to the expanded ROW would be evident as travel occurs along the roads and trails and through the historic district. This would diminish the integrity of setting, location, feel, and design of these resources. The impacts on these landscapes would be adverse.

Thirteen cultural landscapes were identified in the study area on which impacts from alternative 2 would be substantial, producing noticeable changes or alterations to the character-defining features of the cultural landscapes. These features include historic viewsheds, spatial organization, and cultural vegetation. The Watergate Recreation Site would be affected by the ROW expansion that would encompass part of the open lawn area and expose it to wide views of the alternative 2 alignment. This level of impact also occurs at the Horace Van Auken Farmstead and Otto Nehland House. Visual proximity to the expanded ROW and the larger transmission poles would also affect the E. L. Garris House and Barn, George Trauger House and Barn, Jacob Shoemaker House, James Van Campen Farm, Millbrook Schoolhouse, Millbrook Village Historic District, Overfield Cemetery, Schoonover Farm, Stone Spring Farm, and Sylvester Hill House. The expanded ROW in its final alignment would cut a swath close to or across these sites and farmsteads, resulting in adverse impacts.

Overall, impacts to cultural landscapes under alternative 2 would be adverse.

Section 106 Summary

Effects under section 106 would occur on cultural landscapes that are included in the national register or have been determined by the NPS or SHPO to meet national register eligibility requirements. After applying the Advisory Council criteria for adverse effects (36 CFR 800.5, “Assessment of Adverse Effects”), the NPS has concluded that implementation of alternative 2 would have an *adverse effect* on cultural landscapes. The effects of alternative 2 on individual cultural landscapes are shown in table J-1 in appendix J.

Cumulative Impacts

Cumulative impacts on cultural landscapes from past, present, and reasonably foreseeable projects inside the study area would be adverse, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the impacts on cultural landscapes as a result of alternative 2 are combined with the other projects inside the study area, an overall adverse cumulative impact would be expected. Alternative 2 would not alter the level of impact.

Conclusion

Inside the study area, the implementation of alternative 2 would result in adverse impacts on cultural landscapes. The effects of past, present, and reasonably foreseeable projects, when combined with the impacts on cultural landscapes under alternative 2, would result in overall adverse cumulative impacts on cultural landscapes inside the study area.

Alternative 2b

Alternative 2b would follow the same alignment as described for alternative 2. The 54 cultural landscapes identified in the study area with adverse impacts are the same as those in alternative 2. However, due to the differences in the alternatives (additional towers and slightly different access roads), the impacts on the remaining cultural landscapes along the alignment differ for alternative 2b.

Eight cultural landscapes were identified in the study area for which impacts from alternative 2b would alter character-defining features of the landscapes and result in measurable changes, thus diminishing the overall integrity of the resources. Criteria for eligibility for the national register such as location, setting, feel, and design would be threatened, but not enough to remove the resources from the national register or render them ineligible. Visual proximity to the larger transmission poles in the existing ROW would affect the E. L. Garris House and Barn, George Trauger House and Barn, Jacob Shoemaker House, James Van Campen Farm, Millbrook Schoolhouse, Millbrook Village Historic District, Overfield Cemetery, and Sylvester Hill House. The impacts to these landscapes would be adverse.

Five cultural landscapes would be traversed by the alternative 2b alignment and the larger towers. They include APPA, the Old Mine Road Historic District, the River Road System (New Jersey), River Road (Pennsylvania) Shawnee to Decker’s Ferry, and US Route 209 (Community Drive to Spackman’s Creek). Alignment crossings and tower size and number would disassociate these road and trail corridors from their rural vernacular surroundings, including the historic built features and field patterns that convey important associations. The alternative 2b alignment crossing, with increased tower size and number, would threaten the survival of numerous features established during the periods of significance along the margins of the road and trail alignments. Viewsheds to the towers and the existing corridor would be evident as travel occurs along the roads and trails and through the historic district. This would diminish the integrity of setting, location, feel, and design of these resources. The impacts on these landscapes would be adverse.

Five cultural landscapes were identified in the study area on which impacts from alternative 2b would be substantial, producing noticeable changes or alterations to the character-defining features of the cultural landscapes. These features include historic viewsheds, spatial organization, visual connections to the larger landscape, and cultural vegetation. The larger towers would disassociate these sites from their rural vernacular surroundings, including the historic built features and field patterns that convey important associations. This would jeopardize the integrity of setting, location, feel, and design of these resources. Cultural landscapes with this level of impact include the Horace Van Auken Farmstead, Otto Nehland House, Schoonover Farm, Stone Spring Farm, and the Watergate Recreation Site. Due to the proximity of the proposed towers, historic viewsheds and patterns of open space and vegetation would be jeopardized and the sites would also be exposed to wide views of the alternative 2b alignment. The impacts on these landscapes would be adverse.

Overall, impacts to cultural landscapes under alternative 2b would be adverse.

Section 106 Summary

Effects under section 106 would occur on cultural landscapes that are included in the national register or have been determined by the NPS or SHPO to meet national register eligibility requirements. After applying the Advisory Council criteria for adverse effects (36 CFR 800.5, “Assessment of Adverse Effects”), the NPS has concluded that implementation of alternative 2b would have an *adverse effect* on cultural landscapes. The effects of alternative 2b on individual cultural landscapes are shown in table J-1 in appendix J.

Cumulative Impacts

Cumulative impacts on cultural landscapes from past, present, and reasonably foreseeable projects inside the study area would be adverse, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the impacts on cultural landscapes as a result of alternative 2b are combined with the other projects inside the study area, an overall adverse cumulative impact would be expected. Alternative 2b would not alter the level of impact.

Conclusion

Inside the study area, implementation of alternative 2b would result in adverse impacts on cultural resources. When considered with the effects of other past, present, and reasonably foreseeable projects inside the study area, the overall cumulative impacts from alternative 2b would be adverse.

Alternative 3

During the course of the impact analysis, including fieldwork and background research regarding existing topographic and vegetation conditions, 55 cultural landscapes were identified in the study area as having little to no view of alternative 3. Impacts would not be discernible due to the distance from the alternative 3 alignment or due to vegetation and topographic features that would block views from the cultural landscapes. These cultural landscapes include Abraham Van Campen Farm, Abraham Van Campen III Barn, Benjamin B. Van Campen Farm, Blasi House, Bushkill Dutch Reformed Church, Bushkill School, Calno Schoolhouse, Camp Mohican, Camp Pahaquarra, Camp Weygadt, Cold Spring Farm Spring House, Decker Ferry House, Delaware Water Gap Slate Company Quarry and Building Sites Historic District, E. L. Garris House and Barn, Flatbrookville Bridge, Fort Hynshaw, Grube Cemetery, Garris Mill site, George Trauger House and Barn, Gonzales Mill site, Hidden Lake Lodge, Horace Van Auken Farmstead, Jacob Shoemaker House, James Van Campen Farm, John Turn Farm, Laurel Falls Schoolhouse, Michael Cemetery, Millbrook Schoolhouse, Millbrook Village Historic District, Miller Farm, Minard-Hamilton

Farmstead, Munsch-Cyr Farm, Otto Nehland House, Overfield Cemetery, Pahaquarry Copper Mines, Pennsylvania Subdistrict, Peter's House and Garage, Ralph G. Turn Jr. Farmstead, Raymond Steele Gulf Gas Station, Sadie Van Campen Farm, Salamovka, Schoonover Farm, Slateford Farm, Smith-Rosenkrans House, St. John's Catholic Church, Stone Spring Farm, Sylvester Hill House, Totts Gap Farm, Totts Gap Road, Van Auken Cemetery, Van Campen Sawmill site, Van Scouder-Knight property, Watergate Recreation Site, and Zion Lutheran Church.

Seven cultural landscapes were identified in the study area as having seasonal views of alternative 3. These landscapes include Copper Mine Inn, Dimmick's Ferry, John Stark Michael Farm, McManus House, Newcomb House, Smithfield Beach, and Trieble-Rouch House. Impacts to these cultural landscapes would be adverse; however, these cultural landscapes are so far removed or so obscured during all but winter months by intervening topography and/or vegetation that the S-R Line would not be readily noticeable and would not diminish the integrity of the cultural landscapes.

Three cultural landscapes were identified in the study area for which impacts from alternative 3 would alter character-defining features of the landscapes and result in measurable changes, thus diminishing the overall integrity of the resources. APPA, the River Road System (New Jersey), and River Road (Pennsylvania) Shawnee to Decker's Ferry would be crossed by alternative 3. APPA would be paralleled as well. Alignment crossings would disassociate these road and trail corridors from their rural vernacular surroundings, including the historic built features and field patterns that convey important associations. The alignment crossing threatens the survival of features established during the periods of significance along the margins of the trail and road alignments. Viewsheds to the ROW would be evident as travel occurs along the roads and trail. This would diminish the integrity of setting, location, feel, and design of these resources. The impacts on these landscapes would be adverse.

Overall, impacts to cultural landscapes under alternative 3 would be adverse.

Section 106 Summary

Effects under section 106 would occur on cultural landscapes that are included in the national register or have been determined by the NPS or SHPO to meet national register eligibility requirements. After applying the Advisory Council criteria for adverse effects (36 CFR 800.5, "Assessment of Adverse Effects"), the NPS has concluded that implementation of alternative 3 would have an *adverse effect* on cultural landscapes. The effects of alternative 3 on individual cultural landscapes are shown in table J-1 in appendix J.

Cumulative Impacts

Cumulative impacts on cultural landscapes from past, present, and reasonably foreseeable projects inside the study area would be adverse, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the impacts on cultural landscapes as a result of alternative 3 are combined with the other projects inside the study area, an overall adverse cumulative impact would be expected. Alternative 3 would not alter the level of impact.

Conclusion

Inside the study area, the implementation of alternative 3 would result in adverse impacts on cultural landscapes. When the impacts on cultural landscapes as a result of alternative 3 are combined with other projects inside the study area, an overall adverse cumulative impact would be expected.

Alternative 4

During the course of the impact analysis, including fieldwork and background research regarding existing topographic and vegetation conditions, 11 cultural landscapes were identified in the study area as having little to no view of the alternative 4 alignment. Impacts would not be discernible due the distance of the cultural landscapes from the alignment and due to vegetation and topographic features that would block views. These cultural landscapes include Camp Weygadt, Emory Pipher Quarry, Jon Stark Michael Farm, Laurel Falls Schoolhouse, McManus House, New York and Delaware River Slate Company, Newcomb House, River Road (Pennsylvania) Shawnee to Decker's Ferry, River Road System (New Jersey), Smithfield Beach, and Trieble-Rouch House. Alternative 4 would not diminish the integrity of the cultural landscapes.

Three cultural landscapes were identified in the study area as having seasonal views of the alternative 4 alignment. Impacts would not be readily noticeable and would not diminish the integrity of the cultural landscapes. These landscapes include Delaware Water Gap Slate Company Quarry and Building Sites Historic District, Munsch-Cyr Farm, and Slateford Farm. Impacts to these cultural landscapes would be adverse; however, due to the distance of these cultural landscapes from the alignment and due to visual screening by intervening vegetation and topography during all but the winter months, the S-R Line would not be readily noticeable and would not diminish the integrity of the cultural landscapes.

Three cultural landscapes were identified in the study area for which impacts from alternative 4 would alter character-defining features of the landscape and result in measurable changes, thus diminishing the overall integrity of the resources. Alternative 4 would be close to these cultural landscape resources and its presence would be readily noticeable. Criteria for eligibility such as location, setting, feel, and design would be threatened, but not enough to remove the resources from the national register or render them ineligible. The alternative 4 alignment would be close to Totts Gap Farm, it would cross APPA, and it would cross and run parallel with Totts Gap Road. The line crossings would disassociate the road and trail corridors from their rural vernacular surroundings, including historic built features and field patterns that convey important associations. The crossings would jeopardize the survival of numerous features established during the periods of significance along the margins of the alignments. Viewsheds to the ROW would be evident as travel occurs along the road and trail. This would diminish the integrity of setting, location, feel, and design of these resources. The impacts on these landscapes would be adverse.

Overall, impacts to cultural landscapes under alternative 4 would be adverse.

Section 106 Summary

Effects under section 106 would occur on cultural landscapes that are included in the national register or have been determined by the NPS or SHPO to meet national register eligibility requirements. After applying the Advisory Council criteria for adverse effects (36 CFR 800.5, "Assessment of Adverse Effects"), the NPS has concluded that implementation of alternative 4 would have an *adverse effect* on cultural landscapes. The effects of alternative 4 on individual cultural landscapes are shown in table J-1 in appendix J.

Cumulative Impacts

Cumulative impacts on cultural landscapes from past, present, and reasonably foreseeable projects inside the study area would be adverse, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the impacts on cultural landscapes as a result of alternative 4 are combined with the other projects inside the study area, an overall adverse cumulative impact would be expected. Alternative 4 would not alter the level of impact.

Conclusion

Inside the study area, the implementation of alternative 4 would result in adverse impacts on cultural landscapes. When the impacts on cultural landscapes as a result of alternative 4 are combined with other projects inside the study area, an overall adverse cumulative impact would be expected.

Alternative 5

Alternative 5 would follow the same alignment as alternative 4 with the exception of the portion of the B-K Line from the Bushkill Substation to the western boundary of DEWA. Impacts on cultural landscapes would therefore be the same inside the study area as described for alternative 4. Overall, impacts to cultural landscapes under alternative 5 would be adverse.

Section 106 Summary

Effects under section 106 would occur on cultural landscapes that are included in the national register or have been determined by the NPS or SHPO to meet national register eligibility requirements. After applying the Advisory Council criteria for adverse effects (36 CFR 800.5, “Assessment of Adverse Effects”), the NPS has concluded that implementation of alternative 5 would have an *adverse effect* on cultural landscapes. The effects of alternative 5 on individual cultural landscapes are shown in table J-1 in appendix J.

Cumulative Impacts

Cumulative impacts on cultural landscapes from past, present, and reasonably foreseeable projects inside the study area would be adverse, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the impacts on cultural landscapes as a result of alternative 5 are combined with other projects inside the study area, an overall adverse cumulative impact would be expected. Alternative 5 would not alter the level of impact.

Conclusion

Inside the study area, the implementation of alternative 5 would result in adverse impacts on cultural landscapes. When the adverse impacts on cultural landscapes as a result of alternative 5 are combined with other projects inside the study area, an overall adverse cumulative impact would be expected.

SOCIOECONOMICS

This section evaluates the potential impacts of each alternative on the social and economic elements of the communities near the study area. Values of the social environment mainly include quality of life, while economic values include economic benefits or losses to local communities. Impacts were determined by considering the effect of the existing conditions and the proposed construction and operation of the transmission lines on the overall socioeconomic conditions in the area.

METHODOLOGIES

Impacts were evaluated using the process described in the “General Methodology for Measuring Impacts by Resource” section at the introduction of chapter 4. Impacts were determined by considering the effect of the existing conditions and the proposed construction and operation of the transmission lines on the communities and populations that could be affected by the proposed actions. Impacts related to changes in visitor use as a result of the proposed alternatives were considered in relation to the local economy.

Impacts on businesses that provide services to visitors, such as canoe liveries, lodging and food facilities, and others were evaluated qualitatively. No statistical or other quantitative analysis was completed during the course of this socioeconomic impact analysis. Because no measurable difference is expected among the action alternatives, impacts are analyzed collectively under “Common to All Action Alternatives,” rather than individually.

Perceptions based on aesthetics and/or safety concerns related to high-voltage transmission lines can affect where people live and work, which can shift populations and affect socioeconomics. Literature assessing the impacts of high-voltage transmission lines on property values was used to estimate how these perceptions could affect development patterns. This literature generally concludes that high-voltage transmission lines do have an effect on property value (Hamilton and Schwann 1995). For example, the obstruction of favored views or the presence of structures in a natural environment may decrease selling price (Furby et al. 1988). Properties adjacent to or within approximately 500 to 650 feet of the transmission line experience the most impact (Hamilton and Schwann 1995; Des Rosiers 2002). Neither the height of the transmission structures nor the voltage of the lines was found to have a significant impact on property values (Hamilton and Schwann 1995).

Conversely, in some studies a small beneficial impact was found associated with a transmission line ROW that provides access to recreational use, is attractively landscaped, or provides added privacy to adjacent properties. However, the literature notes that the value of this “greenspace” “should not be overrated” (Hamilton and Schwann 1995). Being adjacent to an easement can increase value from 7% to 22% only where proximity advantages (enlarged visual field, increased intimacy) exceed drawbacks. Nonadjacent but visually exposed properties can experience higher property values due to improved visual clearance (Des Rosiers 2002).

Transmission lines can affect farm operations and increase costs for farm operators, depending on the transmission line design and type of farming. Transmission lines can affect field operations, irrigation, aerial spraying, windbreaks, and future land development. According to the Public Service Commission of Wisconsin (2010), tower placement in farm fields can

- create problems for turning field machinery and maintaining efficient fieldwork patterns
- create opportunities for weed encroachment
- compact soils and damage drain tiles
- result in safety hazards due to pole and guy-wire placement
- hinder or prevent aerial activities by planes or helicopters
- interfere with moving irrigation equipment
- hinder future consolidation of farm fields or subdividing land for residential development

Some studies of agricultural land indicate that per acre values near transmission lines can be 16% to 29% lower than properties without easements. The negative effects of proximity were largest with smaller properties (Furby et al. 1988).

STUDY AREA

Because socioeconomics primarily pertains to effects outside NPS boundaries, the study area for socioeconomics includes landowners owning in-holdings in DEWA and the counties and townships that are immediately adjacent to the proposed alternatives. Pennsylvania counties in the area of effect include

Pike, Monroe, and Northampton. New Jersey counties include Sussex and Warren. Figure 47 shows counties and townships intersected by each alternative.

CUMULATIVE IMPACTS COMMON TO ALL ALTERNATIVES

Appendix H provides a list of past, present, and reasonably foreseeable activities that would have beneficial or adverse impacts on socioeconomics inside and outside the study area. These projects are summarized below, with anticipated impacts identified in the following subsections. The impacts associated with these projects were analyzed in conjunction with the impacts expected for the no-action and action alternatives.

Projects Inside the Study Area

Inside the study area, cumulative projects that would have adverse and beneficial impacts on socioeconomics include the following road projects: Smooth Ride Initiatives, Old Mine Road South rehabilitation, Delaware River bridge projects, US Route 209 – Raymondskill Creek Bridge rehabilitation, the PADOT SR 2001 road project, and the Marshalls Creek traffic relief project. These projects would result in a beneficial impact on local socioeconomics through improved access to the parks and adjacent businesses after the projects are completed. Overall, cumulative projects inside the study area would result in a beneficial impact on socioeconomics.

Projects Outside the Study Area

Outside the study area, cumulative projects that could affect socioeconomics include proposed residential and commercial developments in New Jersey and Pennsylvania, Susquehanna Nuclear Reactor upgrades, the high-speed passenger train from northeast Pennsylvania to New York City, the New Jersey to Pennsylvania Lackawanna Passenger Rail Cutoff, Marcellus shale natural gas drilling, and the proposed Fernwood Casino. These projects would have beneficial impacts from the increased benefit to the regional economy and tourism and increased workforce demand, as well as improved commuting options, increased property values, and additional tax revenue for local governments, who could expand community services. Cumulative projects outside the study area would result in beneficial socioeconomic impacts.

IMPACTS OF THE ALTERNATIVES ON SOCIOECONOMICS

Common to All Alternatives

Outside the Study Area: The direct impacts from construction and maintenance of the line outside the study area cannot be determined, as described in the introduction of this chapter. In addition, specific impacts outside the study area cannot be identified until the route is chosen by the applicant. However, it is anticipated that the proposed transmission line would pass through populated areas outside the study area where residential and business displacements may occur to accommodate ROW widening. It is assumed that sales tax–generating businesses displaced by ROW widening could be relocated locally and their displacement would not represent a permanent loss in sales tax revenue for state and local jurisdictions. Outside the study area and in urban areas, it is assumed that the applicant would use the existing road system and no new access roads would be required, resulting in no socioeconomic impacts.

Businesses that cater to visitors would experience adverse economic impacts from potential changes in visitation. Impacts caused by changes in visitor spending on counties in the study area cannot be accurately determined, although Monroe and Pike counties rely the most heavily on tourism revenue. Potential impacts on property values would be highly variable and based on distance from the transmission line. No impacts on population growth or migration would occur due to the construction of the S-R Line. Impacts on agricultural revenue and operations would also occur. Construction-related employment and local revenue generation would have a positive socioeconomic impact, while negative effects may occur during construction due to increased noise, dust, light, and glare; displacement of residences and businesses; and decreased recreation, business, and agricultural revenues. Cumulative impacts outside the study area would result in beneficial impacts on socioeconomics as described previously in the “Cumulative Impacts” section. When the impacts on socioeconomic resources as a result of activities outside the study area are combined with other past, present, and reasonably foreseeable projects in the study area, an overall beneficial cumulative impact would be expected.

Alternative 1: No Action

Under the no-action alternative, there would be no changes to tourism revenue. Property value increases or decreases have likely already occurred because the transmission line has been in place for many decades. Neighborhoods have developed around and in response to the existing transmission line. There would be no changes to agricultural land as a result of implementing alternative 1. As a result, alternative 1 would result in no impacts on the local and regional workforce, local businesses, residents, farmers, or property values inside the study area.

Cumulative Impacts

Cumulative projects inside the study area would result in an overall beneficial impact on socioeconomics, as described previously in the “Cumulative Impacts Common to All Alternatives” section. The no-action alternative would have no impacts on socioeconomic conditions. Therefore, there would be no cumulative impacts associated with alternative 1.

Conclusion

Alternative 1 would have no socioeconomic impacts compared to existing conditions and therefore no cumulative impacts.

Common to All Action Alternatives

Mitigation Measures: Mitigation measures would be implemented to reduce impacts on socioeconomics and are taken into consideration in the impact analysis. Mitigation measures are described in appendix F.

The impact analysis for socioeconomics addresses all alternatives under “Common to All Action Alternatives” to reduce repetition. There are few socioeconomic differences between the alternatives, so the analysis discusses them together and highlights their differences where appropriate.

As noted in chapter 3, visitor spending has been in steady decline since 2006, reaching a 5-year low in 2009 despite steady visitation. Therefore, the adverse economic impact resulting from potential changes to visitation under the action alternatives cannot be accurately estimated. Some visitors may not be deterred by the new transmission line crossing the river; some may prefer to recreate elsewhere. Although overall visitation to DEWA is expected to increase, future levels of participation in guided river trips and other recreation services are unknown. Adverse economic impacts on river recreation providers, as well as other companies that serve visitors (e.g., food and lodging establishments), could be greater for alternatives 2, 2b, and 3, which would cross the Delaware River within DEWA, as compared to alternatives 4 and 5, which would cross the river south of DEWA and the Delaware Water Gap, a popular takeout location (e.g., many river trips end at the Kittatinny Point Visitor Center). Increased adverse impacts from alternatives 2 and 2b would also occur as a result of fewer campsites at Hamilton River campsites. This would reduce the number of campsites at a very popular river camping location, forcing visitors to camp elsewhere, possibly affecting the number of visitors and trips liveries could provide.

Stringing transmission line wires across the Delaware River would take approximately one day during the eight month construction period. The river would be closed to recreation service providers during that one day period, which may affect multiday river trips as well. However, if visitors using privately owned boats were unaware of the closure, they might leave and recreate elsewhere, or return home. Local service providers, such as food and lodging establishments, would experience impacts based on the loss of business during the closure.

One local outfitter provides guided tours of APPA. Adverse impacts on views from the trail could diminish visitors' experience. However, the majority of visitors would continue to participate in this activity with the service provider. Under alternative 3, the transmission line would parallel APPA for 2.5 miles, creating an adverse visual effect. If the local outfitter used this section, impacts would occur if visitors chose to avoid the area. Impacts on this particular supplier would be measurable, but impacts on overall economic activity and employment in the study area would be slight.

As noted in chapter 3, Pike County's leading industry is tourism, and the county has a goal to retain tourism as a major component of economic development. Similarly, Monroe County has the third largest tourist economy in Pennsylvania and supports the third largest labor force in tourist-related expenditures. Tourism in Pennsylvania's Northampton County does not play a measurable role in the county's economy. Therefore, in Pennsylvania, Pike County would be the most affected by changes to visitation under alternatives 2 through 4, and Monroe County would also be affected under all action alternatives. Because it is difficult to identify precise reasons why visitor spending has been declining since 2006, the magnitude of the economic impact on these counties from implementation of the action alternatives cannot be accurately determined.

Although recreation and tourism are considered the backbone of Sussex County, New Jersey, only 7% to 11% of the county's revenue is generated by tourism, and 60% of the county's workforce travels outside the county for employment. Wages associated with tourism have prevented the tourism sector from becoming the foundation of Sussex County's economy. Warren County, New Jersey, employs the smallest percentage of people in the sales and service industry in the study area and the county sees little potential of generating family wage jobs and increasing the tax base through tourism expenditures. The action alternatives would not likely have a measurable effect on the affected counties in New Jersey given the small role tourism plays in their overall economy.

Potential indirect impacts on residential property values would be highly variable and are not readily predictable. Residential property values may decrease for those residences directly adjacent to the ROW that do not experience proximity advantages, such as enlarged visual field and increased intimacy. No residences currently exist adjacent to the alternative alignments in DEWA. A few homes are located along the alternative 4 and 5 alignments in and adjacent to Cherry Valley NWR. Some residences might experience property value increases if proximity advantages apply. Impacts would vary based on current market value. However, property value increases or decreases may have already occurred because a transmission line is already in place. Because the literature notes that neither the height of the structures nor the voltage of the lines have been found to have a substantial impact on property values, measurable changes to property values are not expected. Impacts related to the expansion of the ROW would be more likely.

Inside the study area, the alternative alignments would follow an existing utility corridor and transmission line or transportation corridor and traverse forested areas that contain few existing residential and commercial structures. Inside the study area no businesses would require removal and/or relocation.

However, a small number of residential displacements may occur for alternatives 2 and 2b in Lehman, Hardwick, and Stillwater townships. Some additional residential displacements may occur for alternatives 3 and 4 in Smithfield, Middle Smithfield, and Blairstown townships. The alternative 5 alignment would parallel or traverse more highly urbanized areas in Monroe County, Pennsylvania, and Morris County, New Jersey, where the potential for displacements and impacts on adjacent communities would be the greatest. Alternatives 4 and 5 would require a ROW from one private inholding in DEWA near Totts Gap Road, but would not result in a commercial or residential displacement. It is assumed that construction staging areas and the locations of new access roads would be selected to avoid existing residences and structures, and that no displacements or relocations would be required.

The initial displacement of residences and businesses would affect a small sector of the local and regional population resulting in adverse impacts. These impacts are expected to occur during ROW land acquisition leading up to the eight-month construction period. The applicant would provide financial compensation to private property owners when acquiring an easement resulting from the widened ROW, under the authority granted by the states' public utility commissions. The usual measure required is payment of fair market value, as determined by agreement between the parties or an independent appraisal, for the property acquired. Upon issuance of the negotiated financial compensation, it is anticipated that property owners would purchase replacement property and relocate their homes and businesses within two years of completion of the project. Throughout the remaining period of analysis, slight impacts on residences, businesses, sales tax revenue, and neighborhood cohesion would occur.

The presence of a high-voltage transmission line could affect where people live based on visual and noise impacts or their perceptions and beliefs about potential health impacts (see the "Health and Human Safety" section). As a result, people may move away from or avoid housing and communities near a transmission line, resulting in potential socioeconomic impacts on the immediate area. The alternative alignments would be located along an existing utility corridor and transmission line or transportation corridor around which communities have developed. Little to no population migration would occur as a result of upgrading to a high-voltage transmission line.

The proposed alternatives would not encourage population growth inside or outside the study area; instead, the alternatives would be a response to growth already occurring and projected to occur in the region. The resident population in communities surrounding DEWA is expected to continue to increase by as much as 50% by 2020. The implementation of the action alternatives is not expected to affect this growth. No impacts on population growth or employment trends would occur under any of the action alternatives throughout the period of analysis.

All action alternatives parallel or traverse agricultural lands inside and outside the study area, including leased agricultural lands in DEWA. Although the ROW would be widened through these lands, the agricultural use of these lands would not necessarily be precluded. If towers are placed in farm fields, the action alternatives could increase costs for farm operators and decrease property values compared to adjacent properties without transmission line ROWs (see "Methodologies" in this section). Counties in the study area have already experienced the loss of agricultural land in recent years, in part related to the rising costs of farm operations, and have goals to protect farmland. Increased costs and decreased property values could further affect agricultural operations in a small sector of the local and regional economy throughout the period of analysis. The alternative 2, 2b, and 3 alignments could result in tower placement in leased agricultural land in DEWA, resulting in decreased revenue for the park. The intensity of the potential adverse impact on agricultural revenue and operations would vary depending on the quantity of farmland affected by each of the action alternatives.

Construction activities common to all action alternatives could cause major increases in noise levels, generate fugitive dust and odors, and generate glare, temporarily affecting residents, businesses, and business patrons and employees inside and outside the study area. Construction work is scheduled to occur throughout most of the daytime hours (12 hours a day), six days a week, for up to eight months. As documented in the “Soundscapes” section of this EIS, noise levels during construction could increase by more than 13 dBA in areas 3,200 feet from the alignment and 5 dBA for areas 6,400 feet from the alignment. Actual noise levels and quantities of dust and glare would depend on the type, amount, and location of construction activities. Construction work would be localized primarily at tower locations, wire pull sites, and staging areas and would progressively move along the alignment. Therefore, no residences or businesses would experience increased levels of noise, dust, light, and glare for the full eight-month construction period. Construction activities outside DEWA would also conform to local noise ordinances, which may restrict the type and duration of construction noise. Existing businesses immediately adjacent to the alternative alignments inside the study area are identified in table 80. Potential construction-related adverse impacts may include decreased business patronage, especially for businesses with outdoor venues, and changes in the timing and frequency of outdoor social activities.

TABLE 80: BUSINESSES ADJACENT TO THE ACTION ALTERNATIVES WITHIN THE STUDY AREA

Alternative	Business Name	Location
Alternatives 2, 2b	Fernwood Hotel, Golf Course and Resort; Petrizzo’s Restaurant	Middle Smithfield Township
Alternative 3	Fernwood Hotel, Golf Course and Resort; Petrizzo’s Restaurant; Great Bear Golf and Country Club	Middle Smithfield Township
Alternative 4	Fernwood Hotel, Golf Course and Resort; Petrizzo’s Restaurant; Great Bear Golf and Country Club; KOA Campground; Cherry Valley Golf Course; retail and commercial developments surrounding the intersection of SR 209 and Municipal Drive	Middle Smithfield and Stroud townships
Alternative 5	Cherry Valley Golf Course; large commercial developments along I-80	Stroud, Hamilton, Stroudsburg, and East Stroudsburg townships

Local companies and residents may be employed during the decommissioning of the B-K Line and the construction of the new transmission line, resulting in slight temporary economic benefits. Construction employment that would occur over the eight-month period would include skilled or semiskilled positions, such as line workers, welders, heavy equipment operators, surveyors, engineers, utility equipment workers, truck drivers, warehouse workers, and laborers. As indicated in chapter 2, the workforce necessary for construction is expected to range from approximately 20 to 120 personnel, with an estimated average daily workforce of 50 personnel. A small number of new workers may also be required to monitor the newly constructed transmission line ROW for any illegal use and also for resource management throughout the period of analysis. A small proportion of these construction-related and maintenance personnel could be hired locally, resulting in slight beneficial employment impacts. However, it is anticipated that skilled positions would not be filled locally.

The relatively small additions to the construction workforce are not expected to result in a permanent increase in population, employment, or spending in the region. However, the eight-month construction period would temporarily increase overall economic activity, resulting in secondary beneficial economic impacts on local and regional economies. The funds spent directly on the project locally would have multiplier effects throughout the regional economy. Indirect jobs may be created by construction activity, such as material suppliers to construction workers and off-site construction-related workers such as administrative, clerical, and managerial workers. Many construction materials, including the transmission towers and conductors, would likely be purchased outside the study area. Other materials, such as concrete, gravel, and culverts, could be purchased locally. Some local revenues would also be generated through lodging or campground rental fees and through the purchase of meals, etc., for construction workers. Local purchases would result in small increases in local tax revenues, but these generally would not be measurable. Economic impacts would be beneficial.

The removal of existing towers and construction of new towers would likely require construction equipment to traverse agricultural land. This could temporarily restrict crop production or potentially damage crops if activities occurred during the growing season. The restriction of crop production or damage to crops could potentially decrease revenues for agricultural landowners whose crops would be affected. Construction-related adverse impacts on agricultural lands would occur if crop production was decreased or crops were damaged.

All action alternatives would cross DEWA and/or state game lands in Pennsylvania and New Jersey that accommodate hunting and other recreational activities that stimulate the local and regional economy. Construction activity would require restricted public access in some of these areas. These restrictions would be temporary and localized to the immediate construction area; hunting and other recreational activities could continue in unrestricted areas of the park and state game lands. Therefore, temporary changes in visitation patterns for hunting and other forms of recreation, and the resulting effects on tourism revenue for local service providers, are unknown. Prospective visitors could choose to cancel hunting or other recreational trips altogether or could simply choose to hunt or recreate in an alternative location in the park or in state game lands. Normal hunting and recreational activities are expected to resume after construction is completed. The potential impact on the local and regional economy would therefore be limited to the eight-month construction period, and cannot be determined. It is recommended that construction activities be scheduled to avoid peak hunting and recreational seasons in DEWA and other state game lands, if possible.

Cumulative Impacts

Cumulative projects inside the study area would result in an overall beneficial impact on socioeconomics, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the impacts associated with the action alternatives are combined with other past, present, and reasonably foreseeable projects in the study area, an overall beneficial cumulative socioeconomic impact would be expected. None of the action alternatives would alter the level of impact.

Conclusion

Overall, adverse impacts to the local and regional economy from impacts to recreation would occur, with slight indirect effects on residential property values. Adverse impacts are expected on residential property and business owners from possible displacement. Adverse impacts on agricultural revenue and operations would occur related to farm operations. Adverse impacts would occur to service providers during construction closures. Beneficial impacts would also occur during construction from possible local employment, and the eight-month construction period would temporarily increase overall economic activity in the area. Construction-related adverse impacts on agricultural lands would occur if crop production was decreased or crops were damaged.

INFRASTRUCTURE, ACCESS, AND CIRCULATION

The section evaluates the alternatives as they relate to impacts on circulation and access on existing and proposed transportation infrastructure, as well as the impact on the condition of this infrastructure.

METHODOLOGIES

The analysis of impacts on infrastructure, access, and circulation was based on a qualitative assessment of how the different phases (construction, operations and maintenance) of the proposed alternatives would affect existing transportation infrastructure and the ability of visitors and the local community to access or travel (circulate) to their desired destinations. Potential impacts on roads in general were evaluated inside and outside the study area. Planned or programmed road improvements were assessed to determine how such improvements would affect, or be affected by, the proposed alternatives.

STUDY AREA

The study area for infrastructure, access, and circulation includes the areas within the parks, with focus on routes that provide direct access to the vicinity of existing and potential transmission line ROW and proposed utility access roads. Traffic control zones for construction are laid out in sections: advance warning, transition, activity, and termination. These zones would vary in length based on the speed limits, road widths, the type of construction, and other factors. As noted in “Chapter 3: Affected Environment,” various federal highways, state routes, local county roads, and NPS-owned roads make up the transportation network surrounding DEWA, MDSR, and APPA. There are approximately 86 miles of paved roads and 83 miles of unpaved roads in the 67,210-acre national recreation area, and DEWA has over 50 entry points, with a high proportion of travel through the park made by commuters and local residents (NPS and FHWA 2009, 6, 13). Primary roads in DEWA are owned and managed by the NPS; however, there are some private/public inholdings in the states of Pennsylvania and New Jersey with their own roads used to access their properties (NPS and FHWA 2009). Major roads from New Jersey and Pennsylvania traverse the DEWA boundary as shown in figures 49 through 52 (in chapter 3). The MDSR is accessible from multiple points within the park, and APPA is accessible from points in the park and throughout its length. Visitors boating (canoeing, kayaking) MDSR can access the river from boat launches within DEWA off Old Mine Road and River Road. Visitors hiking the APPA can access it from various trails within DEWA and Worthington State Forest in New Jersey. APPA can also be accessed from I-80 at the south end of DEWA, Camp Road at the Mohican Outdoor Center, and Millbrook-Blairstown Road.

CUMULATIVE IMPACTS COMMON TO ALL ALTERNATIVES

For this EIS, actions inside and outside the parks can affect infrastructure, access, and circulation, primarily during deconstruction and construction activities because infrastructure, particularly roads, must support the additional use by large construction vehicles and a construction workforce. Such use can affect how people access and circulate through the parks, as well as surrounding areas. Completed, current, and future activities that would have beneficial or adverse impacts on infrastructure, access, and circulation in the parks, inside and outside the study area, are summarized here, with anticipated impacts identified. Cumulative impacts that would persist beyond the construction period are the focus of the assessment. Generally, the planned NPS, state, and local transportation improvement projects introduced below would benefit infrastructure, access, and circulation in and to the parks because they are maintenance, road, trail, or multimodal improvement projects that improve traveler safety. However, there may be some adverse effects if the transportation improvements induce population growth resulting in traffic congestion, which can affect access and circulation. Appendix H provides a list of cumulative projects.

Under the discussion of each alternative, the impacts associated with these projects were analyzed in conjunction with the impacts expected for the alternatives.

Projects Inside the Study Area

Projects inside the study area related to road and bridge repair would have beneficial impacts on infrastructure, access, and circulation. Several projects would affect circulation and access inside the study area by improving and restoring infrastructure, reducing traffic and congestion, and providing multiple methods of travel in the parks. The following projects would create beneficial impacts on infrastructure, access, and circulation: the US Route 209 commercial use expiration in 2015, Delaware River Bridge projects, the Alternative Transportation Program; Marshalls Creek traffic relief project; Smooth Ride Initiatives 2006–2007 (pavement resurfacing projects); the PADOT SR 2001 road project; Old Mine Road South rehabilitation; and River Road rehabilitation. These projects would have beneficial impacts from improvements to traffic circulation and heavy vehicle use, road resurfacing, and improved signs, shoulders, and road geometry, as well as the addition of turn lanes, guardrails, and reflectors. However, while the road and bridge repair projects may be immediately beneficial, these projects are not considered beneficial to the parks. These projects are contrary to the parks' goals of maintaining character, scenery, and cultural landscapes. Additionally, these projects could facilitate an increase in population in the area of effect, resulting in additional demands on infrastructure, and could also adversely affect access and circulation.

The construction of Turtle Beach in 2010 resulted in damage to Old Mine Road in New Jersey due to the weight of the trucks and construction equipment used for construction. Park roads not designed to withstand heavy loads might be similarly damaged in the future for projects that require the transport of heavy construction equipment.

Cumulative impacts on infrastructure, access, and circulation inside the study area would be immediately beneficial due to the implementation of maintenance and safety projects for park roads. However, these past, present and reasonably foreseeable future projects represent an adverse impact.

Projects Outside the Study Area

Outside the study area, residential and commercial development would have adverse cumulative impacts on infrastructure, access, and circulation. These projects would have adverse impacts through increased traffic congestion, and increased urbanization, which would require new infrastructure and put stress on the existing system. There would be beneficial impacts from airport improvements and the high-speed passenger train from northeast Pennsylvania to New York City. These projects would provide improvements in the infrastructure of the area. Cumulative impacts on infrastructure, access, and circulation outside the study area would be adverse.

IMPACTS OF THE ALTERNATIVES ON INFRASTRUCTURE, ACCESS, AND CIRCULATION

Common to All Alternatives

Outside the Study Area: Outside the study area, regardless of which alternative is selected, the transmission line could pass through Carbon, Lackawanna, Luzerne, Monroe, Northampton, Pike, and Wayne counties in Pennsylvania and Morris, Sussex, and Warren counties in New Jersey.

Under the no-action alternative, existing conditions would persist outside the study area. There would be no impacts from construction. Slight impacts would occur to access and circulation during maintenance periods. Outside the study area, there would be impacts from project construction under any of the action alternatives. The specific locations of the access roads outside the study area would be identified during design and are currently not known; however, multiple major and local roads would be crossed. In addition, access roads may be needed along the length of the transmission line. During the transmission wire installation, roads (including some major highways) would be closed, partially closed, or detoured. During these periods, road detours would result in changes to circulation and access to desired destinations resulting in adverse impacts.

Outside the study area, indirect impacts on infrastructure, access, and circulation from vegetation clearing, construction of the transmission line, operation and maintenance of the transmission line, and vegetation maintenance would be adverse and would occur to varying degrees, depending on the location. These impacts would persist for the full period of analysis. Outside the study area, access roads would cross local and regional transportation facilities, to be determined. Cumulative impacts on infrastructure, access, and circulation outside the study area would be expected to be adverse, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the adverse impacts expected on infrastructure, access, and circulation are combined with other past, present, and reasonably foreseeable projects outside the study area, an overall cumulative adverse impact would be expected.

Alternative 1: No Action

Under the no-action alternative, widening the existing transmission line ROW would not occur. The operation of the existing transmission line would continue to require periodic maintenance, including the clearing of vegetation in the ROW. There would be no impacts on local roads or park access or circulation associated with the alternative 1 alignment related to the operation of the line. During the infrequent periods of maintenance activity for the transmission line, there could be maintenance equipment moving along the roads used to access the ROW. Because maintenance would occur only periodically, there would be a slight, perceptible effect on the ability of the public to access desired destinations or on daily traffic volumes; however, there would be no change from existing conditions. Selected trails are used for existing maintenance activities and would continue to be used under alternative 1. These trails are the Hamilton Trail in New Jersey, the McDade Trail near Community Drive, and part of the Van Campens Glen Trail. Where transmission lines cross roads and trails, there could be temporary, brief road closures or detours during the maintenance periods. Depending on the length of closure or detour and the type of road (e.g., county road), the impact could vary from no perceptible change to a noticeable change that does not limit the ability of the public to readily access their destination. Therefore, impacts on access and circulation would continue to occur during maintenance. As stated in chapter 2, no new construction activity would take place; activities would only include operation and maintenance of the existing line. Therefore, alternative 1 would result in no change from existing conditions.

Cumulative Impacts

Cumulative impacts on infrastructure, access, and circulation inside the study area would be adverse as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the impacts expected on infrastructure, access, and circulation as a result of alternative 1 are combined with other past, present, and reasonably foreseeable projects in the study area, the cumulative impacts would be adverse.

Conclusion

Alternative 1, the no-action alternative, would continue the operation and maintenance of the existing transmission line. Inside the study area, there would be adverse impacts during maintenance. Cumulative impacts would be adverse.

Common to All Action Alternatives

Mitigation Measures: Mitigation measures would be implemented to reduce impacts on infrastructure, access, and circulation and are taken into consideration in the impact analysis for each of the build alternatives. Mitigation measures are described in appendix F.

Project Construction: Under all action alternatives, the proposed transmission facilities would require one new double 500-kV line between the Susquehanna and Roseland substations. This would require the construction of new towers and foundations to accommodate the line. Spur roads, access roads, pulling and splicing sites, wire pull locations, and staging areas would be required for all action alternatives. (Access roads would also be needed for on-going maintenance, discussed below.) Helicopters and trucks would likely be used to transport construction equipment and supplies. These activities would temporarily disrupt road and potentially trail and river activity within the parks' boundaries. The closest rail intermodal facility is located near the intersection of I-81 and I-380, well outside the study area; therefore, the equipment would need to be trucked to the study area. This analysis assumes that equipment would likely be brought into the area from access points along I-80, and construction staging would occur outside the parks or within the existing cleared ROW. From the construction staging area to the site on the transmission line, construction traffic and equipment would travel on existing roads or new transmission line access roads. Roads not designed to withstand heavy loads (e.g., Old Mine Road, River Road, others) could be damaged via the transport of construction vehicles and heavy equipment, with impacts to park infrastructure

New access roads for construction and maintenance of the transmission line would be composed of compacted dirt or gravel. Access roads are considered permanent, because they would be used for maintenance activities once construction is complete. The access roads for decommissioning the existing transmission line are discussed below. In addition to permanent access roads, there may be spur roads to pulling and splicing sites. Pulling and splicing sites would be established inside and outside the study area and would require additional access roads connecting to the associated tower. When possible, these areas would be established where the ground is already disturbed. Tower and pulling and splicing sites would be located to avoid wetlands and sensitive areas where possible, and the spur roads would be restored after construction. During future project planning, design engineers would work closely with park staff to avoid sensitive areas within park boundaries as much as possible. Mitigation measures described in appendix F would be applied, but they would not be sufficient to change the level of impact to NPS roads.

Because all staging areas would be located outside the parks or on existing cleared ROW, there would be no anticipated impacts on parking availability in DEWA.

Overall, construction could last up to eight months, based on a six-day-a-week, 12-hour-a-day schedule. The construction labor force would range from 20 to 120 persons, with an average workforce of 50. The construction crews would use public roads and proposed access roads (described as applicable by alternative, below) to reach the construction sites. The average anticipated workforce of 50 personnel would be detectable when compared to the current traffic volumes on park roads. Volumes are up to 660 to 12,000 per day during the month of August, depending on park location, but lower during the months planned for construction.

In addition to the traffic associated with employees commuting to their work site, there would be traffic associated with the movement of construction equipment. From the staging areas outside the parks there would be daily construction traffic going back and forth to the access road for a specific construction site along the ROW. Estimated construction trips would be seven (one-way) per hour and approximately 140 vehicle miles traveled per day. During the overall project construction, construction would focus on specific transmission line segments and then move to another segment. Therefore, the need to access each site would be localized and of a shorter duration than the duration of construction of the entire project. The movement of heavy equipment and the transport of materials on large trucks could result in traffic delays because this equipment moves slowly or may be oversized, disrupting normal traffic flow. In addition, trucks would be required to stop at the park contact station to show their commercial use authorization, which would impact congestion on park roads such as River Road or Old Mine Road, where no commercial traffic is allowed except permitted canoe liveries. These traffic delays and the potential for less ease of access to desired destinations would be noticeable to the public. These impacts would be similar inside and outside the study area.

The proposed transmission lines would cross existing roads and during transmission wire installation, roads would be closed. Individual road closures would not likely last more than three days, and the roads could be open for access during non-construction work hours. During closure periods there would be road detours resulting in apparent changes to circulation and access to desired destinations.

During periods of maintenance there could be temporary closures of short sections of trails. The proposed transmission line could cross existing trails, including APPA. During transmission wire installation, trails would be closed or detoured. The analysis assumes that similar to roads, trail closures would not last more than three days. Closures to river traffic are anticipated for one day during construction for the removal of the existing B-K Line and one day for the installation of the new line.

Construction for all action alternatives would result in adverse impacts on infrastructure, access and circulation in the study area.

Removal of Existing Structures: Under all action alternatives (2, 2b, 3, 4, and 5), all or a portion of the existing B-K Line within the park boundaries would be removed to the extent feasible as described in chapter 2. The removal of the transmission line would disrupt circulation and access. The use of construction equipment and the potential disruption of traffic and other transportation services would result from the decommissioning the existing transmission line. Individual roads or trails would potentially be closed for a day or more during the removal of the line.

In the study area, the access roads used to decommission the existing transmission line would cross or intersect the following facilities, listed from east to west (with the purpose of the facility in parentheses):

New Jersey:

- APPA (hiking trail)
- Millbrook Road / NPS 602 (main east–west road)
- Old Mine Road (main north–south road, scenic route, southern section closed in winter)
- Pioneer, Hamilton Ridge, and Van Campens Glen trails (hiking trails; Hamilton Ridge Trail provides access to existing utility road)

Pennsylvania:

- Freeman Tract Road (unpaved township road, crossed by B-K Line)
- NPS River Road / Township 515 / (primary entry road to parks, north–south road, scenic route, eligible historic resource, provides access to existing utility road)
- Community Drive (local road)

- US Route 209, located outside park boundaries but inside and outside study area (primary road to parks)
- Creek Road (local road)

The roads listed above, particularly River Road and Old Mine Road, would be affected by the weight of the equipment used to approach and decommission the existing line. Sections of these historic roads are in poor condition, and the weight of heavy vehicles would further damage them. Depending on the weight of the vehicles and the condition of the road section, impacts to infrastructure would range from detectable to readily apparent. There would also be impacts to roadside vegetation and the canopy if it needs to be cut to allow sufficient clearance for construction vehicles and equipment. Local phone, electric, and cable lines could also require relocation.

During the decommissioning of the existing B-K Line, traffic delays from the movement of heavy equipment and transport of materials on large trucks would affect the roads listed above, disrupting normal traffic flow because this equipment moves slowly or may be oversized. These temporary traffic delays and the potential for reduced ease of access to desired destinations would be noticeable to the public for short periods; therefore, adverse impacts on access and circulation would result.

As described in the "Project Construction" section below, there could be temporary closures or detours where the existing line crosses a road (e.g., Old Mine Road) or trail (e.g., APPA) as the existing line is removed. At these specific locations, the impacts would be apparent for access and circulation.

Overall, the removal of the transmission line would result in localized adverse impacts on infrastructure, access and circulation that would last several days to a few weeks, depending on location. Damages to existing roadway infrastructure and the tree canopy could occur. Areas disturbed by road-related construction would be reclaimed after construction is complete (see appendix F). However, this reclamation would not be sufficient to change the level of impact.

Maintenance: After construction is complete, the facility would require periodic inspections via helicopter and truck, and regularly scheduled maintenance every six months to ensure system reliability and performance. The access roads established for construction would be maintained at a width of 12 feet.

During the short periods of maintenance activities for the transmission line or access roads, maintenance equipment could move along public roads (either inside or outside the study area). Because the roads within the parks generally have low traffic volumes, there would be some effect on the ability of the public to access desired destinations or on daily traffic volumes.

Where transmission lines cross roads (either inside or outside the study area), there could be temporary closures or detours of the roads during the maintenance periods. Depending on the length of time of the closure or detour and the type of road (e.g., interstate, highway, rural road), the impact could vary from no perceptible change to a noticeable change that does not limit the public's ability to readily access their destination.

Maintenance activities would result in adverse impacts on access and circulation and potential impacts to roadway infrastructure from the use of heavy equipment.

Alternative 2

Under alternative 2, the project construction impacts related to infrastructure, access, and circulation in the study area would last an estimated eight months. The roads affected during project construction would be the same as those listed under the "Removal of Existing B-K Line" section above. Potential damages to infrastructure could increase due to the intensified use of the road by construction trucks and equipment for installation of the S-R Line, which may require heavier construction equipment than that used to decommission the existing line.

Use of heavy construction equipment on historic River Road and Old Mine Road, sections of which are in poor condition, could result in adverse impacts that persist beyond the construction period. These roads would be used to reach the transmission line ROW access roads. Equipment such as concrete trucks and cranes can weigh many tons. Although the equipment would be used for short periods, impacts on River Road and Old Mine Road would occur due to their current condition and their intended use, as described in chapter 3. Impacts could occur to other roads (e.g., Community Drive) used by construction equipment, as well. These impacts would affect the roadway condition and would persist after construction. The alternative 2 alignment would cross River Road near the northern terminus where the road is newest and close to DEWA Headquarters. Impacts would likely be apparent. Approximately 1.5 miles of Old Mine Road would be affected by construction vehicles if the alternative 2 alignment is accessed from the north. Depending on the condition of Old Mine Road in this section, impacts on this historic road would be apparent to obvious. The NPS *Park Road Standards* manual notes that "Park roads cannot accommodate all types of vehicles … the Service is not obligated to construct roads or to manage traffic so that all forms of modern transportation technology can be accommodated within the park" (NPS 1984b, 8). The NPS *Park Road Standards* manual also describes how park roads are designed based on the types of vehicles allowed to use the facility by park management. The physical dimensions and operating characteristics of the vehicles that would be used on the roads are used to develop design criteria (NPS 1984b, 13). Although the parks did not design the original roads, they maintain them as park connector roads, which are not intended to bear heavy loads. Mitigation measures described in appendix F would be applied, but they would not be sufficient to change the level of impact to NPS roads.

Alternative 2 would require 5.4 miles of access roads, 2.0 miles of which would be outside the ROW (1.6 miles in Pennsylvania and 0.4 mile in New Jersey). The new access roads could lead to more unauthorized use of the project corridor. The mitigation measures in appendix F would help offset this potential impact. Potential impacts related to vegetation, soils, and wildlife are addressed under "Vegetation," "Geologic Resources," and "Landscape Connectivity, Wildlife Habitat, and Wildlife."

Cumulative Impacts

Cumulative impacts on infrastructure, access, and circulation inside the study area would be adverse, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the impacts expected on infrastructure, access, and circulation as a result of alternative 2 are combined with other past, present, and reasonably foreseeable projects in the study area, the cumulative impacts would be adverse.

Conclusion

Inside the study area, impacts on access and circulation would occur at specific locations during the construction period. Use of heavy construction equipment on historic River Road and Old Mine Road would result in adverse impacts on infrastructure, depending on current condition of existing road sections. These effects would persist until the damage to the roads is repaired. Cumulative impacts would be primarily adverse.

Alternative 2b

The alternative 2b alignment would follow the same route as alternative 2. There would be no measurable change to infrastructure, access, and circulation compared to alternative 2. Therefore, adverse impacts inside the study area would occur as described under alternative 2.

Cumulative Impacts

Cumulative impacts would be the same as alternative 2: adverse.

Conclusion

There would be no measurable difference between the direct and indirect adverse impacts of alternatives 2 and 2b relative to infrastructure, access, and circulation. Cumulative impacts would be primarily adverse.

Alternative 3

Inside the study area, the alternative 3 alignment would traverse DEWA, MDSR, APPA, and Worthington State Forest for approximately 4.5 miles. The alignment would use an existing transmission line ROW that would be expanded from its current 100-foot width by an additional 50 to 100 feet. In total, the alternative 3 alignment would traverse 157 miles and would require the development of new access roads and spur roads. Inside the study area, approximately 1.6 miles of access roads would be required outside the ROW. Additional access roads would be needed for the approximately 5-mile segments running parallel to the north–south boundaries of DEWA on the New Jersey and Pennsylvania sides of the park. These access roads should remain outside the study area. All access roads would be permanently maintained.

The duration of project construction impacts related to infrastructure, access, and circulation in the study area would generally be less than eight months for this alternative. In the study area, the following roads (listed from east to west) would be intersected or crossed by utility access roads:

New Jersey:

- Yards Creek Road (provides access to Yards Creek Hydroelectric Station)
- APPA (hiking trail)
- Old Mine Road (main north–south road, scenic route, listed historic resource, southern section closed in winter)

Pennsylvania:

- McDade Trail (hiking, mountain biking, and cross-country skiing trail)
- River Road (primary road to parks, north–south roadway, scenic route, eligible historic resource, provides access to existing utility road)
- Mosiers Knob Road (local road)
- Creek Road (local road)

During construction, there could be impacts on the roads listed above due to traffic delays from the movement of heavy equipment and the transport of materials on large trucks, disrupting normal traffic flow because this equipment moves slowly or may be oversized. Temporary traffic delays and the potential for reduced ease of access to desired destinations would be noticeable to the public for short periods and would result in adverse impacts on access and circulation. As described under the “Project Construction” section, there could also be temporary road closures or detours where the existing line crosses the road as the existing line is removed. Impacts would be localized and apparent for access and circulation.

As discussed in the “Project Construction” section, the construction for all action alternatives would result in impacts on access and circulation in the study area. Impacts on infrastructure from heavy construction equipment would also occur, as described for the alternative 2 alignment. These impacts would persist beyond the construction period, until the roads are repaired. Additionally, under alternative 3, longer sections of River Road and Old Mine Road would be traveled by construction equipment to reach the transmission line ROW. Approximately 5 miles of both roads would need to be traveled if accessed from I-80 to the south. Approximately 4.5 miles of River Road and 6.5 miles of Old Mine Road would be traveled if accessed from the north. As described in chapter 3, River Road is in poor condition and therefore susceptible to damage from heavy loads. The southern section of Old Mine Road in Worthington State Forest includes a narrow one-lane section that would also be susceptible to damage from wide, heavy loads. This segment may have to be avoided entirely if the construction equipment is too wide to pass safely. If so, the route to the construction site would likely use Millbrook Road (NPS 602) for access to Old Mine Road from the north. Damages to the roads used for transporting construction vehicles and equipment would likely occur, with the severity depending on the condition of the specific road sections. Mitigation measures described in appendix F would be applied, but they would not be sufficient to change the level of impact to NPS roads.

Alternative 3 would require 3.5 miles of access roads, 0.9 mile of which would be outside the ROW. The additional new utility access roads could lead to more unauthorized use of the project corridor. The mitigation measures in appendix F would help offset this potential impact. Potential impacts related to vegetation, soils, and wildlife are addressed under “Vegetation,” “Geologic Resources,” and “Landscape Connectivity, Wildlife Habitat, and Wildlife.”

Cumulative Impacts

Cumulative impacts on infrastructure, access, and circulation inside the study area would be adverse, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the impacts expected on infrastructure, access, and circulation as a result of alternative 3 are combined with other past, present, and reasonably foreseeable projects in the study area, the cumulative impacts would be adverse.

Conclusion

Inside the study area, adverse impacts on access and circulation would occur at specific locations during the construction period. The use of heavy construction equipment on park roads, including historic River Road and Old Mine Road, could result in adverse impacts on infrastructure, depending on the current condition of the existing road sections. These effects would persist until the damage to the roads is repaired. Cumulative impacts would be primarily adverse.

Alternative 4

Inside the study area, the alignment for alternatives 4 would follow approximately 1.7 miles parallel to an existing 100-foot-wide ROW for electric utilities in the southernmost portion of DEWA. The ROW would need to be expanded by an additional 100 to 200 feet, with vegetation cleared for construction and operation of the line. This segment would cross NPS Drive and Mountain and Totts Gap roads. It would cross the APPA in the southern part of DEWA. In addition to crossing these areas of DEWA and APPA, Alternative 4 would follow the alignment of the B-K Line for 0.6 mile from the western boundary of DEWA to the Bushkill Station (near Park Headquarters), totaling 2.3 miles within the park. Outside DEWA and APPA, the alternative 4 alignment would angle northeast to follow the existing B-K Line to the Roseland Substation in New Jersey, and would rejoin the alternative 3 alignment on the Pennsylvania side of the river, traveling north, west, and south to Susquehanna Substation. The alignment would require expanding the ROW to cross the Lower Delaware River outside DEWA.

Construction of alternative 4 would be anticipated to last eight months; therefore, the project construction impacts related to infrastructure, access, and circulation for these alternatives would generally last eight months.

Inside the study area, utility access roads would intersect or cross the following facilities (all in Pennsylvania):

- NPS Drive (local road)
- Totts Gap Road (local road)
- APPA (trail)
- Mountain Road (local road)
- Creek Road (local road, alternative 4 only)

During construction, there could be adverse impacts on the roads listed above due to traffic delays from the movement of heavy equipment and the transport of materials on large trucks, disrupting normal traffic flow because this equipment moves slowly or may be oversized. Temporary traffic delays and the potential for reduced ease of access to desired destinations would be noticeable to the public for short periods and would result in impacts on access and circulation. As discussed in the “Project Construction” section, the construction for all action alternatives would result in adverse impacts on access and circulation in the study area. Beyond the construction period, there could be infrastructure impacts on NPS Drive, Totts Gap Road, and Mountain Road from the use of heavy equipment. Depending on the condition of the roads, adverse impacts would vary. Mitigation measures described in appendix F would be applied, but they would not be sufficient to change the level of impact to NPS roads.

Alternative 4 would require 1.6 miles of new access roads, 0.5 mile of which would be outside the ROW. The new access roads could lead to more unauthorized use of the project corridor. The mitigation measures in appendix F would help offset this potential impact. Potential impacts related to vegetation, soils, and wildlife are addressed under “Vegetation,” “Geologic Resources,” and “Landscape Connectivity, Wildlife Habitat, and Wildlife.”

Cumulative Impacts

Cumulative impacts on infrastructure, access, and circulation inside the study area would be adverse, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the impacts expected on infrastructure, access, and circulation as a result of alternative 4 are combined with other past, present, and reasonably foreseeable projects in the study area, the cumulative impacts would be adverse.

Conclusion

Inside the study area, adverse impacts on access and circulation would occur during the construction period at specific locations. Additional infrastructure adverse impacts could result from the use of heavy equipment on NPS Drive, Totts Gap Road, and Mountain Road. These effects would persist until the damage to the roads is repaired. Cumulative impacts would be primarily adverse.

Alternative 5

Inside the study area, the alignment for alternative 5 would follow the same route through DEWA and APPA as alternative 4, with the exception of the portion of the B-K Line from the Bushkill Substation to the western boundary of DEWA. Alternative 5 would require 0.9 mile of new access roads, 0.16 mile of which would be outside the ROW. Outside the study area, the alternative 5 alignment would generally follow I-80 to the Roseland and Susquehanna substations. The adverse impacts on infrastructure, access, and circulation would be the same as described for alternative 4.

Cumulative Impacts

Cumulative impacts on infrastructure, access, and circulation inside the study area would be adverse, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the impacts expected on infrastructure, access, and circulation as a result of alternative 5 are combined with other past, present, and reasonably foreseeable projects in the study area, the cumulative impacts would be adverse.

Conclusion

Inside the study area, adverse impacts on access and circulation would occur during the construction period at specific locations. Additional infrastructure adverse impacts could result from the use of heavy equipment on NPS Drive, Totts Gap Road, and Mountain Road. These effects would persist until the damage to the roads is repaired. Cumulative impacts would be primarily adverse.

VISUAL RESOURCES

This section evaluates impacts on visual resources and scenic views associated with DEWA (including MDSR) and APPA. Impacts were determined by assessing the visual quality of existing views at a variety of locations in DEWA and along APPA, and then comparing that assessment with visual simulations representing the proposed changes (see appendix K).

METHODOLOGIES

The analysis of impacts for scenic views and visual resources assesses the potential impact associated with constructing, operating, and maintaining the proposed transmission lines along the alternate alignments being evaluated in this EIS. The analysis also assesses the potential impact associated with decommissioning the existing transmission line.

Visual quality is by nature subjective. The Federal Highway Administration (FHWA) developed an analytical method for assessing visual quality effects by reducing subjectivity and allowing for a more objective assessment of visual effects. This method is described in detail in the manual *Visual Impact Assessment for Highway Projects* (FHWA n.d.).

Visual quality is the character of the landscape that generally gives visual value to the setting. Because visual quality is inherently subjective, objective descriptions are used to quantify the visual assessment. Three critical characteristics of landscape visual quality are considered and appraised, including vividness, intactness, and unity. Each of these characteristics is independent and intended to evaluate one aspect of visual quality. Definitions of these terms are (FHWA 1988, 48):

Vividness: The combination of landform, water, vegetation, and human development that form a memorable composition and distinctive visual scene. Contrast and visual interest tend to contribute to strong vividness. The numeric rating for vividness is derived by appraising each of these four components and dividing their sum by four. The numeric breakdown is as follows:

7–Very high

6–High

5–Moderately high

4–Average

3–Moderately low

2–Low

1–Very low

Intactness: The visual integrity of the natural and built environment and its freedom from visually encroaching elements. The numeric rating is derived by appraising these two components and then dividing their sum by two. The numeric breakdown is then the same as for vividness.

Unity: The degree to which the visible components of the landscape combine to form a coherent, harmonious visual pattern. Human development can contribute to visual unity by adhering to principles of context sensitive design. The numeric breakdown is the same as for vividness.

Evaluations based on these three criteria have proven to be good predictors of the visual quality using the following sample equation:

$$\text{Visual Quality} = \frac{\text{Vividness} + \text{Intactness} + \text{Unity}}{3}$$

The total visual quality was then defined based on the following breakdown:

5.7–7.0: Very high

4.7–5.6: High

3.7–4.6: Moderately high

2.7–3.6: Average

1.9–2.6: Moderately low

1.1–1.8: Low

0.0–1.0: Very low

Following the discussion for each alternative, a table provides the visual quality numeric scoring for each KOP analyzed for the given alternative. The numeric scoring shown in the tables and provided in this analysis was calculated (and in some cases rounded) to two significant digits.

Other terms and definitions used in performing the visual quality assessment include the following:

Viewer Position: The position from which the viewer observes the subject. The viewer is superior when above the subject and inferior when below the subject. The normal position is when the viewer is level with the subject.

In addition, exposure, sensitivity, frequency, viewer numbers, and duration are each terms FHWA uses to identify and consider how viewers interact with and respond to views being evaluated. These terms and impacts to viewers and their experience are discussed in the "Visitor Use and Experience" section.

Enabling and management documentation defines the mission of the NPS as including the preservation of scenic places, among other special qualities of places (i.e., historic, cultural, biological, etc.). Therefore, the integrity of national park system units is reliant on freedom from incompatible visual encroachments or elements in scenic views that conflict with the critical characteristics of high visual quality. The intrinsically scenic character of protected parks calls for the parks themselves to be considered a visual resource, separate from evaluation, and consideration of the sensitivity or possible reaction or quantity of potential resource viewers. However, the potential effects of the proposed actions on viewers (e.g., park visitors) are discussed in the "Visitor Use and Experience" section of this chapter.

In summary, this analysis generally followed these steps:

1. Determine the alternative elements and their extent using the alternatives description prepared for the EIS at the time field work was conducted in the fall of 2010. This involves understanding the transmission corridor alignment alternatives, tower scale and dimensions, layout, and the zone of cleared vegetation along the length of the corridor (350 feet for alternatives 2, 3, 4 and 5, and 100 feet for alternative 2b).

2. Establish the project visual analysis study area: for this analysis, the study area corresponds to the area between the VSLs, as described in chapter 2.

3. Determine the viewshed of the study area. A viewshed can be thought of as the 'seen area' from a given point in the landscape.

4. Determine KOPs, which provide a broad range of representative views from which to view the alternatives (described in more detail below).

5. Conduct field work to establish visual quality at KOPs in their present condition, evaluated using the visual quality rating process described above. The present visual character of the study area was also established during field work (refer to chapter 3).

6. Prepare visual simulations to represent the changes that would be expected under the proposed alternatives as seen from the KOPs (refer to appendix K for images of the existing conditions and simulated conditions).

7. Establish visual quality of the effects of the proposed action as described above using the simulations. Visual quality considers the entire view from a KOP, which may include positive or negative features that are not always able to be captured in the representative photograph used to create the simulations. To account for this, the simulations were taken into the field and compared with the present view where feasible.

8. Determine visual impacts on KOPs based on the overall change in visual quality ratings. Also, a qualitative discussion of the overall effects of the proposed alternatives is provided in each conclusion.

Key Observation Points and Field Work

Key observation point is a term commonly used in visual resource analysis to describe an identified location and position of a viewer, for the purpose of evaluating potential action impacts from a wide variety of viewing contexts. KOPs can be either sensitive points within the viewshed, typical points representative of a common landscape character or view type, or random points (FHWA 1988, 33). Typically, KOPs document the landscape from a stationary view and a level position. Locations of KOPs were determined through field work and consultation with NPS staff familiar with park resources.

In general, the KOPs selected include established scenic vistas; social and recreational attractions such as day-use areas, visitors centers, and campgrounds; cultural landscape resources such as historic sites; and points along roads and trails with special scenic qualities. In addition, points where an alignment would cross a resource feature (trail, river) were included. The locations of all preliminary KOPs identified for this analysis are shown on figures 54 and 55 (in chapter 3).

KOPs are a standard assessment tool used for visual quality impact; however, they are intended to identify representative views within the study area, and therefore they have certain inherent limitations. KOP photographs capture the viewscape as a snapshot in time at a specific location and looking at a defined direction. Level of visibility of the proposed actions could vary depending upon the season (leaf-on or leaf-off in a deciduous forest, for example), and atmospheric and weather conditions can extend or limit views into the distance. KOP analyses are not intended to consider every point in the landscape; they are however, intended to provide an adequate sample from which conclusions regarding potential impacts or benefits to a scenic resource can be determined. Changes to visual resources caused by the alternatives would be seen from locations other than those evaluated by the given KOPs. Also, the impact on a view is affected by the direction the viewer is facing. Consideration for these limitations and variables is included relevant to each KOP.

Field work to establish the study area and document existing view conditions at preliminary KOPs was conducted over two sessions during September and October 2010. Working in teams of at least two, each preliminary KOP was visited to establish visibility of relevant existing transmission or utility features, and representative views and the surrounding landscape were photographed. Each KOP was assessed using the FHWA Visual Quality Rating Scale described above, using a field data sheet to record visual quality ratings for unity, intactness and vividness. A third field work session was conducted in December 2010 after visual simulations representing proposed conditions had been prepared. When feasible, the simulations were brought into the field for comparison with the existing ‘on the ground’ view conditions. A detailed discussion on the creation of visual simulations is provided below.

Creation of Visual Simulations

Each KOP was visited to establish existing visual quality and to collect photographs. An approximately 27-millimeter focal length was selected to represent the field of view perceived by the human eye for all the simulations to best capture each view, including the appropriate context. A single photograph was then selected for each KOP, which was intended to depict a “typical view” of the alignment in the context of the setting. Digital SLR [single lens reflex] cameras were used to create photographs for the simulations, as they provide the highest quality image and sharp detail close up and at a distance. Photographs were taken using Canon 50D (17- to 40-millimeter lens), Canon 5D Mark II (17- to 40-millimeter lens), and Canon T2i (18- to 55-millimeter lens) cameras.

Digital study area data were gathered and compiled to create a 3D model of each alignment using the primary modeling package (AutoCAD 2008). Elevation data acquired from U.S. Geological Survey Seamless Data Warehouse was used to define the elevation of the proposed tower structures, as well as the KOPs. In addition, GIS-based reference data (existing roads, selected park features, and the proposed alignments) were combined to create a reference file to confirm viewpoints were in the correct spatial relationship to the proposed 3D model. Finally, GPS points acquired during fieldwork provided accuracy in locating the position of the viewer in relation to the 3D model and existing features. Proposed towers were placed according to the design documents provided by the applicant for alternative 2, and approximately 1,200 feet apart for the remaining alternatives where the tower locations have not been determined, with some adjustment as appropriate for topography changes and angle points. The repositioned existing distribution transmission lines were shown within the ROW using the best available information based on industry standards relative to pole type and offset clearances. However, the exact design and placement of these lines is not known at this time.

Next, a 3D model of the proposed alignment, including towers, conductors, insulators, and wires, was modeled per details provided by the applicant. After the model was built in AutoCAD and reference points for the photographs were placed, the model was exported to a rendering software package, Vue 5 Infinite, which allows the application of photorealistic textures and realistic lighting. A virtual camera was placed within this software to correspond to the location of each KOP photograph. Textures were applied to depict proposed elements (i.e., Corten steel transmission towers), and lighting in the existing photograph was duplicated in the software package so shadows, time of day, and weather conditions were matched. The computer rendered the view from each virtual camera at each KOP, matching the angle of view at 27 millimeters to match the existing photograph. The rendering was saved as an image file for the next step.

The images were then prepared for inclusion in the EIS. Using photographic modification software, the photographs were altered to remove existing features, such as steel lattice towers and vegetation that would be removed according to the proposed alternative. The simulations show the proposed conditions at approximately 15 years after implementation, representative of the typical future condition. The 350-foot proposed ROW was used to define the vegetation removal limits from the photographs, and aerial photography combined with reference object dimensions, such as the existing and proposed towers, were used to determine the clearing effects in each photograph. In the case of more challenging areas, such as the alternative 3 crossing of Old Mine Road, a surface model of the existing terrain was created and a 350-foot-wide clearing was modeled to depict the changes as accurately as possible.

In areas where existing vegetation being removed would reveal something currently hidden from view, fieldwork photographs were used to represent the new viewshed. In cases where no reference photographs were available due to geographic features or dense forest, a typical texture of the same forest, land cover, or terrain type was used to replace the removed vegetation. After removing existing features, the rendering of the proposed improvements was overlaid and then appropriately blended into the existing photograph, with adjustments to account for distant haze and shadows from existing vegetation.

Study Area and Viewshed

The geographic study area for visual resources is divided as inside and outside the study area. The NPS cannot prescribe changes on lands outside its ownership, which are those outside the study area. However, due to the nature of scenic views, particularly distant views such as those in the landscape being analyzed for the EIS, visual changes outside defined ownership boundaries still have the potential to directly impact views as seen from adjacent protected areas, including those owned and managed by the NPS. Therefore, the conclusion statements under each alternative discussion refers to locations inside the study area and outside the study area, but the level of impacts on the visual resources were determined regardless of this consideration.

In addition, a second study area, unique to visual resources analyses and not addressed under other resource topics, was defined and considered. As stated previously, visibility is not always limited to defined boundaries, so impacts on visual resources must be considered beyond the localized vicinity of the proposed actions. To account for this, an additional preliminary ‘line of sight’ analysis was performed early in the process. This analysis used unique study areas for each alternative. Line of sight analyses are often used in visual resource analysis and can help identify patterns of visibility in the landscape of a proposed action, in this case, transmission towers. For this analysis, a zone of visual influence (ZVI) study area was initially defined at 20 miles from the DEWA boundary and the APPA centerline. This conservative distance was considered for two primary reasons. First, many park resources are located at geographic highpoint locations within park boundaries, offering broad vistas of the landscapes outside NPS ownership. Second, the large scale of the proposed actions increases the potential to see the transmission lines from a distance.

Each alternative was analyzed according to a unique corresponding ZVI study area. The area defined as 20 miles offset from DEWA and the centerline of APPA were then overlain onto an area defined as 20 miles offset from each alternative alignment, and the intersection of the two areas became the ZVI study area for the given alternative. This approach was effective for identifying geographic areas most likely to be impacted by the proposed actions.

Once the ZVI study area was defined for each alternative, a GIS line-of-sight analysis was conducted within in the ZVI study area for existing and proposed conditions for each alternative alignment. This process allowed for the identification of places in the landscape where existing transmission poles could be visible for each proposed alignment. The landscape terrain was represented by a 10 meter by 10 meter digital elevation model. Existing transmission poles were analyzed using the best available data, including pole height and location. Because proposed tower locations are not yet known, for the purposes of this analysis, preliminary tower locations were applied for each alternative, including prescribed towers at high points and angle points, and then sampled with spacing one tower every 2 miles, or approximately 8.3 % of the potential tower locations, as identified in chapter 2. The viewshed was then determined for each alternative by a GIS-based series of yes/no analyses whereby any grid square was highlighted if any part of any tower was visible. The results of these bare earth visibility analyses were tabulated and are included at the end of each alternative discussion. The tabulations show areas (in acres) from which existing wood poles and proposed monopole towers could be seen under bare earth conditions from within DEWA and from the APPA corridor, defined at 1,000 feet wide.

Although the ZVI analyses were useful for preliminary study, they consider the landscape under ‘bare earth’ terrain conditions (without regard for vegetation cover). Detailed vegetation cover data was not available for this level of analysis. Based on field observation, the undeveloped landscape in the study area is generally densely forested and views are commonly limited to the foreground or middle ground by surrounding vegetation. While the visual simulations taken at the KOPs have certain limitations because they are a snapshot in time (see Key Observation Points and Field Work), the bare earth ZVI analyses also has their limitations because they do not consider screening from existing vegetation. However, changes to vegetation from management actions and natural events such as blowdowns and wildfires could potentially open vistas and bring the towers and ROW clearing within view.

The final locations chosen to determine the effects of the proposed alternatives (i.e., the KOPs) were determined with the assistance of NPS staff familiar with park resources and field work.

References to the study area in the remaining portion of this visual resources analysis refer to study area established by the VSLs.

CUMULATIVE IMPACTS

Actions inside and outside the parks can affect scenic quality of views seen from in the parks. Replacement or restoration of park facilities would likely benefit overall visual quality, whereas activities outside the study area, such as expansion of natural gas pipelines or construction of cell towers, could degrade visual resources both inside and outside the study area. Past, present, and reasonably foreseeable future activities that would have beneficial or adverse impacts on visual resources in the parks, inside and outside the study area, are summarized here. Cumulative impacts on visual resources were then determined by combining the impacts from the projects listed below. These projects were taken from a list of potential cumulative projects developed for the S-R Line that can be found in appendix H. Overall cumulative impacts were considered for each alternative and are described below.

Projects Inside the Study Area

Inside of the study area, cumulative projects that would result in adverse impacts on visual resources include the following utility projects: Metropolitan Edison Utility Tree Removal and Trimming, and Metropolitan Edison Enhanced Vegetation Management Program (which will expose more of the transmission line and impact the viewscape); Federal Energy Regulatory Commission Relicensing of Yards Creek Generating Station; Jersey Central Power & Light vegetation maintenance; Marcellus Shale Natural Gas Drilling, Northeastern PA and Southern NY; and Columbia Gas Transmission Company (new gas pipeline).

Many activities undertaken within DEWA to upgrade roads would beneficially affect visual resources, including: Smooth Ride Initiatives 2006/2007: Road Surface Rehabilitation throughout DEWA; US Route 209 Roadway Surface and Health and Safety Improvements; Old Mine Road South Rehabilitation; DEWA 14(7) Rehab Remainder of US Route 209; Alternative Transportation Program; US Route 209 Commercial Use Expiration 2015. Other infrastructure improvements within DEWA would beneficially affect visual resources, including Hazardous Structure Demolition/Deconstruction; Stabilize and Repair Damaged Structures; Kittatinny Point Visitor Center Storm Recovery; Kittatinny Point Boat Launch Replacement; River Campsite Restoration of Flood-Damaged Sites; Re-route 150 Feet of Coppermine Trail; and Agricultural Leases (which would preserve agricultural lands). Although the beneficial impacts of these actions could positively affect visual resources, the beneficial impacts would not outweigh the adverse impacts from the above-mentioned projects. Cumulative impacts inside the study area would result in adverse impacts on visual resources.

Projects Outside the Study Area

Outside of the study area, cumulative projects that would result in adverse impacts on visual resources include the following utility and energy projects: Tennessee Gas Line Proposal; PJM Interconnection Proposal; PPL Proposal for Transmission Line Substation; Blue Mountain Ski Resort Community Scale Wind Turbine, Palmerton, Carbon County, PA; and Wind Turbines in Northeastern PA.

Outside of the study area, some NPS activities would beneficially affect visual resources in other parts of the park, including Regrade Six Historic Building Sites, Phase II (Parkwide); Pocono Environmental Education Center Cabin Replacement; Rehabilitate Childs Park; removing dead and dying trees; and upgrading cultural and recreational facilities. The designation of agricultural security areas would also be a beneficial impact, because agricultural security areas would help preserve traditional land uses and viewscapes. Such agricultural security areas include Pike County Agricultural Security Areas; New Jersey

Highlands Water Protection and Planning Act (Highlands Council); Pocono Forest and Waters Conservation Landscape Initiative (PA Department of Conservation and Natural Resources); New Jersey State Forests, Parks, & Wildlife Management Areas—NJ DEP Natural Lands Management Program; PA Forest Stewardship Program; NJ Forest Stewardship Program; Sussex County Farmland Preservation; Warren County Farmland Preservation; Monroe County Agricultural Land Preservation Program; Northampton County Farmland Preservation Agricultural Security Areas; County Open Space Plans; Common Waters Parntership (Common Water Fund); The Nature Conservancy New Jersey Chapter; The Nature Conservancy Pennsylvania Chapter Northeast Region; and Wallkill NWR; Cherry Valley NWR. Although these projects could positively affect visual resources, the beneficial impacts would not outweigh the adverse impacts from the above-mentioned projects. Cumulative impacts outside the study area would result in adverse impacts on visual resources.

Projects Specifically Affecting APPA

For APPA, the geographic range for cumulative impacts on visual resources is the entire trail, Maine to Georgia, and includes transportation and infrastructure crossings (roads, bridges, ROWs) that degrade the visual resources of APPA. Scenic quality of the trail is already adversely impacted by other actions.

The development and utility projects listed above, particularly the Marcellus shale and Columbia and Tennessee pipelines, would also adversely affect APPA. The resource management and restoration plans and activities would offer beneficial effects. Additional adverse impacts occur from activities already implemented or planned along the entire length of the trail, including Dominion/Allegheny Power 500-kV Transmission Line Project, the Potomac-Appalachian Transmission Highline ROW EIS, 317 antennas greater than 200 feet tall (e.g., cable television, communication towers) located within five miles of APPA (the vast majority, 113, are in Pennsylvania, Virginia has the next highest at 59, New Jersey has 9); 63 pipelines (the vast majority, 28 are in Pennsylvania, Massachusetts has the next highest at 14, New Jersey has 1); 94 electrical power lines (the vast majority, 34, are in Virginia, Pennsylvania has the next highest at 17, New Jersey has 4). In addition, approximately 1,500 transportation infrastructure facilities, including local roads, park roads, highways and interstates, and railroads are within, or proposed for development within, the vicinity of APPA. The majority, 316, are in Virginia, with Pennsylvania the next highest at 228. New Jersey has 85 proposed activities.

Of these projects, most are complete and currently affect the visual resources of APPA. The following projects are planned for the future: four transmission line upgrades in Virginia, West Virginia, and New Hampshire, three natural gas line upgrades in Pennsylvania and New Jersey, the Berks County Public Safety Communications Project (3 tall communication towers on Kittatinny Ridge), and the Highland Wind farm in Maine. Additionally, the continued and expanded exploration of shale gas in the Allegheny Plateau is expected to continue and accelerate the need more transmission projects. Likewise, the increasing interested in development of ridge-top wind resources will generate more projects of that type. The expansion of the cellular network resulting in additional towers is also expected to continue.

IMPACTS OF THE ALTERNATIVES ON VISUAL RESOURCES

Common to All Alternatives

Outside the Study Area: Outside the study area, regardless of which alternative is selected, the transmission line could pass through Carbon, Lackawanna, Luzerne, Monroe, Northampton, Pike, and Wayne and counties in Pennsylvania and Morris, Sussex, and Warren counties in New Jersey. The clearing, construction, and vegetation maintenance activities outside the study area would be consistent with those described for inside the study area. The direct impacts from construction and maintenance of the line outside the study area cannot be determined, as described in the introduction of this chapter. In addition, specific impacts outside the study area cannot be identified until the route is chosen by the applicant.

Outside the study area, visual resources would remain as they are described in chapter 3 under alternative 1. Possible impacts would vary based on the type of protected area affected and its established goals or management strategies for the protection of scenic views.

As indicated in chapter 3, the transmission line would cross a variety of different types of publically accessible protected areas. Under the action alternatives, a wider cleared ROW, taller structures, larger more numerous conductors, and additional access roads could impact visual resources in these areas. The action alternatives could result in no noticeable change in scenery. However, adverse impacts would result from areas where the changes in overall visual quality as a result of the action alternatives were in conflict with stated management plans, policies, or guidelines established for visual resources within these areas. The intensity of impacts would depend on the location and duration of the activity, season, and weather conditions.

Outside the study area, views from APPA would be affected upon approach to the transmission line. Depending on the route outside the study area, the transmission line could cause visual impacts, especially if the line causes disruptions to the middleground, creating a noticeable contrast to the trail scenery and affecting the unity and intactness of the views near the crossing.

Additionally, outside the study area, alternatives 4 and 5 would cross a small section of Cherry Valley NWR in Pennsylvania. As noted in chapter 3, the refuge would permit public access for day use. The stated “premier task” of the refuge is “conserving wildlife” (USFWS 2010c). Cherry Valley NWR is not explicitly managed for visual quality. However, the disruption of forest cover caused by the wider ROW and the presence of large transmission infrastructure could adversely affect scenery relative to a protected natural landscape. Outside the study area, alternatives 4 and 5 would cross the Delaware River. Changes to views, such as views from pedestrian bridges, could result from the increase in tower height and larger more numerous conductors seen crossing the river. These impacts would affect visual resources because they would represent a new visual intrusion where none currently exists. However, the level of impact would depend on whether such views or areas are managed or protected with regard to visual quality.

Outside the study area, impacts on visual resources would be caused by vegetation clearing, construction of the transmission line, operation and maintenance of the transmission line, and vegetation maintenance with the severity depending on the area the line was passing through and any stated management policies, plans, or guidelines for the protection of scenic views or visual quality. Cumulative impacts outside the study area would result in adverse impacts on visual resources as described previously in the “Cumulative Impacts” section. When the impacts on visual resources as a result of activities outside the study area are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected.

Alternative 1: No Action

Under the no-action alternative, the existing corridor, galvanized steel tower structures, and conductors would remain visible from recreation sites, scenic trails, and scenic drives in DEWA. The existing corridor and structures would also remain visible where the alignment crosses APPA. The existing transmission line ROW would not be widened. Overall visual quality scores for alternative 1 (the present alignment) under existing conditions are provided in Table 81.

Affected KOPs with visibility of the existing alignment include the following:

- APPA (where the alignment crosses)
- Old Mine Road
- Fernwood Resort at Hwy 209
- Hamilton Ridge Trail; Pioneer Trail
- McDade Trail near the Schoonover House
- Millbrook Village (vicinity)
- Watergate Recreation Site
- Van Campens Glen Trail
- MDSR (east of Bushkill)
- Hamilton River campsites

In general, the existing transmission alignment prevents the potential for high visual quality where the alignment is visible. The existing alignment hinders visual unity due to the large transmission structures conflicting with the natural, undeveloped aesthetic seen throughout DEWA and along APPA in the study area. Particularly, the existing alignment disrupts the dominance, scale, and diversity of the visual patterns present in the naturally occurring landscape. The abrupt interruption of vegetation created by the cleared ROW also disrupts the visual harmony associated with nationally protected scenic resources, particularly in the regional context of northeast Pennsylvania/western New Jersey, where the undeveloped landscape is predominantly vegetated by mixed deciduous forest.

The presence of the existing alignment also adversely affects visual intactness. Visible towers and conductors represent incompatible intrusions that encroach upon the natural setting. The cleared ROW creates a visually reductive swath that can interrupt continuous forest cover and cause it to appear fragmented. The presence of the alignment tends to diminish overall intactness of the scenic natural area due to the appearance of the transmission line infrastructure. Depending on viewpoint location, the cleared ROW creates unobstructed viewshed corridors along which the lattice towers and conductors can be seen into the distance, typically until visibility is bounded by a topographic feature, commonly a ridgeline. Visual encroachments from the existing alignment are therefore accentuated when viewed from with the ROW looking parallel with it; such as where roads and trails intersect the alignment.

Visual vividness, or memorability, is also affected by the presence of the existing route, because protected scenic resources are often valued, and thus remembered, for their freedom from otherwise ubiquitous and typically unsightly infrastructure elements.

Operation of the existing transmission line would require periodic maintenance, including clearing and mowing of vegetation in the ROW. Definitive vegetation management carried out by the applicant within the existing ROW is not known, so the impacts can only be estimated. All maintenance activities, particularly recent vegetation removal and the presence of large equipment, have the potential to adversely impact protected scenery.

For these reasons, continued operation of the existing alignment, alternative 1, would result in adverse impacts on the visual resources of DEWA, MDSR, and APPA. Conversely, at APPA, the existing ROW clearing provides an opportunity to view east and west, which would not be possible without the continued maintenance of the corridor.

Cumulative Impacts

Cumulative impacts inside the study area from past, present, and reasonably foreseeable projects would result in adverse impacts on visual resources as described previously in the "Cumulative Impacts" section. When the impacts on visual resources as a result of alternative 1 are combined with other projects in the study area, an overall cumulative adverse impact would be expected.

The past, present, and reasonably foreseeable projects identified along the length of APPA would produce adverse cumulative impacts on the trail as explained in the "Cumulative Impacts" section. When the impacts on visual resources as a result of alternative 1 are combined with other projects that affect APPA, an overall adverse cumulative impact would be expected.

Conclusion

Alternative 1, the no-action alternative, would result in the continued presence, operation, and maintenance of the existing transmission line route. Vegetation clearing would result in adverse impacts during maintenance activities and for a time after maintenance activities. When combined with the impacts on visual resources under alternative 1, the effects of past, present, and reasonably foreseeable future projects would result in adverse cumulative impacts on visual resources inside the study area, and adverse cumulative impacts specifically on APPA.

Common to All Action Alternatives

Mitigation Measures: Mitigation measures would be implemented to reduce impacts on visual resources and are taken into consideration in the impact analysis. Mitigation measures are described in appendix F.

Alternatives 3, 4, and 5 include the removal of all or a portion of the B-K Line as described in chapter 2. For these alternatives, the existing B-K Line corridor would be allowed to revegetate, ultimately returning to forested habitat; under alternatives 2 and 2b the proposed transmission line would be constructed along the existing B-K Line alignment.

During removal and disposal of existing structures, there would be adverse visual impacts from grading activities, dust production, removal of the crane pads and equipment at wire pull sites, disassembly and removal of lattice towers, creation of access roads, and transportation of construction equipment to and from the decommissioning sites. There would be similar impacts related to construction of the new line including grading activities to create level pads for tower sites, construction of foundations, and construction of steel towers, including wire installation. New pulling and splicing sites, as well as new construction staging locations, would further adversely impact scenery and views near the construction activities. Short duration construction detours and/or road closures may increase road signage and create traffic congestion, which would adversely impact general scenic quality in DEWA. In general, construction-related impacts would be most acute where the activity is visible in the foreground to middleground, between 0.25 and 2 miles away. Impacts on visual quality and scenic views during the operation of the proposed action alternatives would vary by alternative, as discussed in subsequent paragraphs.

Because some ROW expansion is necessary only for construction safety and maneuverability, a portion of the corridor along the ROW would be allowed to revegetate after construction is complete. Only the width of the ROW necessary to maintain access roads and the transmission line would continue to be maintained, up to 350 feet. However, for the purposes of this analysis, all visual simulations assume clearing of the entire 350-foot standard ROW width. Revegetation would improve visual quality of

DEWA and APPA by potentially increasing the extent of vegetation screening between the proposed action and the viewer, slightly lessening the long-term effects of the ROW expansion.

Maintenance vehicles and field crews would be periodically visible locally from KOPs associated with the alternatives. Effects of recent vegetation clearing (i.e., visible pruning scars, recently removed tree branches and stumps) would adversely impact visual quality where the proposed corridor is visible in the foreground, such as at locations where the alternative passes over a scenic trail or MDSR. It is anticipated that the proposed ROW would be maintained approximately every year or as deemed necessary by the applicant.

For all the action alternatives, certain dynamic components of the visual environment would interact with the proposed actions creating some level of variability in the resulting impact. Examples of these components include ephemeral qualities, such as weather conditions (e.g., low cloud cover or haze) and seasonal variations, such as the deciduous forest condition (leaf-on/leaf-off) and how that affects visibility from a given point. Solar aspect, also a seasonal consideration, would play a role in how the proposed ROW expansions appear when viewed from a moderate distance, because the greatest potential for visibility of the corridor occurs from the visual contrast caused by the shadow effect of the adjacent vegetation. Finally, the position of the viewer and the angle at which one views the alignment would affect the level of impact on visual quality. Each of these components is discussed if or when they influence the level of impact under the proposed alternatives.

It is expected that diverter devices would be placed on static wires and transmission conductors to prevent bird strike along specific segments of the alignment. The locations of the bird diverters are presented in figures 74, 75, and 76. The diverters would be required where the alignment where it would intersect with typical migratory bird routes: crossing MDSR and where the alignment passes over Kittatinny Ridge and the Hogback. Bird diverting devices are also discussed in the “Landscape Connectivity, Wildlife Habitat, and Wildlife” section of this chapter. Generally speaking, the devices would increase visibility of the lines by making the conductors more noticeable and would increase visual clutter, especially when seen in the foreground. It is not currently known what type of device would be installed; however, the devices would be in accordance with APLIC standards and be considered the best available technology. The spacing of the devices on the conductors would be based on the type installed; but spacing could vary from 30 to 200 feet apart. Spiral wire diverters were originally analyzed along the alignment where diverters would be required. For the sake of completeness, marker ball devices were also considered and simulated at two KOPs at alternative 3: McDade Trail near MDSR and the crossing at APPA. The spiral wires and marker ball type diverters were each simulated for McDade Trail where alternative 3 crosses MDSR, and at APPA where alternative 3 crosses over the trail. Figures 3-4a and 3-4b and 3-13a and 3-13b in appendix K depict possible diverter types that could be installed, and the corresponding visual impacts of each. Based on these simulations, the marker balls would result in greater visual impact than the spiral wire because they result in greater visual clutter and would be visible from further away.

The following analysis and evaluation for each alternative were based on the changes in visual quality at each selected KOP with visibility of a given alternative. Qualitative discussion of the impacts (considering changes to unity, intactness, and vividness) are provided, followed by the change in the visual quality numeric rating, based on FHWA methodology to provide objective analysis. General changes to visual resource resulting from the alternative are also described following each alternative description.

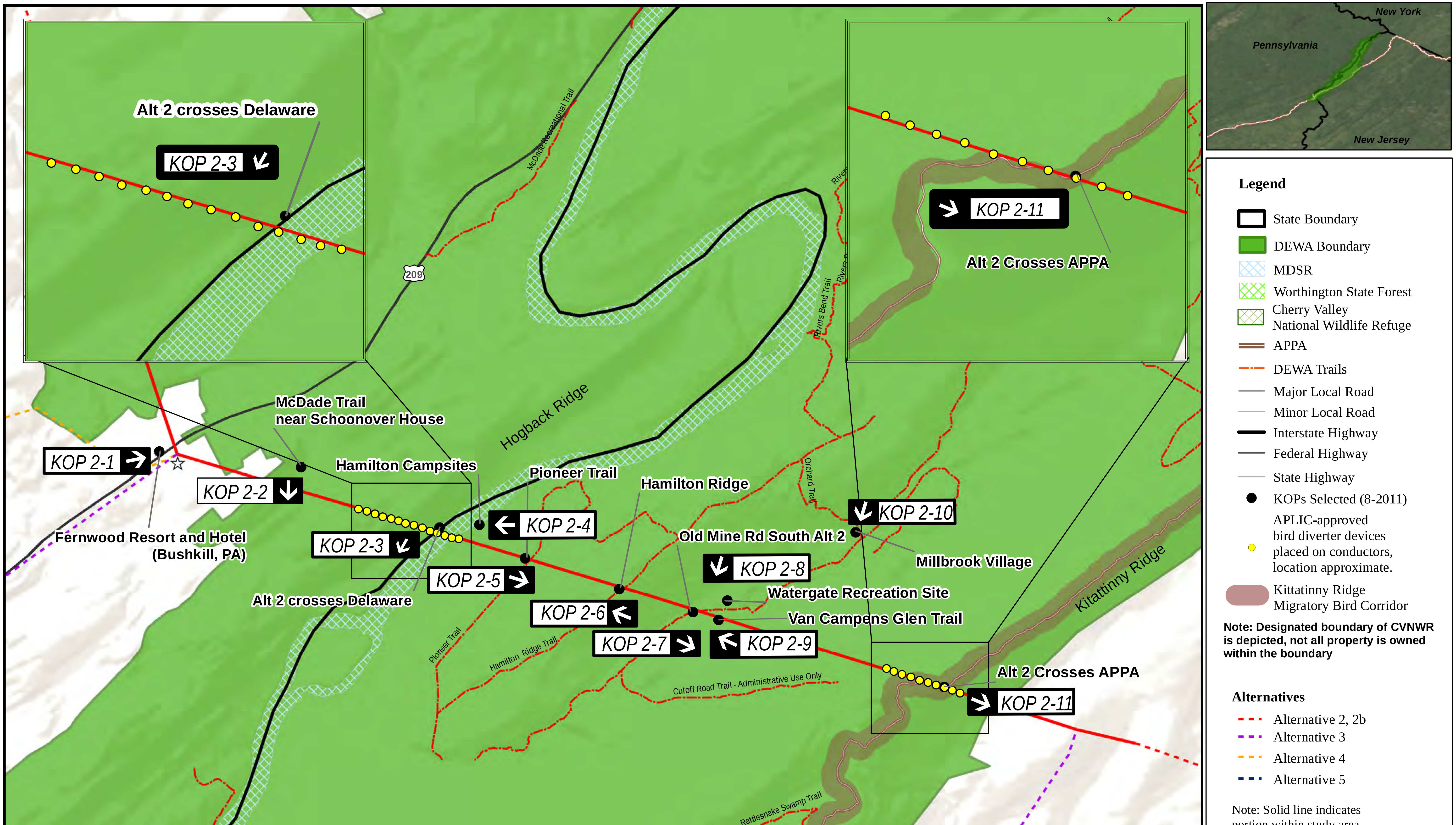
Alternative 2

Alternative 2 would result in widening the existing transmission line ROW through DEWA, MDSR, and APPA for approximately 5.6 miles. The existing structures and lines would be removed and replaced with new monopole towers and lines as described in chapter 2, resulting in a permanent loss of vegetation along the existing ROW. During the course of this analysis, including fieldwork and visual simulation production, certain preliminary KOPs were found to provide no visibility of the proposed actions, because the viewing distance was so great the impact would not be discernible, or vegetation or landform features blocked potential views. These KOPs were subsequently eliminated from further study. For alternative 2, these KOPs include the following:

- APPA at the future relocation section
- Culver fire tower
- Blue Mountain viewpoint
- Rattlesnake Mountain viewpoint
- Sunrise Mountain pavilion
- DEWA Cliff Trail overlooks
- Salamovka House
- Rivers Bend group campground
- Camp Mohican Lodge facility
- Pennsylvania Hwy 209 at Little Egypt Road

Visual simulations were prepared to depict the changes for KOPs impacted by alternative 2 and are included in appendix K (figures 2-1 through 2-11). Affected KOPs with potential visibility of the proposed actions under alternative 2 include the following:

- Fernwood Resort at Hwy 209
- McDade Trail near the Schoonover House
- MDSR (east of Bushkill)
- Hamilton River campsites
- Pioneer Trail
- Hamilton Ridge Trail
- Old Mine Road
- Watergate Recreation Site
- Van Campens Glen Trail
- Millbrook Village (vicinity)
- APPA (at the point where the existing alignment passes over)



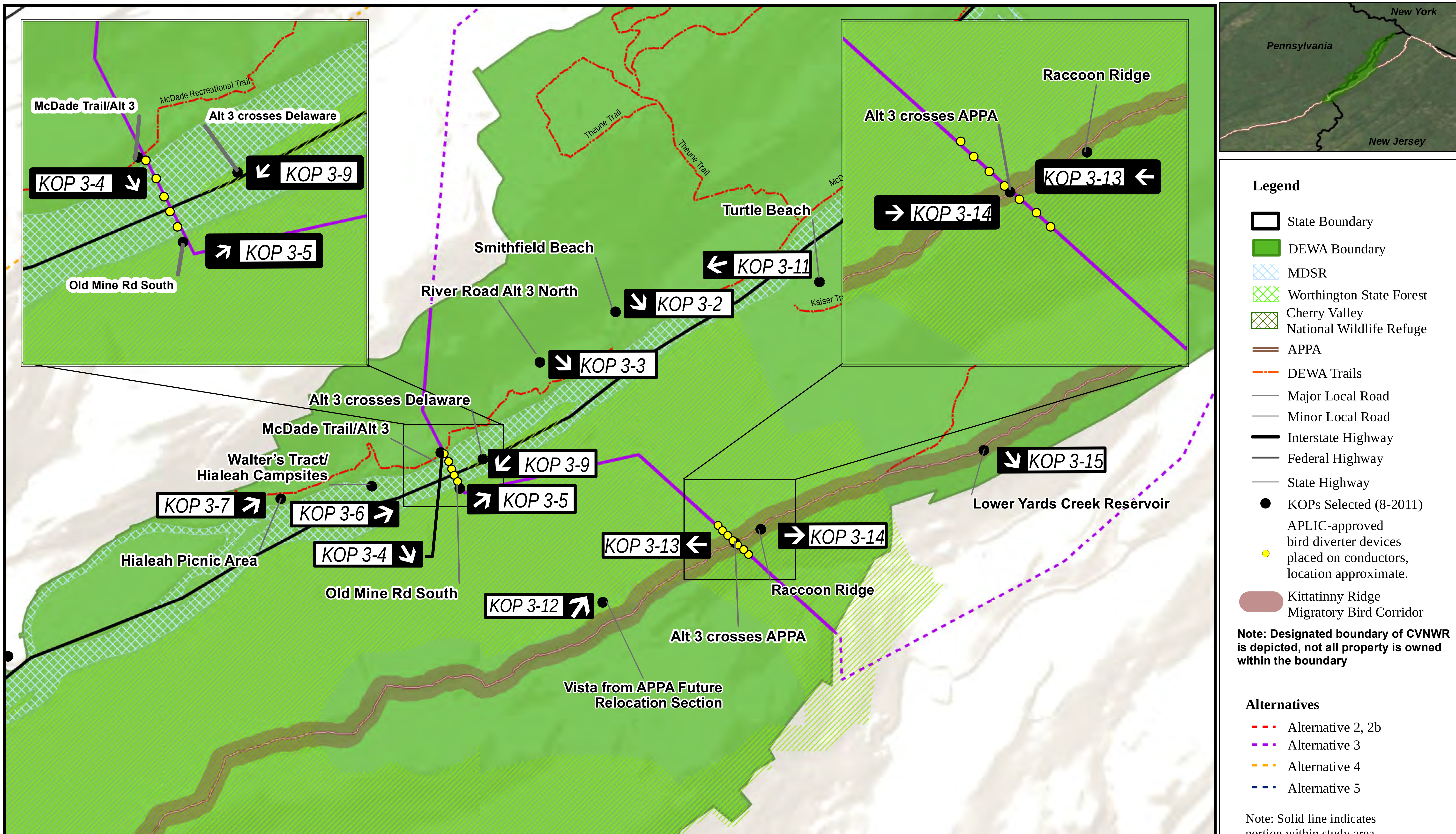
Susquehanna to Roseland Transmission Line Proposal and Right-of-Way Request EIS

Figure 74
Alternative 2
Locations of Bird Dirverter Device Placement

Source: ESRI ArcGISonline Map Service 2010
National Atlas of the United States, 2005

Projection: NAD 83 UTM Zone 18N
Date: October 2011

0 0.5 Miles

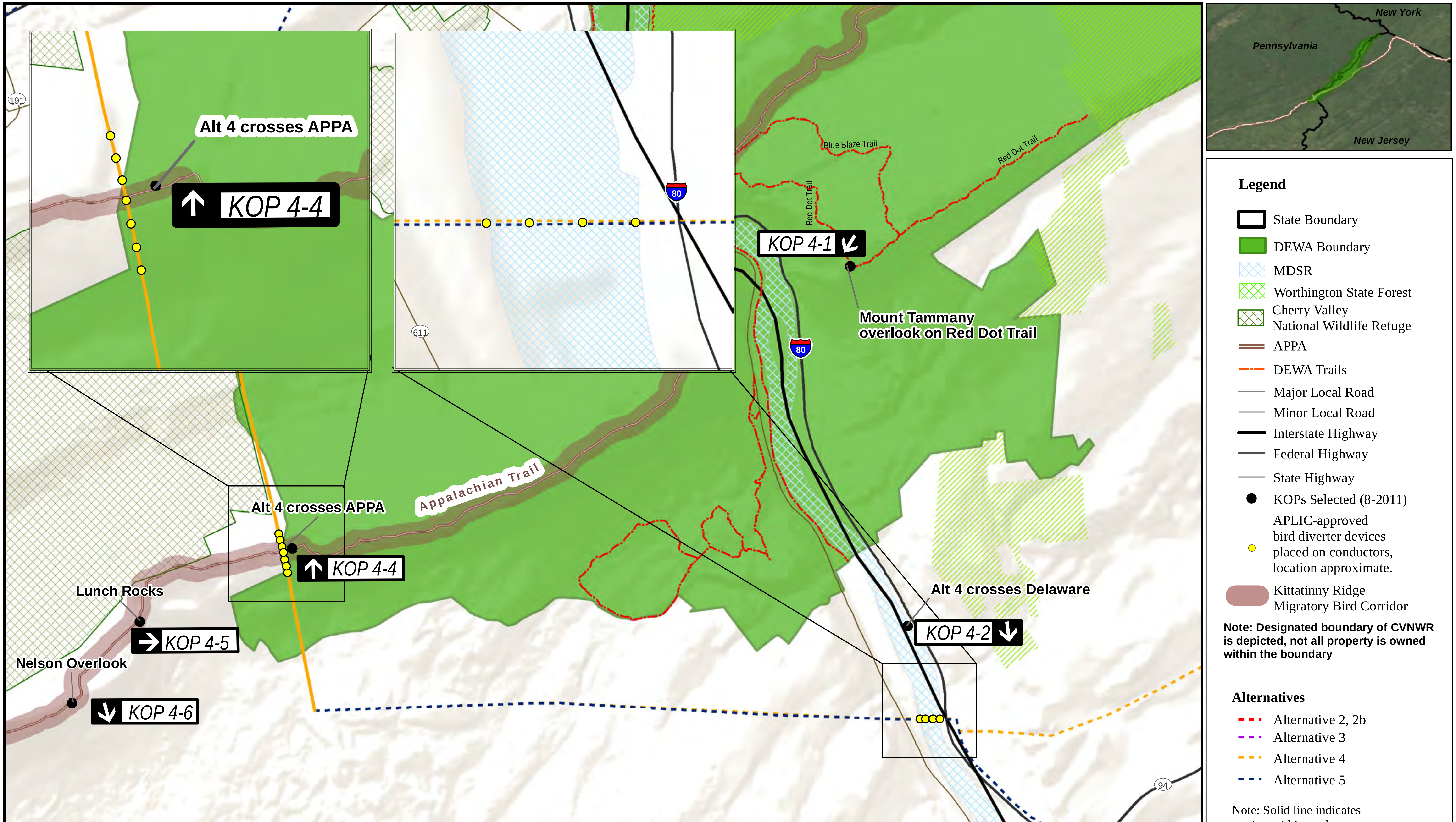


Susquehanna to Roseland
Transmission Line Proposal
and
Right-of-Way Request EIS

Figure 75
Alternative 3
Locations of Bird Dirverter Device Placement

Source: ESRI ArcGISonline Map Service 2010
National Atlas of the United States, 2005

Projection: NAD 83 UTM Zone 18N
Date: October 2011



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

Figure 76
Alternatives 4 and 5
Locations of Bird Dirverter Device Placement

Source: ESRI ArcGISonline Map Service 2010
National Atlas of the United States, 2005

Projection: NAD 83 UTM Zone 18N
Date: October 2011

Table 81 summarizes changes in the overall visual quality for the affected KOPs for alternative 2, based on the FHWA scale of 0 to 7.

TABLE 81: ALTERNATIVE 2: SUMMARY OF CHANGES TO VISUAL QUALITY RATINGS* AT IDENTIFIED KOPS

KOP Name	Visual Quality Score Under Existing Conditions	Visual Quality Score Under Simulated Proposed Conditions	Total reduction in Visual Quality, unless noted otherwise
Fernwood Resort	2.54	2.21	0.33
McDade Trail near Schoonover House and Community Dr.	5.04	3.42	1.62
MDSR at alternative 2	5.00	3.83	1.17
Hamilton River campsites	5.13	4.46	0.67
Pioneer Trail	3.04	2.50	0.54
Hamilton Ridge Trail	3.00	2.79	0.21
Old Mine Rd., at alternative 2	3.04	2.96	0.08
Watergate Recreation Site	4.67	3.38	1.29
Van Campens Glen Trail	3.08	2.33	0.75
Millbrook Village	4.42	3.92	0.50
APPA at alternative 2 crossing	2.71	2.92	Increase of 0.21 from specific KOP viewpoint (overall impacts to APPA would be adverse)

*The ratings are based on the FHWA scale from 1-7.

Fernwood Resort, Pennsylvania Hwy 209

Proposed conditions are represented in appendix K, figure 2-1, "Proposed." While Fernwood Resort is located outside the DEWA boundary, its proximity to the park along Pennsylvania Hwy 209 results in its serving as a visual point of access; therefore it has been included for the sake of completeness. As figure 2-1 in appendix K shows, the new towers would be much more visible compared with baseline conditions. Vegetation removal would be visible near the proposed tower and in the background as the alignment crests the slope. Visual unity would be reduced from low to very low to low; due to the scale of the proposed tower giving it stronger dominance in this view. However, in the context of the surrounding development, the change would be less pronounced. Intactness would be reduced due to the increased encroachment resulting from the introduced conductors and tower silhouetted against the sky, but would remain moderately low to average. Vividness for the existing commercial development is currently very low to low, and the proposed action would have adverse effects on this aspect of visual quality. The overall visual quality at Fernwood Resort would remain moderately low (however, the visual quality rating would be reduced from 2.54 to 2.21 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 0.33. Adverse impacts would occur on the visual resources of Fernwood Resort due to the alternative 2 alignment.

McDade Trail near Community Drive, Schoonover House

Proposed conditions are shown in appendix K, figure 2-2, "Proposed." Vegetation would be removed to accommodate the proposed alignment, and the taller tower would noticeably extend above the tree tops. Due to the perpendicular angle of the view from McDade Trail at this point, the widened ROW would be somewhat subtle. Visual unity would be reduced from moderately high to high to moderately low to average due to the scale of the tower drawing focus away from the human-made structure (i.e., the barn) that previously was the focus. The visible tower and conductors appear out of proportion with the other visible elements, creating visual conflict. Intactness would also be reduced from moderately high to high to moderately low to average, as the tower and new conductors encroach upon the view and would be silhouetted against the sky. Vividness would be somewhat reduced from moderately low/average to moderately low, mainly due to the intruding human-made development impacting the ability of the scene to be remembered for its natural or historic and cultural uniqueness. The presence of access roads would also contribute to adverse visual impacts compared to baseline conditions. The overall visual quality at McDade Trail at the Schoonover House would be reduced from high to average (shifting from 5.04 to 3.42 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 1.62. Adverse impacts would occur on the visual resources of McDade Trail, Community Drive, and the Schoonover House near the alternative 2 alignment.

MDSR

Proposed conditions are shown in appendix K, figure 2-3, “Proposed.” Along MDSR, the taller towers and larger conductors would become more noticeably visible compared with baseline conditions, in which the steel lattice structure is mostly screened from view until seen from directly beneath the alignment. Proposed conditions show the tower extending beyond the tree height, disrupting the scale and balance of the scene. Due to the angle of this view, the proposed vegetation removal would be only somewhat more visible moving toward the line, and then very apparent when viewed within the proposed ROW. For visibility to migratory birds, deflector devices in accordance with APLIC standards and considered best available technology would be installed on the conductors where they cross the river and ascending the Hogback Ridge. While the distance from which the diverters would be discernable would depend on type installed, when seen their presence would increase visual clutter and the ability of the conductors to be noticed.

Affects to visual unity would include a reduction to the existing harmony shown in the baseline condition, caused by the introduced tower and conductors conflicting with the natural view. Therefore, unity would be reduced from moderately high to moderately low. Intactness would be reduced from moderately high / high to average / moderately high due to the new encroaching features and vegetation removal increasing the apparent level of development and contributing to visual intrusions. Vividness would be somewhat reduced numerically but would remain average to moderately high due to the intrusion of incompatible human-made elements detracting from the otherwise memorable combination of natural elements: water, vegetation, and landform. The overall visual quality at MDSR would be reduced from high to moderately high (shifting from 5.00 to 3.83 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 1.17. Adverse impacts would occur on the visual resources of MDSR due to the alternative 2 crossing.

Hamilton River Campsites

Proposed conditions are represented in appendix K, figure 2-4, “Proposed.” Taller towers and vegetation removal would be apparent compared with baseline conditions, although the line of sight across the river would remain somewhat screened by trees. Hamilton River includes eleven relatively primitive campsites, and a central, representative site was selected for this analysis. The expanded ROW on the New Jersey bank (the nearer bank in the figure) would also be clearly visible from the campsite, as vegetation removal would likely extend to the northern edge of the campsite. It is possible that a new tower on the New Jersey bank would be visible from the campsite. A new or improved existing (i.e., cleared and graveled) maintenance access road is also proposed near the campsite. For visibility to migratory birds, deflector devices in accordance with APLIC standards and considered best available technology would be installed on the conductors where they cross the river and ascending the Hogback Ridge. While the distance from which the diverters would be discernable would depend on the type installed, when seen their presence would increase visual clutter and the ability of the conductors to be noticed.

Overall, visual unity would be reduced from moderately high / high to average / moderately high, as the proposed actions would conflict with the sense of visual remoteness, free from other visual cues of development. The noticeably cleared ROW across the river would also contribute to disrupted visual harmony. Intactness would be reduced from moderately high / high to moderately high due to the widened ROW vegetation removal and the new encroachment of the tower the conductors. Encroachment would be emphasized to the extent bird diverter devices were visible, particularly during winter ‘leaf-off’ conditions when opportunity to view the alignment would be greatest. Vividness would be reduced from average / moderately high to moderately low / average due to the intrusion of human-made infrastructural elements into the otherwise undeveloped setting, thus limiting the ability of the view to be remembered as highly natural. The overall visual quality at Hamilton River campsites would be reduced from high to moderately high (shifting from 5.13 to 4.46 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 0.67. Adverse impacts would occur on the visual resources of Hamilton River campsites due to the alternative 2 alignment.

Pioneer Trail

Proposed conditions are shown in appendix K, figure 2-5, “Proposed.” Taller poles, larger conductors, and substantial vegetation removal would occur where the trail passes under the alignment. The new, larger towers would have a longer span capacity, resulting in potentially fewer total towers, depending upon terrain, thus contributing to visual unity. As seen in the figure, the nearest tower would be on the distant horizon, rather than in the immediate foreground as in the baseline condition. However, overall unity would still be somewhat reduced compared with baseline conditions, mainly due to the expanded ROW vegetation clearing disrupting the naturally occurring landscape (thus decreased from low / moderately low to low). Intactness would also be reduced from average / moderately low to average, as the proposed alignment would increase the apparent level of development and increase visual encroachments resulting from the tower fully silhouetted at the top of the ridgeline and the conductors obstructing the sky view. Vividness at Pioneer Trail would be reduced numerically, but would remain low to moderately low, primarily due to the substantial vegetation loss in the proposed ROW creating a manmade intrusion in the context of the scenic wooded landscape trail. No visual benefit would be provided by the cleared vegetation in terms of new views, as visibility would be limited to the near middleground by topography, and the surrounding landscape forms are not highly memorable. The overall visual quality at Pioneer Trail would be reduced from average to moderately low (shifting from 3.04 to 2.50 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 0.54. Adverse impacts would occur on the visual resources of Pioneer Trail due to the alternative 2 alignment.

Hamilton Ridge Trail

Proposed conditions are shown in appendix K, figure 2-6, “Proposed.” This KOP is located near Pioneer Trail, as described in the “Visual Resources” section of chapter 3. Impacts on the visual environment would be similar to those at Pioneer Trail; the widening of the cleared ROW being the most apparent change compared with existing conditions. However, the proposed tower design would produce a slight improvement in visual unity. The towers would be visually simpler compared with the steel lattice structures, and in the context of this view, would appear more visually concurrent surrounded by the vegetation due to the color, line, and form of the tower and the woody foreground vegetation. In addition, the position of the viewer- somewhat superior relative to the landscape as it falls away along the corridor- contributes to the proposed tower appearing less visually dominant compared with baseline conditions. Therefore, visual unity would be enhanced from low / moderately low to moderately low. Intactness would be reduced, from average to moderately low, due to the widened cleared ROW resulting in a visual manmade intrusion in the context of the scenic wooded trail. Vividness would not be substantially affected, as the clearing would create an opportunity to view the surrounding landscape. However, the vegetation removal would reduce the vegetation component of the vividness of the scene, and vividness would remain low to moderately low. The overall visual quality at Hamilton Ridge Trail would be reduced from moderately low / low to moderately low (shifting from 3.00 to 2.79 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 0.21. Adverse impacts would occur on the visual resources of Hamilton Ridge Trail due to the alternative 2 alignment.

Old Mine Road

Proposed conditions are shown in appendix K, figure 2-7, “Proposed.” Primary impacts would result from the visual fragmentation of the vegetation caused by widening the cleared ROW. Unity would be only slightly altered compared with baseline conditions, enhanced from low / moderately low to moderately low as the proposed monopole towers would be somewhat less visually obtrusive. Intactness would be reduced from average to moderately low to average due to the visual subtraction of forest cover and the encroachment of the conductors. Vividness would be reduced numerically, primarily due to the vegetation removal along the proposed ROW interrupting the otherwise forested scenic drive. Vividness would remain low to moderately low. The overall visual quality at alternative 2 crossing Old Mine Road would remain average (shifting slightly from 3.04 to 2.96 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 0.08. Adverse impacts would occur on the visual resources of Old Mine Road due to the alternative 2 alignment.

Watergate Recreation Site

Proposed conditions are shown in appendix K, figure 2-8, “Proposed.” As the figure indicates, the alignment abuts the edge of the picnic area at Watergate Recreation Site, so the proposed ROW expansion would likely encroach onto the existing open lawn area, which would expose much of lawn to wide views of the alternative 2 alignment. The taller towers would noticeably extend above the tree tops, disrupting the scale of the surrounding visual elements and adding visual clutter. Unity would be reduced from moderately high to moderately low due to the obvious presence of a major transmission line being out of visual harmony with the pastoral recreation area. Intactness would be reduced from average / moderately high to moderately low / average due to the encroachment of the proposed ROW corridor and the increased visibility of taller towers and more conductors. Vividness would be somewhat reduced from average / moderately high to moderately low / average due to the encroaching transmission structures limiting the ability of the area to be remembered as scenic and natural. The overall visual quality at alternative 2 crossing Watergate Recreation Site would be reduced from moderately high / high to average (shifting from 4.67 to 3.38 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 1.29. Adverse impacts would occur on the visual resources of Watergate Recreation Site due to the alternative 2 alignment.

Mitigation at Watergate Recreation Site could help reduce the level of impact expected. A conceptual representation of this mitigation is shown in appendix K, figure 2-8, “Mitigation.” Conceptual landscaping as represented in the figure shows how vegetation planted outside but along the utility ROW would likely look in approximately 15 years, consistent with the timeframe of this EIS. Beyond that, it is assumed that the vegetation would eventually grow to screen the elements of the alternative from many views in the Watergate Recreation Site picnic area, particularly views from the open picnic lawn thus reducing the overall visual quality impacts of the transmission line at this KOP. However, even after mitigating landscaping (i.e., trees) reaches mature size, it would not necessarily screen all visibility of the proposed towers from all points in Watergate Recreation Site, especially given seasonal changes in canopy cover and the varying topography of the area. Specifically, it is possible that the proposed towers would remain visible from the upper parking lot of the recreation area.

Van Campens Glen Trail

Proposed conditions are shown in appendix K, figure 2-9, “Proposed.” Impacts would be similar to those of Pioneer and Hamilton Ridge Trail KOPs. Taller towers would be visible from the trail and would extend higher than the tree tops. The widened clearing of the ROW would interrupt the surrounding forested landscape, creating a visual intrusion. Visual unity would be reduced at this view from low / moderately low to low as the proximity to the nearest tower emphasizes its scale, which does not harmonize with the visual order of the view. The expanded ROW would more strongly dominate the scene, also reducing visual harmony. However, if the towers were placed and thus seen from a greater distance, it is possible they could provide a slight increase in visual harmony compared with baseline conditions (i.e., steel lattice structures). Intactness would be reduced from average to moderately low due to the visual subtraction of the expanded ROW and from the towers silhouetted against the sky. Vividness would be slightly reduced compared with baseline conditions; from low / moderately low to low, as the widened ROW clearing would create a visual intrusion in the context of a scenic wooded trail. The overall visual quality at alternative 2 crossing Van Campens Glen Trail would be reduced from average to moderately low (shifting from 3.08 to 2.33 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 0.75. Adverse impacts would occur on the visual resources of Van Campens Glen Trail due to the alternative 2 alignment.

Millbrook Village, Vicinity

Proposed conditions are shown in appendix K, figure 2-10, “Proposed.” No visual impacts are expected under alternative 2 from in the village due to localized tree cover and structures limiting views predominantly to the foreground. However, the existing transmission alignment would be visible approaching the village from Old Mine Road, traveling south. Compared with baseline conditions, alternative 2 would be more noticeable as it passes at an angle across the background slope. Depending on atmospheric and light conditions, the conductors may be highly visible or blend into the vegetation, except where they are visible above the landform and thus become silhouetted. A contrasting shadow line along the proposed ROW would be visible during sunny days, particularly in the afternoon, causing the alignment to be more noticeable. Unity at this view would be slightly reduced from moderately high / average to moderately high due to the alignment conflicting with the texture, pattern, and line of the scene. Intactness would be reduced somewhat from average / moderately high to moderately low / average, as the conductors would add visual clutter and would be visible across the entire background of the view. Vividness would be reduced numerically, but would remain moderately low to average due to the presence of modern human-made infrastructure visible in proximity to an area intended to exhibit historic and cultural landscape values. The overall visual quality near Millbrook Village would remain moderately high (shifting from 4.42 to 3.92 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 0.50. Adverse impacts would occur on the visual resources near Millbrook Village due to the alternative 2 alignment.

APPA at Alternative 2 Crossing

Proposed conditions are shown in appendix K, figure 2-11, “Proposed.” Visual changes would include new steel towers, more and larger conductors, and an expanded ROW clearing, which would be visible when hiking toward the corridor and from the trail looking into the distance to the east. Bird diverter devices meeting APLIC standards would be required at this location, placed along the proposed alignment approximately 500-feet to either side of the APPA centerline.

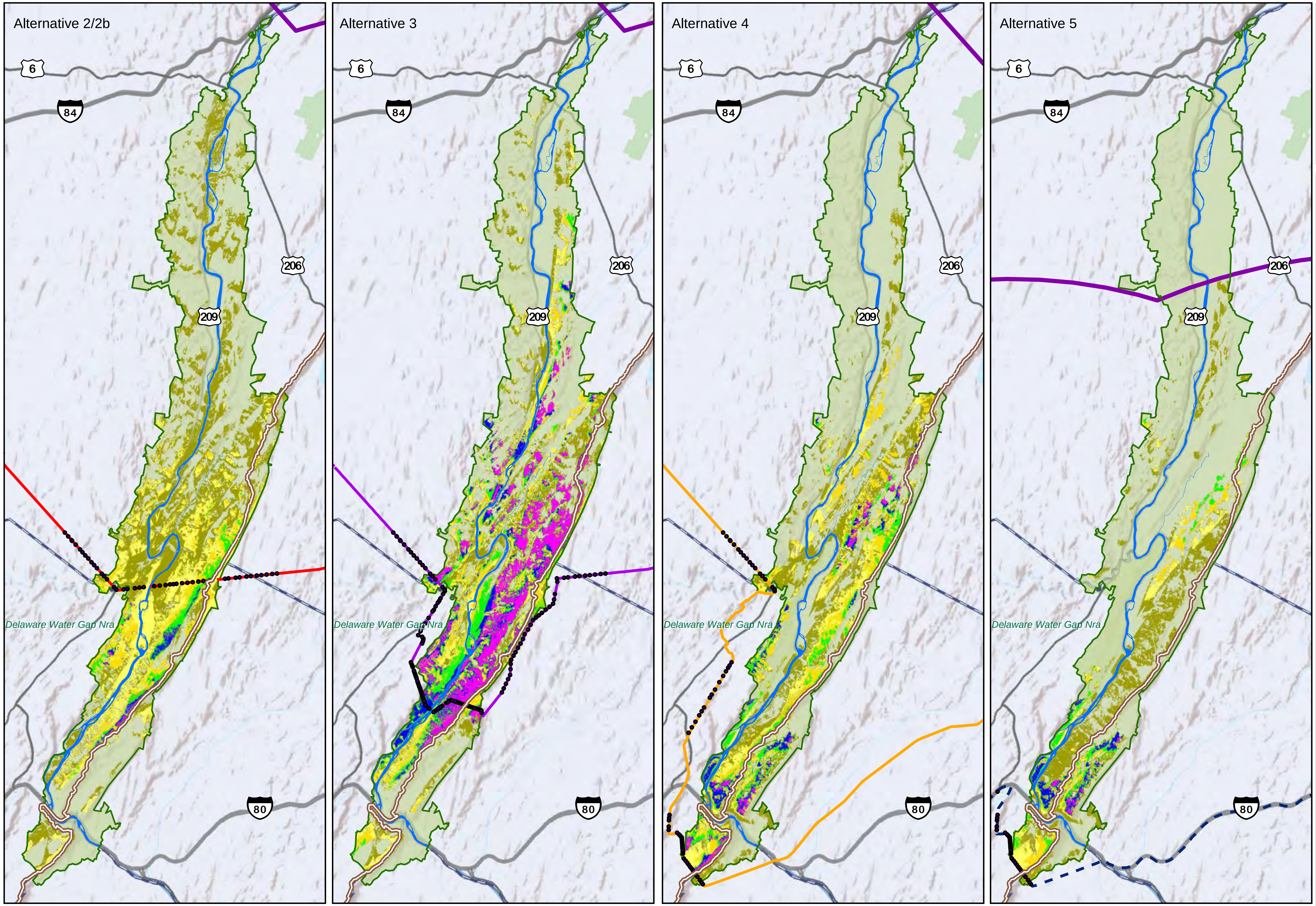
From this specific KOP viewpoint, the form and color of the monopole tower harmonize slightly better in the context of the surrounding landscape compared with the existing steel lattice structure, marginally improving visual unity. However, this improvement would be offset by the disharmony created by the widened cleared ROW swath receding into the distance, emphasized by the angle of view looking parallel to the alignment. Overall unity would, therefore, be only slightly enhanced from low to low / moderately low. Intactness would receive some benefit from the proposed tower design reducing visual clutter in the foreground and opening the opportunity to view out. However, the tower and larger conductor would remain encroachments, particularly because this location would require installation of bird diverters on the conductors. Also, the visual subtraction created by the widened ROW clearing in the middleground would negate some of the benefit. For these reasons, intactness would not be altered at this view. Vividness would be slightly benefited as the reduction in visual clutter would create an opportunity to view farther into the scenic landscape, and would be enhanced from low / moderately low /moderately low. Overall visual quality where alternative 2 crosses APPA would remain average. The visual quality score from this viewpoint would be marginally enhanced compared with existing conditions, shifting slightly from 2.71 to 2.92 on the FHWA scale of 1 to 7. This represents a slight increase in overall visual quality of 0.21 at this particular viewpoint, so visual quality could improve depending upon on the viewer's position. However, overall, the expanded ROW clearing, taller towers, and larger more numerous conductors (including diverter devices) would very likely degrade visual quality of views approaching and from other points within the ROW relative to APPA. For these reasons, adverse impacts would occur on the overall visual resources of APPA at the alternative 2 crossing. It is also possible that the widened ROW could be seen where it traverses outside the study area from APPA.

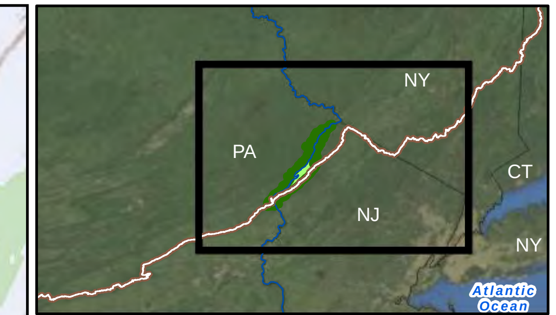
Zone of Visual Influence (ZVI) Bare-Earth Terrain Modeling

As described in the "Methodologies" section, table 82 provides areas (in acres) from which the existing lattice towers and proposed transmission towers could potentially be seen under bare earth conditions, for alternatives 2 and 2b, for lands within DEWA and along the APPA alignment (defined at 1000 feet wide). Similar tables indicating the 'zone of visual influence' are provided for each alternative. Figures representing this bare-earth analysis are provided for existing and proposed alignment conditions for all the alternatives in appendix K and in the Visual Resources Summary Report. Figures 77 and 78 present a comparison of the potential existing pole visibility across the alternatives and potential proposed pole visibility, respectively. See figures 79 and 80, respectively, for potential existing pole visibility and potential proposed pole visibility specific to alternatives 2 and 2b.

TABLE 82: ALTERNATIVE 2/2B VISIBILITY USING ZVI BARE-EARTH TERRAIN MODELING (ESTIMATED IN ACRES)

Pole / Tower height	Number of poles/towers within DEWA:	Potential Visibility from within DEWA	Potential Visibility from MDSR	Potential Visibility from APPA
Existing 85' lattice towers along alignment alternative 2 would follow	23	31,606	902	3,171
Proposed 200 foot monopole (towers as sampled)	26 (alt. 2) 28 (alt. 2b)	23,066	321	5,200





Legend

Number of Existing Poles Potentially Visible

- 1 to 6
- 7 to 12
- 13 to 18
- 19 to 24
- 25 to 30
- 31+
- Existing Pole
- Alternative 2/2b
- Alternative 3
- Alternative 4
- Alternative 5

Note: Solid line indicates portion inside the study area

- Study Area
- APPA
- Delaware Water Gap NRA Boundary
- Delaware River
- County Line
- Interstate
- U.S. Highway

Notes: Existing tower locations are located along existing transmission lines. Large towers were given an 85 foot elevation (tower height) and small and medium towrs were given a 65 foot elevation. The vewshed analysis for the study area was clipped to the extent of the Delaware Water Gap NRA.

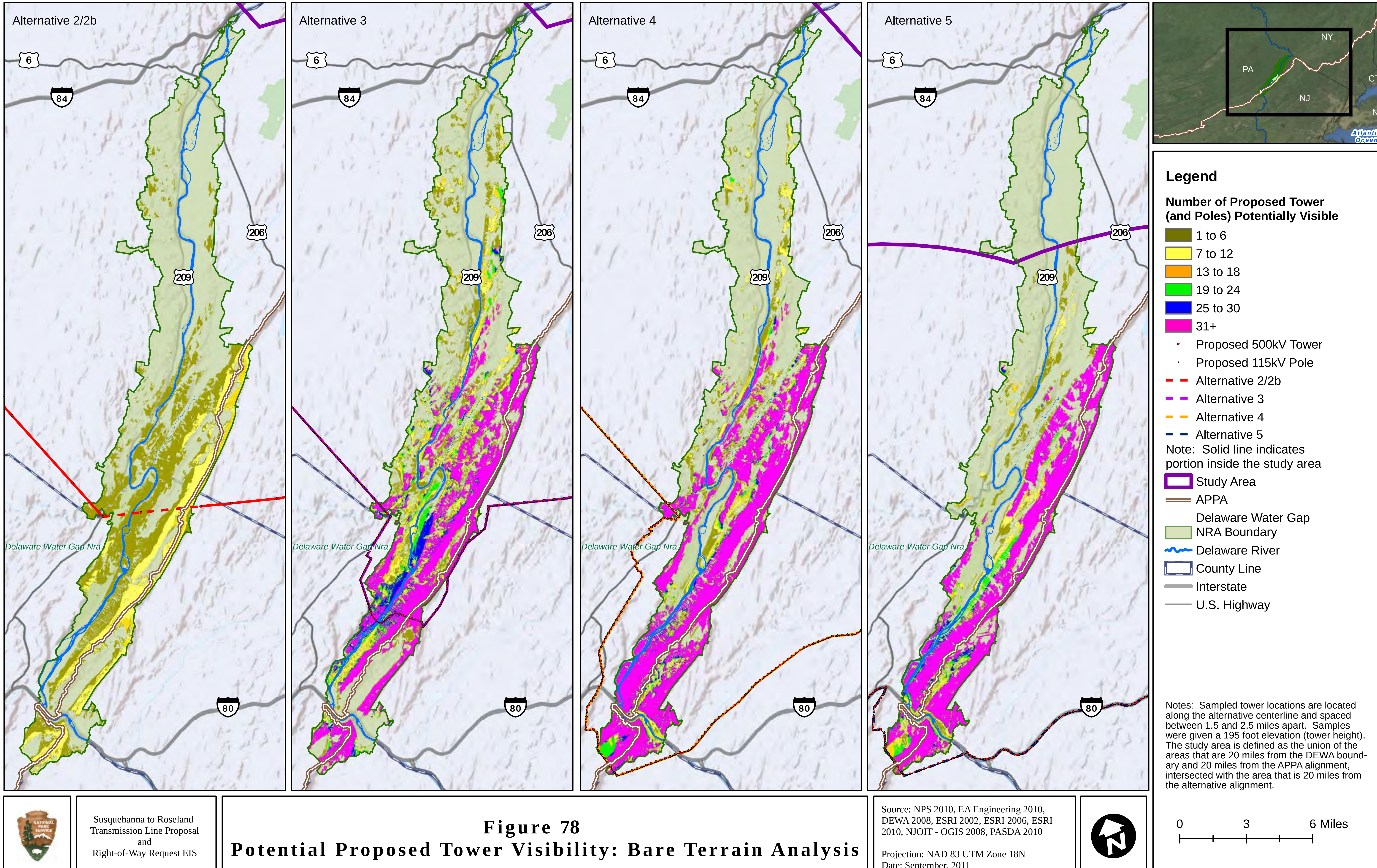
0 3 6 Miles

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

Figure 77
Potential Existing Pole Visibility: Bare Terrain Analysis

Source: NPS 2010, EA Engineering 2010, DEWA 2008, ESRI 2002, ESRI 2006, ESRI 2010, NJOIT - OGIS 2008, PASDA 2010

Projection: NAD 83 UTM Zone 18N
Date: September, 2011

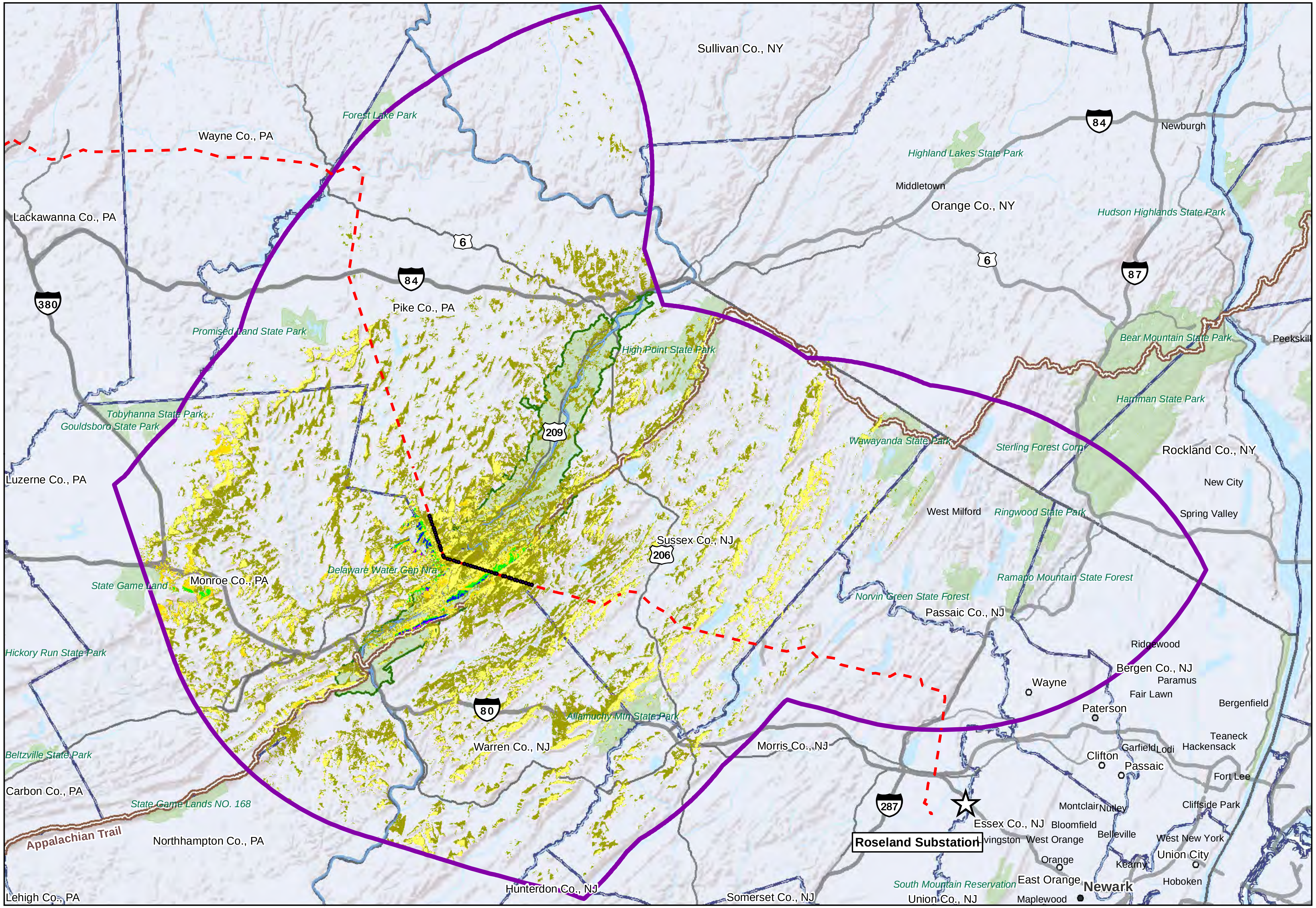


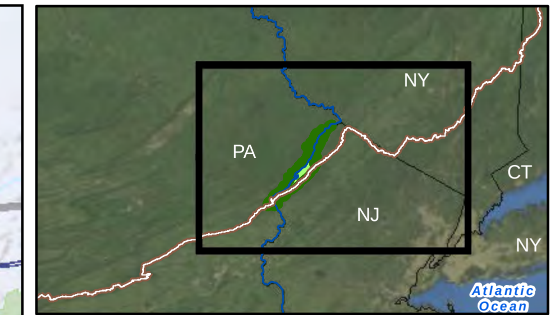
Susquehanna to Roseland Transmission Line Proposal and Right-of-Way Request EIS

Figure 78
Potential Proposed Tower Visibility: Bare Terrain Analysis

Source: NPS 2010, EA Engineering 2010, DEWA 2008, ESRI 2002, ESRI 2006, ESRI 2010, NJOIT - OGIS 2008, PASDA 2010

Projection: NAD 83 UTM Zone 18N
Date: September, 2011





Legend

Number of Existing Poles Potentially Visible

- 1 to 6
- 7 to 12
- 13 to 18
- 19 to 24
- 25 to 30
- 31+
- Alternative 2/2b
  Note: Solid line indicates portion inside the study area
- Existing Pole
- Study Area
- Delaware Water Gap NRA Boundary
- APPA
- Delaware River
- County Line
- Interstate
- U.S. Highway

Notes: Existing tower locations are located along existing transmission lines. Large towers were given an 85 foot elevation (tower height) and small and medium towers were given a 65 foot elevation. The study area is defined as the union of the areas that are 20 miles from the DEWA boundary and 20 miles from the APPA alignment, intersected with the area that is 20 miles from the alternative alignment.

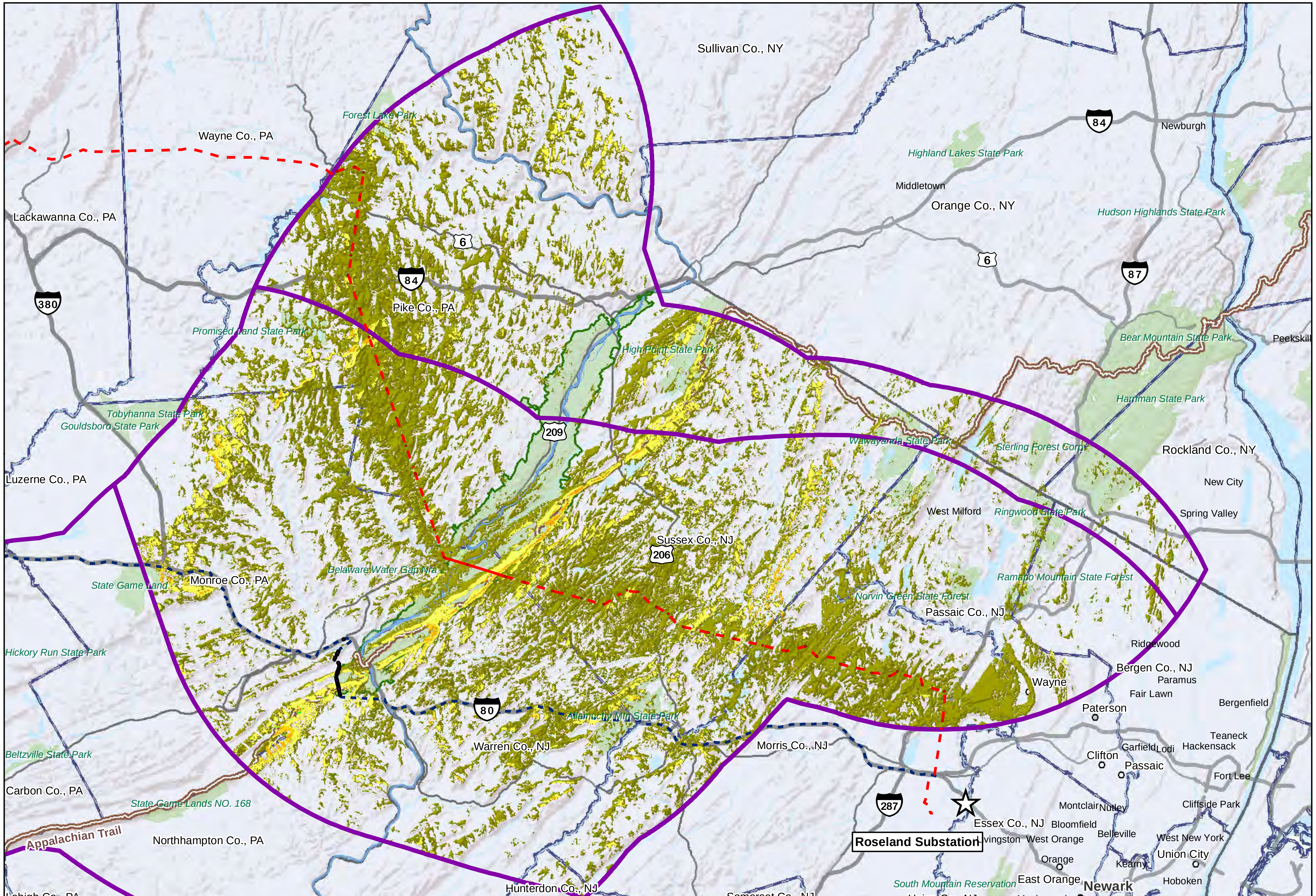
0 5 10 Miles

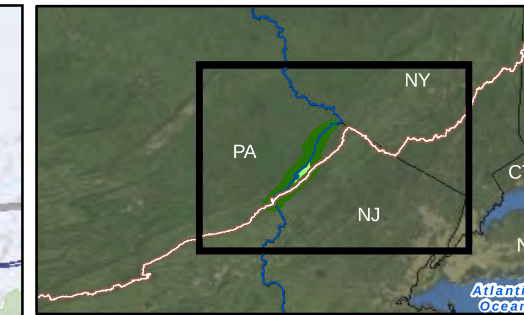
Susquehanna to Roseland Transmission Line Proposal and Right-of-Way Request EIS

Figure 79
Potential Existing Pole Visibility: Bare Terrain Analysis Alternative 2/2b

Source: NPS 2010, EA Engineering 2010, DEWA 2008, ESRI 2002, ESRI 2006, ESRI 2010, NJOIT - OGIS 2008, PASDA 2010

Projection: NAD 83 UTM Zone 18N
Date: September, 2011





Legend

Number of Proposed Towers Potentially Visible

- 1 to 6
- 7 to 12
- 13 to 18
- 19 to 24
- 25 to 30
- 31+
- Alternative 2/2b
  Note: Solid line indicates portion inside the study area
- Proposed 500kV Tower
- Study Area
- Delaware Water Gap NRA Boundary
- APPA
- Delaware River
- County Line
- Interstate
- U.S. Highway

Notes: Sampled tower locations are located along the alternative centerline and spaced between 1.5 and 2.5 miles apart. Samples were given a 195 foot elevation (tower height). The study area is defined as the union of the areas that are 20 miles from the DEWA boundary and 20 miles from the APPA alignment, intersected with the area that is 20 miles from the alternative alignment.

0 5 10 Miles

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

Figure 80
Potential Proposed Tower Visibility: Bare Terrain Analysis Alternative 2/2b

Source: NPS 2010, EA Engineering 2010, DEWA 2008, ESRI 2002, ESRI 2006, ESRI 2010, NJOIT - OGIS 2008, PASDA 2010

Projection: NAD 83 UTM Zone 18N
Date: September, 2011

Overall Alternative 2 Impacts

Activities related to deconstruction and construction near KOP sites would adversely affect visual resources and scenic views, as described in the “Common to All Action Alternatives” section. Under alternative 2, these impacts 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 Campens Glen, Hamilton, and Pioneer trails, Watergate Recreation Site, and Millbrook Village. Adverse impacts would depend on the extent to which deconstruction and construction activities could be seen, as well as the location of temporary spur roads. Adverse impacts would occur, with the most impacts related intense deconstruction and construction activities. Impacts related to operation and maintenance of the transmission line would be the same as for alternative 1: adverse.

Cumulative Impacts

Cumulative impacts inside the study area would result in adverse impacts on visual resources as described previously in the “Cumulative Impacts” section. When the impacts on visual resources as a result of alternative 2 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall cumulative adverse impact would be expected.

The past, present, and reasonably foreseeable projects identified along the length of APPA would produce adverse cumulative impacts on the trail as explained in the “Cumulative Impacts” section. When the impacts on visual resources as a result of alternative 2 are combined with other projects that affect APPA, an overall adverse cumulative impact would be expected.

Conclusion

Inside the study area, alternative 2 would result in adverse impacts on visual quality and scenic views, in particular at the McDade Trail. In general, visual contrast resulting from shadow lines within the ROW corridor swath would be more apparent and visually dominant during spring and summer ‘leaf-on’ conditions; conversely, the taller towers and larger conductors would be more visible during winter ‘leaf-off’ conditions. The straight line formed by the B-K Line alignment provides opportunities to view the corridor at specific locations, such as beneath it while driving Old Mine Road. In such cases, the corridor would be highly visible and would encroach briefly as the viewer approaches or is within the ROW. The adverse impacts would potentially be highest at the Watergate Recreation Site depending on the proximity of the viewer to the transmission line. Impacts related to deconstruction and construction would be localized. Ongoing maintenance activities would be of limited duration and in specific locations, resulting in localized adverse impacts. When combined with the impacts on visual resources under alternative 2, the effects of past, present, and reasonably foreseeable future projects would result in adverse cumulative impacts on visual resources inside the study area, and adverse cumulative impacts specifically on APPA.

Alternative 2b

The alternative 2b alignment would follow the same route as alternative 2, described previously. However, under alternative 2b the proposed alignment would be constructed within the existing ROW limits currently in place within DEWA boundaries, which varies from 100 to 350-feet wide. The KOPs with potential visibility of the proposed actions under alternative 2b are the same as those for alternative 2. In general, alternative 2b would result in similar visual effects as alternative 2 given the coincident alignment and identical infrastructure proposals.

Table 83 summarizes the change in overall visual quality ratings at the affected KOPs for alternative 2b, based on the FHWA scale of 1 to 7.

TABLE 83: ALTERNATIVE 2B: SUMMARY OF CHANGES TO VISUAL QUALITY RATINGS* AT IDENTIFIED KOPS

KOP Name	Visual Quality Score Under Existing Conditions	Visual Quality Score Under Simulated Proposed Conditions	Total reduction in Visual Quality, unless noted otherwise
Fernwood Resort	2.54	2.29	0.25
McDade Trail near Schoonover House and Community Dr.	5.04	3.75	1.29
MDSR at alternative 2b	5.00	3.83	1.17
Hamilton River campsites	5.13	4.75	0.38
Pioneer Trail	3.04	2.50	0.54
Hamilton Ridge Trail	3.00	2.79	0.21
Old Mine Rd., at alternative 2	3.04	2.79	0.25
Watergate Recreation Site	4.67	4.58	0.09
Van Campens Glen Trail	3.08	2.58	0.50
Millbrook Village	4.42	4.17	0.25
APPA at alternative 2 crossing	2.71	2.92	Increase of 0.21 at specific KOP location (impacts are anticipated to APPA as a result of alternative 2b)

*The ratings are based on the FHWA scale from 1-7.

Visual simulations were prepared to depict the changes for KOPs impacted by alternative 2b (appendix K, figures 2b-1 through 2b-11). Because the changes to the transmission corridor would be similar to alternative 2, it was not necessary to include detailed analysis for each KOP. However, numeric scoring of the proposed conditions based on the simulations was required to determine the intensity of impact. The results of that scoring are shown in the visual analysis matrix for alternative 2b included in appendix K. For those segments of the alignment where the existing ROW width is 100-feet or 150-feet, slightly less visual disruption and fragmentation would occur under alternative 2b compared with the expanded clearing proposed under alternative 2, especially when the ROW is viewed along its length. This difference is most notable relative to the overall intactness of a view and the vegetation component of the vividness of a view.

Overall Alternative 2b Impacts

Impacts from the height of the proposed towers, particularly when silhouetted against the sky, along with the larger and more apparent conductors, would be similar to alternative 2. This would result in adverse impacts at several KOPs under alternative 2b, with the most intense impacts at McDade Trail near the Schoonover House and Community Drive, and MDSR. Overall, alternative 2b would have adverse impacts on visual resources.

Cumulative Impacts

Cumulative impacts inside the study area would result in adverse impacts on visual resources as described previously in the “Cumulative Impacts” section. When the impacts on visual resources as a result of alternative 2b are combined with other past, present, and reasonably foreseeable projects in the study area, an overall cumulative adverse impact would be expected.

The past, present, and reasonably foreseeable projects identified along the length of APPA would produce adverse cumulative impacts on the trail as explained in the “Cumulative Impacts” section. When the impacts on visual resources as a result of alternative 2b are combined with other projects that affect APPA, an overall adverse cumulative impact would be expected.

Conclusion

Inside the study area, alternative 2b would result in adverse impacts. Despite some marginally improved views from very specific view locations as a result of the removal of the lattice tower, shown at the KOP, impacts on APPA from alternative 2b would remain adverse. When combined with the impacts on visual resources under alternative 2b, the effects of past, present, and reasonably foreseeable future projects would result in adverse cumulative impacts on visual resources inside the study area, and adverse cumulative impacts specifically on APPA.

Common to Alternatives 3, 4, and 5

Removal of the B-K Line: Under alternatives 3, 4, and 5, the B-K Line would be decommissioned and removed, allowing that corridor to be revegetated according to its natural condition, as described in chapter 2. Benefits of this action to the visual resources of DEWA and APPA would include improved visual cohesiveness and unity resulting from the unobstructed natural forest cover within. The absence of the B-K Line has the potential to improve overall vividness for views in DEWA, as the landscape would provide unencumbered views of natural forest and a greater aesthetic of remoteness consistent with a nationally protected scenic resource.

KOPs that would be directly benefited with regard to visual quality due to decommissioning, removal and revegetation of the existing alignment include the following:

- APPA at the crossing of the existing alignment (however, the benefits of the existing distant view opportunity created by the cleared vegetation there would be lost)
- McDade Trail near Schoonover House along Community Drive
- MDSR at the crossing of the existing corridor
- Hamilton River campsites
- Pioneer and Hamilton Ridge trails
- Old Mine Road
- Watergate Recreation Site
- Van Campens Glen Trail
- Millbrook Village

Impacts resulting from the decommissioning, removal and revegetation would be consistent with those discussed earlier for construction activities. The presence of dismantling equipment and periodic traffic congestion related to the activity would cause adverse impacts on the visual resources of DEWA and APPA, especially at the listed KOPs. Decommissioning and revegetating the existing B-K Line would improve the larger visual environment to these KOPs in DEWA and along APPA.

The following alternatives propose to follow various existing rights of way in the study area and vicinity, as described in chapter 2. Where an alternative would follow an existing transmission line for a portion of its route, the proposed 500-kV conductors and towers would be collocated within ROW with the existing line The visual impact would be exacerbated by the inconsistent appearance and scale of the different lines: the proposed alignment consisting of tall monopole towers while the existing alignments include various styles of shorter wooden poles. For the purposes of this analysis, the visual simulations of the proposed conditions show repositioned existing distribution transmission lines based on the best available information in accordance with applicable safety and clearance standards. The final design and placement of these lines is not known at this time.

Alternative 3

The existing alignment the alternative 3 corridor would follow includes several angle points, where the route would change direction, resulting in the proposed corridor being visible from many different locations in DEWA and along APPA. Unlike alternative 2, the existing distribution line wooden poles along the route the alternative 3 alignment follows would be reconstructed within the proposed ROW, alongside the new line. Visual simulations show this proposed condition.

During the course of this analysis, including fieldwork and visual simulation production, certain preliminary KOPs were found to provide no visibility of the proposed actions, because the viewing distance was so great the impact would not be discernible, or vegetation or landform features blocked potential views. These KOPs were subsequently eliminated from further study. For alternative 3, these KOPs include the following:

- Camp Mohican Lodge facility
- Sunfish Pond

Visual simulations were prepared to depict the changes for KOPs impacted by alternative 3 and are included in appendix K (figures 3-1 through 3-18). Affected KOPs with potential visibility of the proposed actions under alternative 3 include the following:

- Hidden Lake Dam
- Smithfield Beach
- River Road (near the existing transmission alignment)
- McDade Trail at the crossing of the existing alignment
- Old Mine Road at the crossing of the existing alignment
- Walter’s Tract river campsites
- Hialeah Picnic Area (as seen from the exit road)
- MDSR at the crossing of the existing alignment
- Shawnee Resort Beach
- Turtle Beach

- APPA from the future relocation section
- APPA at the crossing of the existing alignment
- APPA at Raccoon Ridge
- APPA at the view overlooking Lower Yards Creek Reservoir
- Two views along APPA at the ridge near Rattlesnake Swamp
- Catfish fire tower

Hidden Lake Dam

Proposed conditions are shown in appendix K, figure 3-1, “Proposed.” Visual changes would be limited to a few towers being visible, but not apparent, in the distance. The changes would not be substantially visible enough to alter visual unity or vividness, which would remain high for unity and average to moderately high for vividness. However, the marginal encroachment of the towers extending above the canopy line would slightly reduce intactness from high to very high / moderately high to high. This impact would be limited to favorable weather conditions not hindered by low clouds or haze. The overall visual quality at Hidden Lake Dam would remain high (shifting slightly from 5.58 to 5.42 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 0.16. Adverse impacts would occur on the visual resources of Hidden Lake Dam due to the alternative 3 alignment.

Smithfield Beach

Proposed conditions are shown in appendix K, figure 3-2, “Proposed.” The proposed 500-kV ROW and towers would be much more noticeable and visually intrusive compared with baseline conditions. While only the tower at the top of the ridge would be seen silhouetted against the sky, the other towers and conductors would still be distinguished above the vegetation. The widened ROW would create a shadow line that contrasts with the color and texture of the forested slope. This effect would be even stronger under sunny conditions. The replacement 115-kV transmission poles and wires could also be seen, though the poles would not be visible above the canopy. At this view, unity would be reduced substantially, from moderately high / high to moderately low / average, as the proposed changes would conflict considerably with the form, emphasis, pattern, and texture of the landscape, drawing focus away from the river and onto the distracting ROW corridor. Intactness would also be reduced, from moderately high / high to average / moderately high, due to the vegetation removal along the ROW creating a visual intrusion across much of the forest backdrop. Vividness would be reduced from moderately high / high to average / moderately high, due to the intrusion of human-made transmission features limiting the ability of the view to be remembered as natural and scenic. The overall visual quality at Smithfield Beach would be reduced from high to moderately high (shifting from 5.38 to 4.00 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 1.38. Adverse impacts would occur on the visual resources of Smithfield Beach due to the alternative 3 alignment.

Table 84 summarizes the change in overall visual quality ratings at the affected KOPs for alternative 3, based on the FHWA scale of 1 to 7.

TABLE 84: ALTERNATIVE 3: SUMMARY OF CHANGES TO VISUAL QUALITY RATINGS* AT IDENTIFIED KOPS

KOP Name	Visual Quality Score Under Existing Conditions	Visual Quality Score Under Simulated Proposed Conditions	Total change in Visual Quality
Hidden Lake Dam	5.58	5.42	0.16
Smithfield Beach	5.38	4.00	1.38
River Rd at alternative 3	4.54	3.96	0.58
McDade Trail at alternative 3- A (spiral wire)	4.92	3.46	1.46
McDade Trail at alternative 3- B (marker balls)	4.92	3.38	1.54
Old Mine Rd., at alternative 3	4.08	2.92	1.16
Walter's Tract River campsites	5.50	3.38	2.12
Hialeah Picnic Area	4.67	3.92	0.75
Hialeah Air Park	4.25	3.38	0.87
MDSR at alternative 3	5.50	3.29	2.21
Shawnee Resort Beach	4.54	4.46	0.08
Turtle Beach	4.88	4.79	0.09
APPA: Future relocation section	6.58	5.96	0.62
APPA: alternative 3 crossing- A (spiral wire)	4.17	2.83	1.34
APPA: alternative 3 crossing- B (marker balls)	4.17	2.67	1.42
APPA: Raccoon Ridge	5.96	4.83	1.13
APPA: View overlooking Yards Creek Reservoir	5.54	4.00	1.54
APPA: Vista from Rattlesnake Swamp Ridge no. 1	5.25	3.75	1.50
APPA: Vista from Rattlesnake Swamp Ridge no. 2	5.50	3.58	1.92
Catfish fire tower	5.25	4.75	0.50

* Visual quality ratings based on FHWA scale from 1-7.

River Road

Proposed conditions are shown in appendix K, figure 3-3, "Proposed." The widened ROW would be more noticeable compared with baseline conditions, and several proposed towers would be seen. The parallel angle of view toward the alignment would emphasize this impact. However, the middleground riparian vegetation and distance to the change would reduce the impacts somewhat. The replacement 115-kV transmission poles and wires could also be seen on the slope of Kittatinny Ridge, though the poles would not be visible above the canopy. Unity would be slightly reduced from moderately high / average to moderately high, as the larger ROW would disrupt the color, form, and texture of the forested slope, and distract from the rural scene. Intactness would be reduced from moderately high to average due to the increased visibility of the transmission elements, which would add visual clutter, and the visually subtractive result of the vegetation removal. Vividness would remain moderately low to average, as the change would interrupt the pastoral aesthetic of the view. The overall visual quality at River Road near the alternative 3 alignment would remain moderately high (shifting slightly from 4.54 to 3.96 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 0.58. Adverse impacts would occur on the visual resources of River Road near the alternative 3 alignment.

McDade Trail, at Alternative 3

Proposed conditions are shown in appendix K, figure 3-4, “Proposed.” This view is from directly beneath the alignment. The widened ROW would appear expansive on the near and far banks of MDSR. Bird diverter devices meeting APLIC standards would be required on the conductors at this location crossing the river. Figures 3-4a and 3-4b in appendix K depict possible diverter types that could be installed, and the corresponding visual impacts of each. Based on these, the diverters would increase visibility of the conductors when seen in the foreground and would increase visual clutter, because the conductors and diverters would be seen silhouetted against the sky. Between the two diverter types, the marker balls would be much more apparently visible than the spiral wires, result in comparatively more visual clutter, and would be seen from farther away. For these reasons, marker ball diverters would result in greater visual impacts compared with spiral wires.

The angle point towers would be more noticeable across the river, and the angle point itself would create visual distraction and relief from viewing the alignment swath straight up the ridge face. Unity would be substantially impacted, changing from moderately high to moderately low due to the proposed corridor interrupting the visual order of the scene, including the scale, balance, texture, and emphasis. The proposed towers and ROW would appear out of scale with the surrounding landscape elements, rising above the tree tops and dominating the view. Intactness would be reduced from moderately high / high to moderately low / average, as the expanded cleared corridor would create a visually subtractive intrusion in the context of the wooded, scenic trail. This impact would be limited slightly by the angle point across the river, where visibility of the clearing would become screened by the perpendicular angle of view and existing vegetation. The larger towers and more visible conductors would increase encroachment on the view. Migratory bird diverters would also be clearly visible on the conductors over the river, as the figures show. The use of bird diverters is discussed in the “Landscape Connectivity, Wildlife Habitat, and Wildlife” section of this chapter. Vividness would be slightly reduced numerically, but would remain average to moderately high, sustained somewhat by the expanded view to the river, including new visibility of a small island, which would enhance the landform component of vividness. However, the vegetation component of vividness would be reduced due to the larger ROW clearing.

For the purpose of comparison, simulations for two possible bird diverter devices were prepared for this KOP and are considered representative of the additional change to the visual environment different styles could result in. If spiral wires were selected, the overall visual quality for McDade Trail at alternative 3 would change from high to average (shifting slightly from 4.92 to 3.46 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 1.46. Considering the simulation depicting the marker ball style, overall visual quality would be further reduced, to a score of 3.38. Regardless of the style of diverter selected, adverse impacts would occur on the visual resources of McDade Trail at alternative 3.

Old Mine Road at Alternative 3

Proposed conditions are shown in appendix K, figure 3-5, “Proposed.” As the figure demonstrates, there would be substantial changes where alternative 3 passes over Old Mine Road. Vegetation removal for the cleared ROW would create an opening wide enough to provide views to MDSR and open the view to more sky, interrupting the predominantly canopy-enclosed viewscape along the road. The angle point double-tower structure would be plainly visible from the road traveling north, as would the corridor passing up the slope, because the view would parallel that portion of the alignment. APLIC-approved bird diverter devices would be required to be placed on the conductors as the alignment crosses MDSR, these would be visible to viewers passing under on Old Mine Road as well, given that the road is so near the river. The repositioned 115-kV poles would be visible but would be somewhat visually absorbed by background vegetation. In general, views traveling south would be less impacted. Visual unity would be reduced from moderately low / average to low, as the visible towers, conductors and angle point, coupled with the existing appurtenances (i.e., highway-style guard rail, smaller transmission line) combine to create a somewhat jumbled, disharmonious view. Intactness would be reduced, changing from moderately high / high to moderately low / average, due to the removal of vegetation and encroachment of the conductors and proposed towers. Conversely, vividness would be marginally enhanced numerically due to the newly created opportunity to view the river, which is relatively unusual along this portion of Old Mine Road, as the river is commonly screened by riparian vegetation (appendix K, figure 3-5, “Existing”). Vividness would remain moderately low to average. The overall visual quality for Old Mine Road at alternative 3 would change from moderately high to average (shifting from 4.08 to 2.92 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 1.16. Adverse impacts would occur on the visual resources of Old Mine Road at the alternative 3 crossing.

Walter’s Tract River Campsites

Proposed conditions are shown in appendix K, figure 3-6, “Proposed.” Although the alignment would be only barely visible from in the campsite, this view was selected to capture the effects of the changes as viewed from the riverbank access trail. Primary changes would include the introduction of several proposed towers, and two visible angle points resulting in views of overlapping conductors. The repositioned existing distribution line would also be visible in the ROW, though its wood poles would not protrude above the canopy. APLIC-approved bird diverter devices would be required were the alignment crosses MDSR, and depending upon the style of diverter selected, these could be visible from the KOP location. To the extent the diverters were visible, the primary effect would be to increase visual clutter and encroaching elements. Visual unity would be decreased substantially, changing from high to low due to the complex alignment adding disorder to the scene. Intactness would be reduced from high to average, because the multiple angle points would increase the extent of the encroachment and introduce visual clutter to the otherwise unencumbered natural setting. The visible removal of vegetation in the proposed ROW would also reduce intactness. Vividness would be reduced numerically, due to the intrusion of human-made structures into the natural view and the removal of vegetation detracting from the memorability of the river setting. Vividness would remain average to moderately high. The impact on vividness would be restrained somewhat by the landscape extending outside the figure, such as views directly across the river and downstream, which would not be impacted and would thus be more memorable. The overall visual quality for Walter’s Tract river campsites at alternative 3 would be reduced from high to average (shifting from 5.50 to 3.38 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 2.12. Adverse impacts would occur on the visual resources of Walter’s Tract river campsite due to the alternative 3 alignment.

Hialeah Picnic Area, Exit Road

Proposed conditions are shown in appendix K, figure 3-7, “Proposed.” No impact is expected to within the picnic area, as views toward the alternative 3 alignment would be blocked by vegetation. This view is from the existing facility exit road, where the proposed alignment would be briefly visible when exiting the picnic area. Changes to the visual resources would include a noticeably visible proposed tower on top of the ridge in the distance, and visible conductors at each side; these features would be silhouetted against the sky. The widened ROW clearing would also be perceptible. These impacts would be tempered somewhat by the distance from the alignment. The repositioned existing distribution line wood poles would be seen, but from this distance would be absorbed by the vegetation. Unity would be slightly reduced from moderately high to average to moderately high due to the distraction caused by disharmonious elements introduced into an otherwise natural scene. Intactness would also be reduced, changing from moderately high to high to average to moderately high due to the introduced encroachments of the tower and conductors, particularly as they would appear silhouetted against the sky. Vividness would be only marginally affected due to the encroaching human-made structures and slightly visible disruption of vegetation. Vividness would be reduced from moderately low to average to moderately low. The overall visual quality for Hialeah Picnic Area would be reduced from high to moderately high (shifting from 4.67 to 3.92 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 0.75. Adverse impacts would occur on the visual resources of Hialeah Picnic Area as viewed from the exit road due to the alternative 3 alignment.

Hialeah Air Park

Proposed conditions are shown in appendix K, figure 3-8, “Proposed.” Compared to baseline conditions, the proposed ROW expansion would be noticeably visible from Hialeah Air Park as it climbs the far slope. The increased width of the corridor, combined with the view angle, would create a contrasting shadow line in the ROW, which would dominate the view and disrupt the color, line, balance, and texture of the view. A few towers, and to a lesser degree, the conductors, would be discernible. The wood poles of the repositioned distribution line would be visible in the ROW, though they would easily be absorbed into the vegetation. Unity would be reduced, changing from average to moderately low due to the encroaching ROW and transmission features conflicting with the existing visual elements. Intactness would be reduced, from moderately high/high to average, due to the scale of the proposed corridor increasing the amount of perceived development and encroaching upon the primarily pastoral recreational setting. Vividness would be reduced numerically somewhat, but would remain moderately low to average due to the introduction of human-made structures and the visual fragmentation of the otherwise contiguous forested slope, which limits the ability of the scene to be remembered as unencumbered and pastoral. The overall visual quality for Hialeah Air Park would be reduced from moderately high to average (shifting from 4.25 to 3.38 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 0.87. Adverse impacts would occur on the visual resources of Hialeah Air Park due to the alternative 3 alignment.

MDSR, at Alternative 3

Proposed conditions are shown in appendix K, figure 3-9, “Proposed.” In the context of the surrounding landscape, this view would be considerably more expansive than could be captured in a single frame. Therefore, the visual quality scores were determined onsite during field reconnaissance and account for views beyond the frame of the figure.

The proposed angle point towers’ scale, coupled with the surrounding cleared vegetation, would result in the towers and conductors becoming dominant in the view. Bird diverter devices meeting APLIC standards would be required along this segment as the alignment crosses the river. The devices would very likely be visible to water recreationalists passing beneath the line. To the extent the devices were visible and from what distance they could be seen, the diverters would increase encroachments into the scene and would cause reduced visual intactness.

Similar to other KOPs, the reconstructed existing distribution line would be visible but not dominant. However, at MDSR, the alignment angle point would emphasize the visual clutter of the collocated transmission lines resulting in many encroachments. Visual unity would be substantially reduced, changing from moderately high / high to moderately low / average, due to the shift in the emphasis and balance of the scene. The introduced transmission elements would create disharmony and conflict with the existing natural features of water, landform, and vegetation. Intactness would be substantially reduced as well, changing from moderately high / high to low / moderately low, due to the encroachments from vegetation removal along the proposed ROW, the angle point of the alignment creating a cluttered appearance, and the multiple conductors being clearly visible across the viewshed. Bird diverters would increase these impacts. Vividness would be reduced, changing from moderately high / high to average / moderately high, due to the increased scale of the human-made objects in the context of the scenic natural landscape. The overall visual quality for MDSR would be reduced from high to average (shifting from 5.50 to 3.29 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 2.21. Adverse impacts would occur on the visual resources of MDSR at the crossing of alternative 3.

Shawnee Resort Beach

Proposed conditions are shown in appendix K, figure 3-10, "Proposed." Similar to Fernwood Resort discussed under alternative 2, Shawnee Resort Beach is located outside DEWA boundaries. However, visible changes that could affect the immediate shoreline and the river are relevant to MDSR in addition to Shawnee Resort Beach. The changes to the view would introduce visibility of a single proposed tower marginally detectable in the far distance, protruding above the tree tops. Opportunity to detect the tower would be highly dependent upon atmospheric conditions. Haze or fog would make the tower indistinguishable, but in clear conditions, it may be slightly more visible than under the simulated conditions. However, visual unity would be unaffected and would remain average. Vividness would also be unaffected and would remain average to moderately high. Intactness would be marginally impacted numerically due to the added encroachment of the tower. The overall visual quality for Shawnee Resort Beach would remain moderately high (the rating would change from 4.54 to 4.46 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 0.08. Adverse impacts would occur on the visual resources of Shawnee Resort Beach due to the alternative 3 alignment, depending on atmospheric conditions.

Turtle Beach

Proposed conditions are shown in appendix K, figure 3-11, "Proposed." The alternative 3 alignment would be slightly closer to the viewer at Turtle Beach compared to Shawnee Resort Beach, but the effects on the visual resources would be similar. A tower at the top of the ridge on the opposite bank (Pennsylvania) would be visible under favorable climatic conditions; fog or haze would make the tower indistinguishable. A slight shadow line would result along the widened ROW corridor. Unity would be unaffected and would remain moderately high. Vividness would also be unaffected and would remain average to moderately high. Impacts on intactness would be similar to those at Shawnee Resort Beach; intactness would be reduced numerically but would remain average to moderately high. The addition of the tower atop the ridge would slightly encroach upon the view, particularly because most of the tower would be silhouetted against the sky. The overall visual quality for Turtle Beach would remain high (shifting from 4.88 to 4.79 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 0.09. Adverse impacts would occur on the visual resources of Turtle Beach due to the alternative 3 alignment, depending on atmospheric conditions.

APPA at Future Relocation Section

Proposed conditions are shown in appendix K, figure 3-12, "Proposed." This KOP is currently located a few hundred feet from APPA, and is in DEWA. However, this analysis evaluates effects on the future APPA relocation site. Changes to the existing view at the relocation site include the introduction of a transmission tower and conductors that were previously absent, but would be seen in the distance on the ridge. Visual unity would be slightly reduced from very high to moderately high to high due to this encroachment disrupting the visual balance of the scene and detracting somewhat from the existing highly harmonious view. Intactness would also be reduced from high to moderately high to high due to the newly encroaching element. Vividness would remain high to very high, as the distance to the encroachment would offset effects on the memorability of the existing scene. The overall visual quality for APPA at the future relocation section would remain very high (shifting somewhat from 6.58 to 5.96 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 0.62. Adverse impacts would occur on the visual resources of APPA at the trail future relocation section due to the alternative 3 alignment.

The following KOPs are located along APPA and within the boundaries of DEWA as well as Worthington State Forest.

APPA at Alternative 3 Crossing

Proposed conditions are shown in appendix K, figure 3-13, “Proposed.” Changes to the view would include new transmission towers, larger conductors, and expansion of the cleared ROW, which would be visible into the middleground as it passes over a forested ridge. Vegetation removal resulting from the expanded ROW clearing would increase the frame of this view, providing a greater opportunity to view the surrounding scenery to the east and west. The increased scale of the steel monopole in the immediate foreground would cause it to become more dominant in the view, compared with baseline conditions. The additional conductors would also distract from and clutter the landscape scene, further emphasized by the inclusion of APLIC-approved bird diverting devices on the conductors, which would be required where the alignment passes over Kittatinny Ridge. Figures 3-13a and 3-13b in appendix K depict possible diverter types that could be installed, spiral wire and marker balls, and the corresponding visual impacts of each. Based on the simulations, the diverters would increase visibility of the conductors when seen in the foreground and would increase visual clutter, because the conductors and diverters would be seen silhouetted against the sky. Between the two diverter types, the marker balls would be more apparently visible than the spiral wires, result in comparatively more visual clutter, and would be seen from farther away.

Visual unity would be reduced from average to low, due to the increased visibility of the transmission structures conflicting with the natural setting and interrupting the color, texture and emphasis of the view. Intactness would be reduced from average to low / moderately low due to the increased visual encroachment of the tower, the larger and more numerous conductors, accumulated visual clutter of the collocated lines, and the visually subtractive quality of the widened ROW. The increase in the scale of the alignment would increase the apparent level of development in the viewshed, also causing a reduction in visual intactness in the context of a protected scenic resource. Vividness would be slightly reduced, due to the vegetation fragmentation and human-made encroachments, but this would be offset somewhat by the increased cleared ROW providing a wider view opportunity of the surrounding landscape, which is scenic and memorable.

As for McDade Trail, two simulations were prepared for this KOP which depict two possible bird diverter styles, spiral wires and marker balls. With spiral wires, the overall visual quality for APPA at alternative 3 would be reduced from moderately high to average (shifting from 4.17 to 2.83 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 1.34. If the marker ball-type bird diverters were selected to be installed on the conductors at this location, the overall visual quality score would be further reduced, to 2.67.

Regardless of the style of bird diverter selected, adverse impacts would occur on the visual resources of APPA at the alternative 3 crossing.

APPA at Raccoon Ridge

Proposed conditions are shown in appendix K, figure 3-14, “Proposed.” Changes to the view would include the introduction of a steel transmission tower behind the existing trees and multiple visible conductors. The widened alignment would also be noticeable in the middleground (across MDSR in Pennsylvania) as it climbs a forested ridge. Visibility of the new transmission line components would decrease visual unity from very high / average to moderately high, compared with baseline conditions, which do not include views of the utility line in the foreground. Added encroachments of the tower and conductors and the ROW visible in the middleground would reduce intactness from very high to average / moderately high. Bird diverter devices would be required on the conductors at this location also, further reducing intactness to the extent they could be seen. Spiral wires were determined to not be visible from this distance. The proposed alignment would affect the memorability of the contiguous vegetation of the scene and its lack of human-made development, reducing vividness numerically, although it would remain moderately high to high. The overall visual quality for the APPA view at Raccoon Ridge would be reduced from very high to moderately high (shifting from 5.96 to 4.83 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 1.13. Adverse impacts would occur on the visual resources of APPA at Raccoon Ridge due to the alternative 3 alignment.

APPA at View Overlooking Lower Yards Creek Reservoir

Proposed conditions are shown in appendix K, figure 3-15, “Proposed.” Changes to the view would include a more noticeable transmission alignment, vegetation removal, larger towers, and numerous visible conductors. The wood poles of the repositioned existing distribution would be seen from the superior viewing angle, but would be easily absorbed by the background vegetation. Visual unity would be reduced from high to average, due to the widened ROW clearing disrupting the texture, pattern, and emphasis of the view and detracting from its existing harmony. The wider proposed corridor, towers and conductors would encroach upon the view, reducing intactness from moderately high / high to moderately low / average. Impacts on the vegetation pattern and increased visible transmission development would affect the memorability of the view, reducing vividness from moderately high to high to average to moderately high. The overall visual quality for the APPA vista overlooking Lower Yards Creek Reservoir would be reduced from high to moderately high (shifting from 5.54 to 4.00 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 1.54. adverse impacts would occur on the visual resources of APPA at the view overlooking Lower Yards Creek Reservoir due to the alternative 3 alignment.

Outside the study area, the following KOPs (which are located in DEWA but outside Worthington State Forest) would be affected by the alternative 3 alignment. Additional adverse impacts en route to the substations would be the same as for alternative 2.

APPA at Vista from Ridge near Rattlesnake Swamp, No. 1

Proposed conditions are shown in appendix K, figure 3-16, “Proposed.” In the vicinity of Rattlesnake Swamp, APPA follows the edge of a rocky ledge for about 2.5 miles, providing continuous scenic views to the east, including opportunities to view the alternative 3 alignment in the valley below. For this reason, two view locations along APPA were selected to evaluate the proposed actions.

Changes in this view would include taller, more noticeable towers and increased visibility of numerous conductors. The repositioned distribution line would also be seen where it passes near the viewer before becoming screened by vegetation. In the foreground, the existing alignment passes over a series of small open fields of rural residential development; therefore, no impacts on vegetation resulting from the proposed ROW expansion would occur. However, the expanded clearing would be noticeable and intrusive in the distance, particularly as the view parallels that portion of the alignment. Visual unity would be substantially reduced from high to moderately low, due to the scale of the proposed alignment conflicting with that of the existing landscape elements and detracting from the harmony of the pastoral scene. The visible angle points of the alignment in the distance would create fragmentation and detract from a cohesive, harmonious visual pattern. Intactness would be reduced from moderately high to high to average to moderately high, due to the encroachment of the noticeable conductors and taller towers, particularly as the alignment would be visible across the viewshed. The higher position of APPA, and thus the viewer relative to the proposed changes, would restrain impacts on intactness to some degree, as the transmission elements would not be seen silhouetted against the sky. The increased scale of the proposed alignment would contribute to a greater perceived level of development, which would affect the ability of the view to be remembered for its consistent rural pattern. Vividness would change from average to moderately high to average. The overall visual quality for the first APPA vista at the ridge near Rattlesnake Swamp would be reduced from high to moderately high (shifting from 5.25 to 3.75 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 1.50. Adverse impacts would occur on the visual resources of APPA at the first vista near Rattlesnake Swamp due to the alternative 3 alignment.

APPA at Vista from Ridge near Rattlesnake Swamp, No. 2

Proposed conditions are shown in appendix K, figure 3-17, “Proposed.” Changes in this view would include noticeable expansion of the cleared ROW visible across the viewshed, taller towers rising above the tree canopy, and numerous conductors. The repositioned existing distribution line would contribute to the overall visual clutter, because the view is superior and looks parallel up the alignment into the distance. Vegetation removal along the proposed ROW would result in a strongly contrasting shadow line, emphasizing the alignment. This effect would be somewhat moderated under overcast weather conditions when lighting would be much more diffused. The dominance of the alignment would conflict with the color, texture, scale, and emphasis of the view, substantially reducing unity from moderately high to high to moderately low. Intactness would also be substantially reduced from high to moderately low / average due to the fragmentation of vegetation and additional visually encroaching transmission elements. Vividness would be reduced from moderately high to average to moderately high due to the increased level of human-made development and the impacts on vegetation cover limiting the ability of the view to be remembered as highly natural. The overall visual quality for the second APPA vista at the ridge near Rattlesnake Swamp would be reduced from high to average (shifting from 5.50 to 3.58 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 1.92. In the short term, the existing towers would also remain visible, further impacting visual quality. Adverse impacts would occur on the visual resources of APPA at the second view near Rattlesnake Swamp due to the alternative 3 alignment.

APPA at Catfish Fire Tower

Proposed conditions are shown in appendix K, figure 3-18, “Proposed.” As discussed in the “Visual Resources” section of chapter 3, views from inside the fire tower at this KOP could not be considered for this analysis because the tower cannot be lawfully entered. However, the trail near the base of the tower offers views to the south. Changes to this view along APPA would include somewhat visible conductors and the tapered top of a single tower. None of the proposed transmission line elements would be highly noticeable from APPA, as they would be below the natural line of sight and would be somewhat screened by branches in leaf-off condition, as simulated. (The changes may be less apparent when the vegetation is leafed out in spring and summer.) Under simulated conditions, visual unity would be marginally affected, and would change from high to moderately high to high. Intactness would be reduced slightly from moderately high to high to moderately high, due to the encroachment of the proposed conductors, given the slightly contrasting effect of their horizontal orientation relative to vegetation. Vividness would be marginally affected by the introduced human-made development and would change from average to moderately low to average. The overall visual quality for APPA at Catfish fire tower would remain high (shifting from 5.25 to 4.75 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 0.50. The existing towers would not be visible from this location. Adverse impacts would occur on the visual resources of APPA at Catfish fire tower due to the alternative 3 alignment.

Zone of Visual Influence Bare-Earth Terrain Modeling: As described in the "Methodologies" in this section, table 85 provides areas (in acres) from which the existing wood poles and proposed transmission towers could potentially be seen under bare earth conditions, specific to alternative 3, for lands within DEWA and along the APPA alignment (defined at 1,000 feet wide). See figures 81 and 82, respectively, for potential existing pole visibility and potential proposed pole visibility specific to alternative 3.

TABLE 85: ALTERNATIVE 3 VISIBILITY USING ZVI BARE-EARTH TERRAIN MODELING (ESTIMATED IN ACRES)

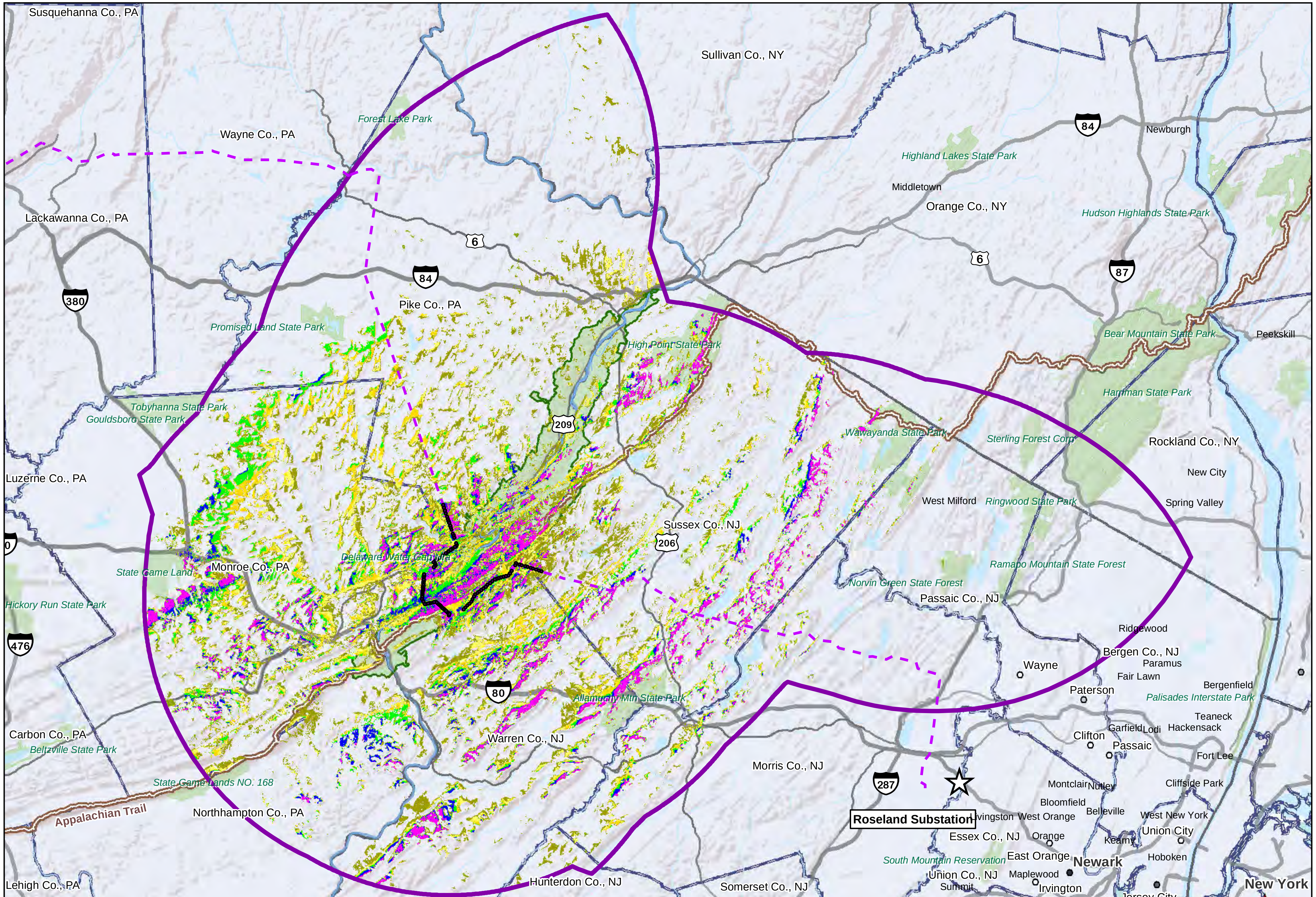
Tower height	Number of poles/towers within DEWA	Potential Visibility from within DEWA	Potential Visibility from MDSR	Potential Visibility from APPA
Proposed 200-feet alternative 3 (towers as sampled)	43	35,417	1,038	6,015
Existing 65 feet to 85 feet Poles along the existing alignment alternative 3 would follow	46	31,645	1,026	3,565

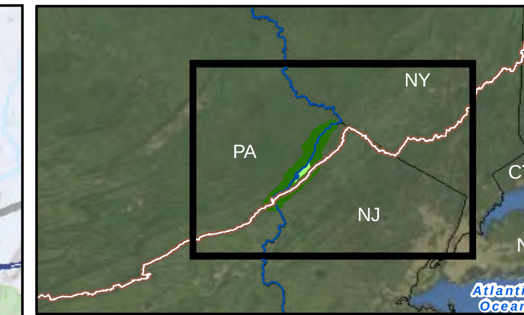
Overall Alternative 3 Impacts

Activities related to deconstruction and construction in proximity to KOP locations would adversely affect visual resources as described in the "Common to All Action Alternatives" section. Impacts would depend on proximity and the extent to which deconstruction and construction activities could be seen, as well as the location of temporary spur roads. Under alternative 3, these impacts would be most apparent where the alignment would cross a resource like the McDade Trail, Old Mine Road, MDSR, and APPA. Views along the McDade Trail, MDSR, and APPA would remain unchanged until reaching the alignment, where the views would be affected during construction. KOPs close to the existing route such as Walter's Tract river campsites would also be impacted for short periods due to construction activities. Adverse impacts would occur on the remaining KOPs considered for alternative 3. Impacts related to operation and maintenance of the transmission line would be the same as alternative 2 and would involve periodic vehicular access for vegetation and equipment maintenance. Such impacts would be localized and of short duration. Overall, alternative 3 would result in adverse impacts on visual resources inside the study area.

Cumulative Impacts

Cumulative impacts inside the study area would result in adverse impacts on visual resources as described previously in the "Cumulative Impacts" section. When the impacts on visual resources as a result of alternative 3 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall cumulative adverse impact would be expected.





Legend

Number of Existing Poles Potentially Visible

- 1 to 6
- 7 to 12
- 13 to 18
- 19 to 24
- 25 to 30
- 31+

- Alternative 3
  Note: Solid line indicates portion inside the study area
- Existing Pole
- Study Area
- Delaware Water Gap NRA Boundary
- APPA
- Delaware River
- County Line
- Interstate
- U.S. Highway

Notes: Existing tower locations are located along existing transmission lines. Large towers were given an 85 foot elevation (tower height) and small and medium towers were given a 65 foot elevation. The study area is defined as the union of the areas that are 20 miles from the DEWA boundary and 20 miles from the APPA alignment, intersected with the area that is 20 miles from the alternative alignment.

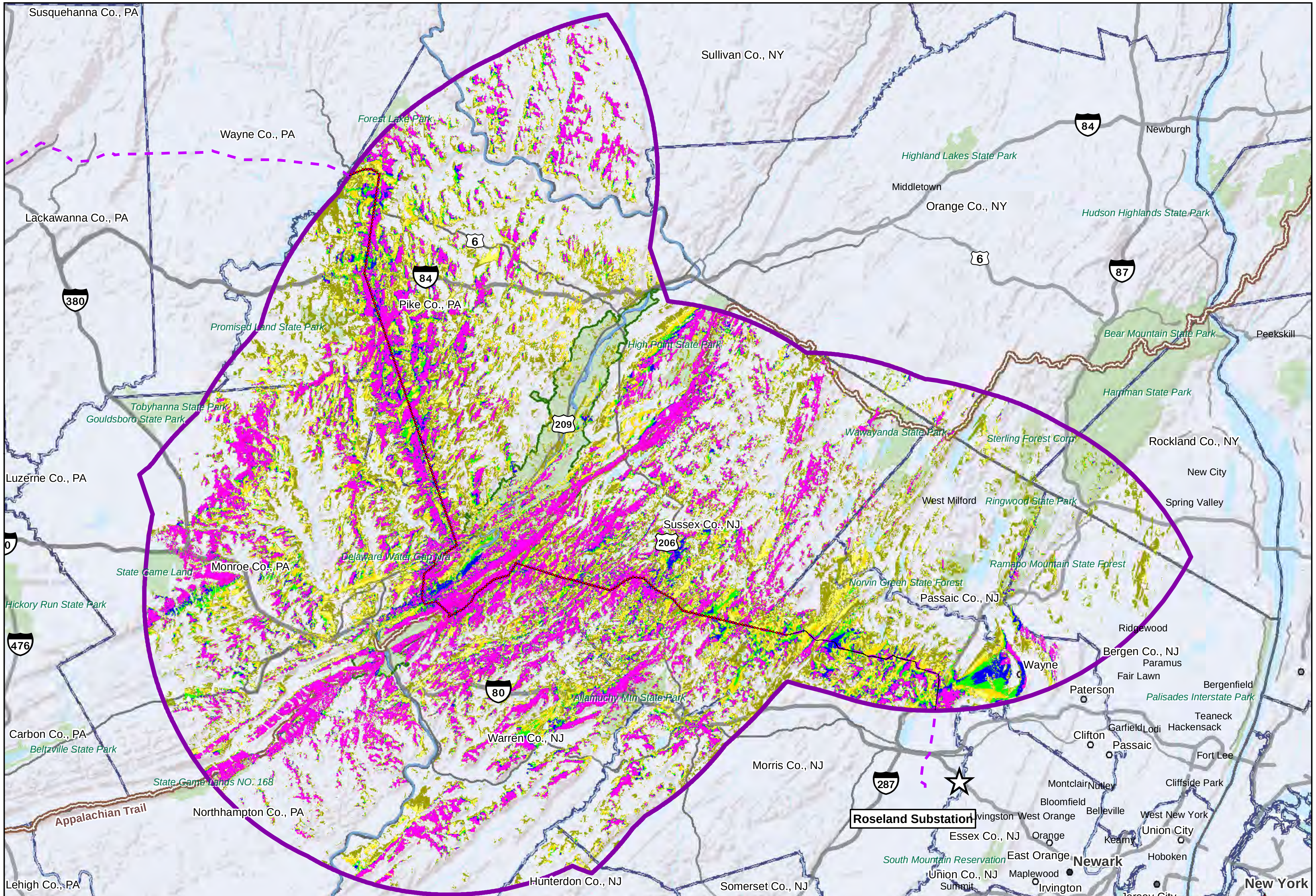
0 5 10 Miles

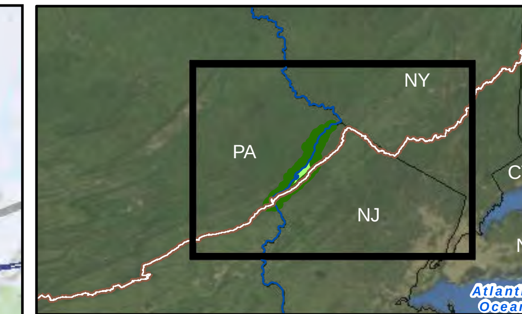
Susquehanna to Roseland Transmission Line Proposal and Right-of-Way Request EIS

Figure 81
Potential Existing Pole Visibility: Bare Terrain Analysis Alternative 3

Source: NPS 2010, EA Engineering 2010, DEWA 2008, ESRI 2002, ESRI 2006, ESRI 2010, NJOIT - OGIS 2008, PASDA 2010

Projection: NAD 83 UTM Zone 18N
Date: September, 2011





Legend

Number of Proposed Towers (and Poles) Potentially Visible

- 1 to 6
- 7 to 12
- 13 to 18
- 19 to 24
- 25 to 30
- 31+

- Alternative 3

Note: Solid line indicates portion inside the study area

- Proposed 500kV Tower
- Proposed 115kV Pole
- Study Area
- Delaware Water Gap NRA Boundary
- APPA
- Delaware River
- County Line
- Interstate
- U.S. Highway

Notes: Sampled tower locations are located along the alternative centerline and spaced between 1.5 and 2.5 miles apart. Samples were given a 195 foot elevation (tower height). The study area is defined as the union of the areas that are 20 miles from the DEWA boundary and 20 miles from the APPA alignment, intersected with the area that is 20 miles from the alternative alignment.

0 5 10 Miles

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

Figure 82
Potential Proposed Tower Visibility: Bare Terrain Analysis Alternative 3

Source: NPS 2010, EA Engineering 2010, DEWA 2008, ESRI 2002, ESRI 2006, ESRI 2010, NJOIT - OGIS 2008, PASDA 2010

Projection: NAD 83 UTM Zone 18N
Date: September, 2011

The past, present, and reasonably foreseeable projects identified along the length of APPA would produce adverse cumulative impacts on the trail as explained in the “Cumulative Impacts” section. When the impacts on visual resources as a result of alternative 3 are combined with other projects that affect APPA, an overall adverse cumulative impact would be expected.

Conclusion

Inside the study area, alternative 3 would result in adverse impacts of varying intensity depending upon the KOP. In general, the complexity of the alignment (i.e., numerous angle points) would affect views from several locations, thereby impacting visual quality at several KOPs and potentially from areas away from the corridor but looking toward the corridor. Similar to alternative 2, the ROW corridor would be most visually apparent in the landscape during spring and summer ‘leaf-on’ conditions when shadow lines increase the visual contrast created by the cleared ROW. During winter ‘leaf-off,’ the proposed towers could become more apparent, but the corridor would be visually de-emphasized. Unlike alternative 2, the existing distribution transmission line would be reconstructed and collocated within the expanded ROW, adding to the visible clutter within the corridor as seen from specific KOPs. The alternative 3 alignment would also create visual intrusions where none currently exist at Raccoon Ridge along APPA, and would be seen from other view locations along the trail. When combined with the impacts on visual resources under alternative 3, the effects of past, present, and reasonably foreseeable future projects would result in adverse cumulative impacts on visual resources inside the study area, and adverse cumulative impacts specifically on APPA.

Alternative 4

Like alternative 3, the existing distribution line would be replaced and repositioned within the ROW to accommodate the proposed double 500-kV line. Visual simulations show both the repositioned existing transmission line and the proposed new alignment.

During the course of this analysis, including fieldwork and visual simulation production, certain preliminary KOPs were found to provide no visibility of the proposed actions because the viewing distance was so great the impact would not be discernible, or vegetation or landform features blocked potential views. These KOPs were subsequently eliminated from further study. For alternative 4, preliminary KOPs eliminated during analysis include the following:

- Arrow Island Overlook
- Lookout Rocks (near Mount Minsi)
- Council Rock.

Visual simulations were prepared to depict the changes for KOPs impacted by alternative 4 and are included in appendix K (figures 4-1 through 4-6). Affected KOPs with potential visibility of the proposed actions under alternative 4 include the following:

- Mount Tammany Summit
- Delaware River as viewed from the river, north of the existing rail bridge
- Karamac Trail along MDSR
- APPA at the crossing of the existing alignment
- APPA at Lunch Rocks

- Nelson Overlook
- Fernwood Resort at Hwy 209.

Table 86 summarizes the change in overall visual quality ratings at the affected KOPs, based on the FHWA scale of 1 to 7.

TABLE 86: ALTERNATIVES 4 AND 5: SUMMARY OF CHANGES TO VISUAL QUALITY RATINGS AT IDENTIFIED KOPS

KOP Name	Visual Quality Rating Under Existing Conditions	Visual Quality Rating Under Simulated Proposed Conditions	Total Decrease in Visual Quality
Mt. Tammany Summit (alternative 4 only)	5.71	4.46	1.25
Delaware River at alternative 4/5 crossing	6.25	4.67	1.58
View from Karamac Trail (alternative 4 only)	5.21	4.79	0.42
APPA: at alternative 4/5 crossing	3.00	2.00	1.00
APPA: Lunch Rocks	5.04	3.04	2.00
APPA: Nelson Overlook	5.21	3.88	1.33

Mount Tammany Summit

Proposed conditions are shown in appendix K, figure 4-1, “Proposed.” Changes to the view due to the alignments for alternative 4 would include a noticeable corridor in the middleground, emphasized by a pronounced shadow line under simulated conditions (the visibility of which would vary depending on atmospheric conditions). The proposed corridor would disrupt the existing texture and line of the view. Proposed towers would be somewhat discernible from this distance, about 2 miles, but only during favorable weather conditions. No proposed conductors would be detectable from this distance. Unity would be reduced from high to average, due to the conflicting line created by the proposed alignment and the disruption of the contiguous forest pattern in the view. Intactness would be reduced from moderately high to average, due to the encroachment created by the proposed alignment, which would disrupt the otherwise intact forested landscape. (This effect would be moderated during winter “leaf-off” conditions, when the shadow line and visual contrast would not occur.) Impacts resulting from the increased visibility of intrusive human-made elements and vegetation removal would impact the ability of the view to be remembered as unencumbered and natural. However, the distance to the proposed actions and size of the corridor when viewed from this distance would offset the impacts slightly. Also, the level of impact would vary based on season and weather conditions. Therefore, vividness would be reduced in numeric score, but remain moderately high. The overall visual quality at Mount Tammany summit would be reduced from very high to moderately high (shifting from 5.71 to 4.46 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 1.25. Adverse impacts would occur on the visual resources at the Mount Tammany summit due to the alignment for alternative 4.

MDSR at Alternative 4 Crossing

Proposed conditions are shown in appendix K, figure 4-2, “Proposed.” Changes to the view would include the introduction of tall transmission towers on both sides of the Delaware River, with multiple angle point towers seen to the east (in New Jersey) where the alignment would change direction. Several conductors would be visible across the viewshed. Because the alignment would cross the river, bird diverter devices meeting APLIC standards would be required on the conductors or static lines, which could be visible, depending on the type of diverter applied. The perpendicular angle of the view toward the alignment and existing vegetation screening would combine to make impacts on vegetation unnoticeable from this view. Visual unity would be reduced from very high to average to moderately high from the transmission line features detracting from the existing historic rail bridge and conflicting with the scale, line, and focus and detracting from the harmony of the existing scene. Intactness would be reduced from high to average to moderately high, due to the encroachment of the towers and conductors, especially when silhouetted against the sky. Vividness would be reduced from moderately high to high to moderately high, due to the encroaching transmission development detracting from the memorability of the unique view focused on a scenic historic object. The overall visual quality at Delaware River at the crossing of alternative 4 would be reduced from very high to high (shifting from 6.25 to 4.67 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 1.58. Adverse impacts would occur on the visual resources of the Delaware River at the alignments for alternative 4 due to the alternatives.

Karamac Trail

Proposed conditions are shown in appendix K, figure 4-3, “Proposed.” Changes to the view would include introduced visibility of a portion of a single transmission tower and several conductors in the distant middleground, rising above existing vegetation. The presence of the transmission structure would somewhat detract from the cohesive, harmonious riverside scene. Unity would be reduced from moderately high to average to moderately high. The tower and conductors would cause a slight encroachment, so overall intactness would be reduced from moderately high to average to moderately high. Vividness would be slightly affected by the introduction of encroaching transmission elements, but would remain moderately high. The overall visual quality at Karamac Trail would remain high (shifting from 5.21 to 4.79 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 0.42. Adverse impacts would occur on the visual resources of Karamac Trail along MDSR due to the alternative 4 alignment.

APPA at Alternative 4 Crossing

Proposed conditions are shown in appendix K, figure 4-4, “Proposed.” Changes to the view would include obvious widening of the alignment, and introduction of several tall towers along the repositioned distribution line as the route continues into the middleground before changing direction. Existing unity at this view is already low (refer to the “Visual Resources” section of chapter 3), and the proposed expanded ROW and numerous visible towers would disrupt the existing scale and emphasis, therefore, reducing unity from low to very low. Intactness would be reduced from average / moderately high to low / moderately low due to the widened ROW creating a visual subtraction in the context of the forested landscape. The encroachment of the towers and increased number of conductors would also affect intactness. Bird diverters would be required at this location as well, further reducing visual intactness to the extent they were visible and apparent as hikers passed beneath the lines. Vividness would be reduced from low / moderately low to very low / low, as the expanded ROW would open up a greater opportunity to view the background landscape, although this would be outweighed by the visually obtrusive proposed corridor development and the impacts on vegetation. The overall visual quality for APPA at the crossing of alternative 4 would be reduced from average to moderately low (shifting from 3.00 to 2.00 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 1.00. Adverse impacts would occur on the visual resources of APPA at the alternative 4 crossing due to the alternatives.

APPA at Lunch Rocks

Proposed conditions are shown in appendix K, figure 4-5, “Proposed.” Changes to the view would include obvious visibility of the proposed ROW, which would enter the scene from the left and continue down the slope, before changing direction away from the viewer. Visibility of the proposed corridor would be emphasized by a contrasting shadow line. It is likely that from this distance the alignment would appear less severe in overcast weather conditions or during winter ‘leaf-off’ when the corridor would create less visual contrast. Portions of several tall towers would be seen above the existing tree canopy, and numerous conductors would be detectable. Visual unity would be substantially reduced from high to moderately low, due to the conflict and disharmony created by the alignment in the context of the existing contiguously forested landscape. Intactness would be similarly reduced from moderately high to high to average, resulting from the visual intrusion created by the proposed cleared ROW, emphasized by the contrasting shadow line and visual subtraction of vegetation. The impacts from the introduced human-made transmission development and, to a larger degree, the loss of the existing continuously intact forest cover would substantially reduce the ability of the view to be remembered for its natural and remote aesthetic. Therefore, vividness would be reduced from moderately low to average to low to moderately low. The overall visual quality for APPA at Lunch Rocks would be reduced from high to average (shifting from 5.04 to 3.04 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 2.00. Adverse impacts would occur on the visual resources of APPA at Lunch Rocks due to the alignments for alternative 4.

APPA at Nelson Overlook

Proposed conditions are shown in appendix K, figure 4-6, “Proposed.” Visible changes would include the introduction of the proposed cleared ROW carving a “U” shape into the existing forest canopy in the middleground. New transmission towers and conductors would be detectable under favorable weather conditions. Unity would be reduced from moderately high to high to moderately low to average due to the widened corridor disrupting the existing form, texture, balance, and pattern of the view, particularly given the multiple directional changes of the proposed alignment. Intactness would be reduced from moderately high to high to moderately low to average, due to the encroachment created by the proposed corridor. The distance of the proposed towers would not add appreciably to encroachments. Vividness would remain average to moderately high, but would be impacted by the intrusion of the human-made transmission line on the visual pattern; and changes to vegetation from the expanded ROW, each of which would impact the memorability of the pastoral aesthetic view. The overall visual quality for APPA at Nelson Overlook would be reduced from high to moderately high (shifting from 5.21 to 3.88 on the FHWA scale of 1 to 7). This represents a decrease in overall visual quality of 1.33. Adverse impacts would occur on the visual resources of APPA at Nelson Overlook due to the alternative 4 alignment.

Fernwood Resort, Pennsylvania Hwy 209

The first 0.6-mile segment of the alternative 4 alignment includes the portion of the alternative 2 alignment from Bushkill Substation to the western boundary of DEWA. Therefore, the Fernwood Resort KOP was analyzed for alternative 2 and the proposed conditions are represented in appendix K, figure 2-1, “Proposed.” The adverse impacts under alternative 4 would be the same as those described for alternative 2.

Zone of Visual Influence Bare-Earth Terrain Modeling: As described in the "Methodologies" section, table 87 provide areas (in acres) from which the existing wood poles and proposed transmission towers could be seen under bare earth conditions, specific to alternative 4, for lands within DEWA and along the APPA alignment (defined at 1000 feet wide). See figures 83 and 84, respectively, for potential existing pole visibility and potential proposed pole visibility for alternative 4 and figures 85 and 86 for alternative 5.

TABLE 87: ALTERNATIVE 4 VISIBILITY USING ZVI BARE-EARTH TERRAIN MODELING (ESTIMATED IN ACRES)

Tower height	Number of poles/towers within DEWA	Potential Visibility from within DEWA	Potential Visibility from MDSR	Potential Visibility from APPA
Proposed 200-feet alternative 4 (towers as sampled)	16	32,857	782	6,725
Existing 65 feet to 85 feet Poles along the existing alignment alternative 4 would follow	14	22,591	530	3,444

Overall Alternative 4 Impacts

Activity during deconstruction and construction would adversely affect visual quality as described in the "Common to All Action Alternatives" section. Impacts would depend on the extent to which deconstruction and construction activities could be seen, as well as the location of temporary spur roads. Under alternative 4, construction impacts would be most apparent where the line would be in proximity to APPA. At this location, the access road would veer east outside the ROW and would cross APPA about 600 feet from the transmission line. This would represent two crossings of the trail related to alternative 4. The widened ROW clearing, reconstructed and collocated distribution line and taller poles as a result of alternative 4 would create impacts. Adverse impacts related to operations and maintenance of the transmission line would occur inside the study area. Overall, alternative 4 would result in adverse impacts to visual resources.

Cumulative Impacts

Cumulative impacts inside the study area would result in adverse impacts on visual resources as described previously in the "Cumulative Impacts" section. When the impacts on visual resources as a result of alternative 4 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall cumulative adverse impact would be expected.

The past, present, and reasonably foreseeable projects identified along the length of APPA would produce adverse cumulative impacts on the trail as explained in the "Cumulative Impacts" section. When the impacts on visual resources as a result of alternative 4 are combined with other projects that affect APPA, an overall adverse cumulative impact would be expected.

Conclusion

Under alternative 4, adverse impacts on visual resources at the affected KOPs would occur. Impacts on DEWA would occur at Mount Tammany summit, the Karamac Trail in Worthington State Forest, and affect APPA where the alignment crosses over. Construction-related and maintenance adverse impacts would occur. When combined with the impacts on visual resources under alternative 4, the effects of past, present, and reasonably foreseeable future projects would result in adverse cumulative impacts on visual resources inside the study area, and adverse cumulative impacts specifically on APPA.

Alternative 5

Alternative 5 would follow the same alignment as alternative 4 with the exception of the portion of the B-K Line from the Bushkill Substation to the eastern boundary of DEWA. Affected KOPs with potential visibility of alternative 5 include the following:

- Delaware River as viewed from the river, north of the existing rail bridge
- APPA at the crossing of the proposed alignment

The impacts on visual resources from the proposed transmission line along the alternative 5 alignment would be the same as those discussed for alternative 4 inside the study area.

Zone of Visual Influence Bare-Earth Terrain Modeling: As described under the “Methodologies” section, table 88 provide areas (in acres) from which the existing wood poles and proposed transmission towers could be seen under bare earth conditions, specific to alternative 5, for lands within DEWA and along the APPA alignment (defined at 1,000 feet wide).

TABLE 88: ALTERNATIVE 5 VISIBILITY USING ZVI BARE-EARTH TERRAIN MODELING (ESTIMATED IN ACRES)

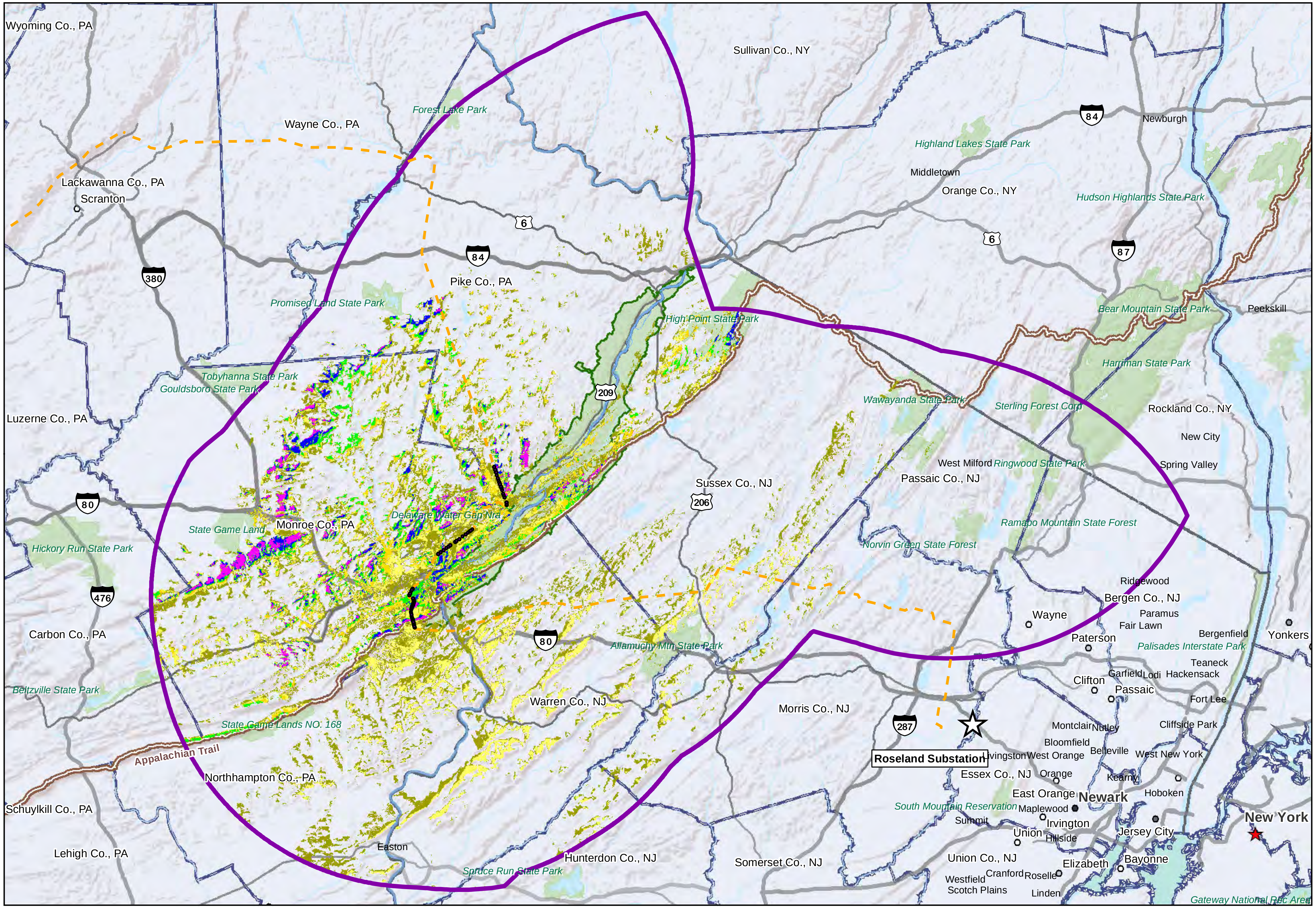
Tower height	Number of poles/towers within DEWA	Potential Visibility from within DEWA	Potential Visibility from MDSR	Potential Visibility from APPA
Proposed 200 feet alternative 5 (towers as sampled)	10	25,086	553	6,223
Existing 65 feet to 85 feet Poles along the existing alignment alternative 5 would follow	11	13,849	432	2,183

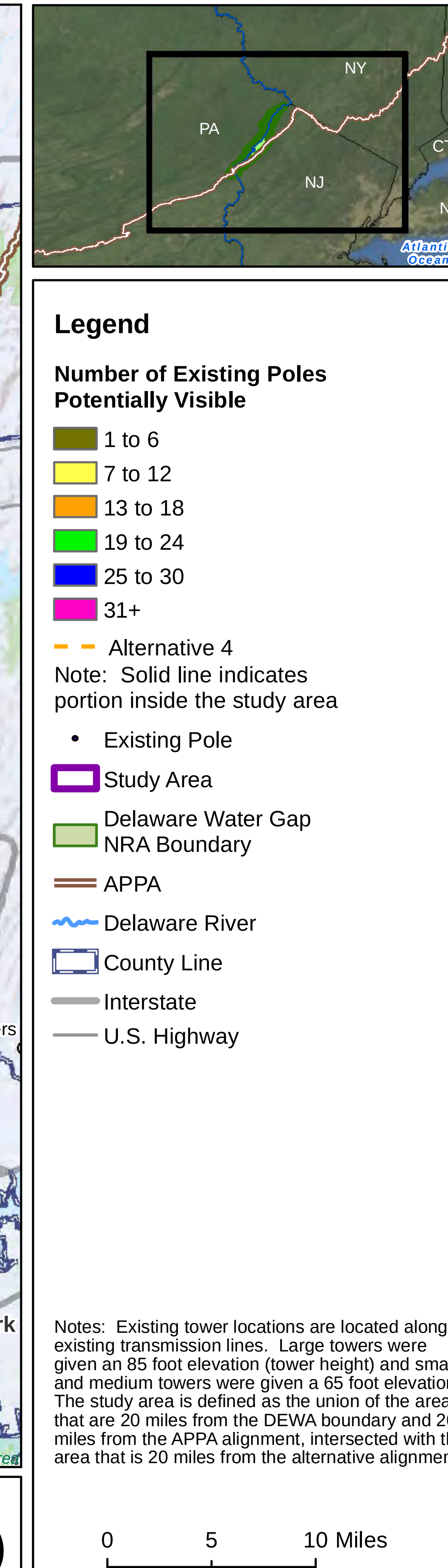
Overall Alternative 5 Impacts

Activity during deconstruction and construction would adversely affect visual quality as described in the “Common to All Action Alternatives” section. Under alternative 5, impacts would be greatest where the transmission line would cross APPA because it would also be intersected by an access road. Impacts related to operations and maintenance of the transmission line would be the same as for alternative 4. Overall, alternative 5 would result in impacts on visual resources.

Cumulative Impacts

Cumulative impacts inside the study area would result in adverse impacts on visual resources as described previously in the “Cumulative Impacts” section. When the impacts on visual resources as a result of alternative 5 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall cumulative adverse impact would be expected.





Notes: Existing tower locations are located along existing transmission lines. Large towers were given an 85 foot elevation (tower height) and small and medium towers were given a 65 foot elevation. The study area is defined as the union of the areas that are 20 miles from the DEWA boundary and 20 miles from the APPA alignment, intersected with the area that is 20 miles from the alternative alignment.

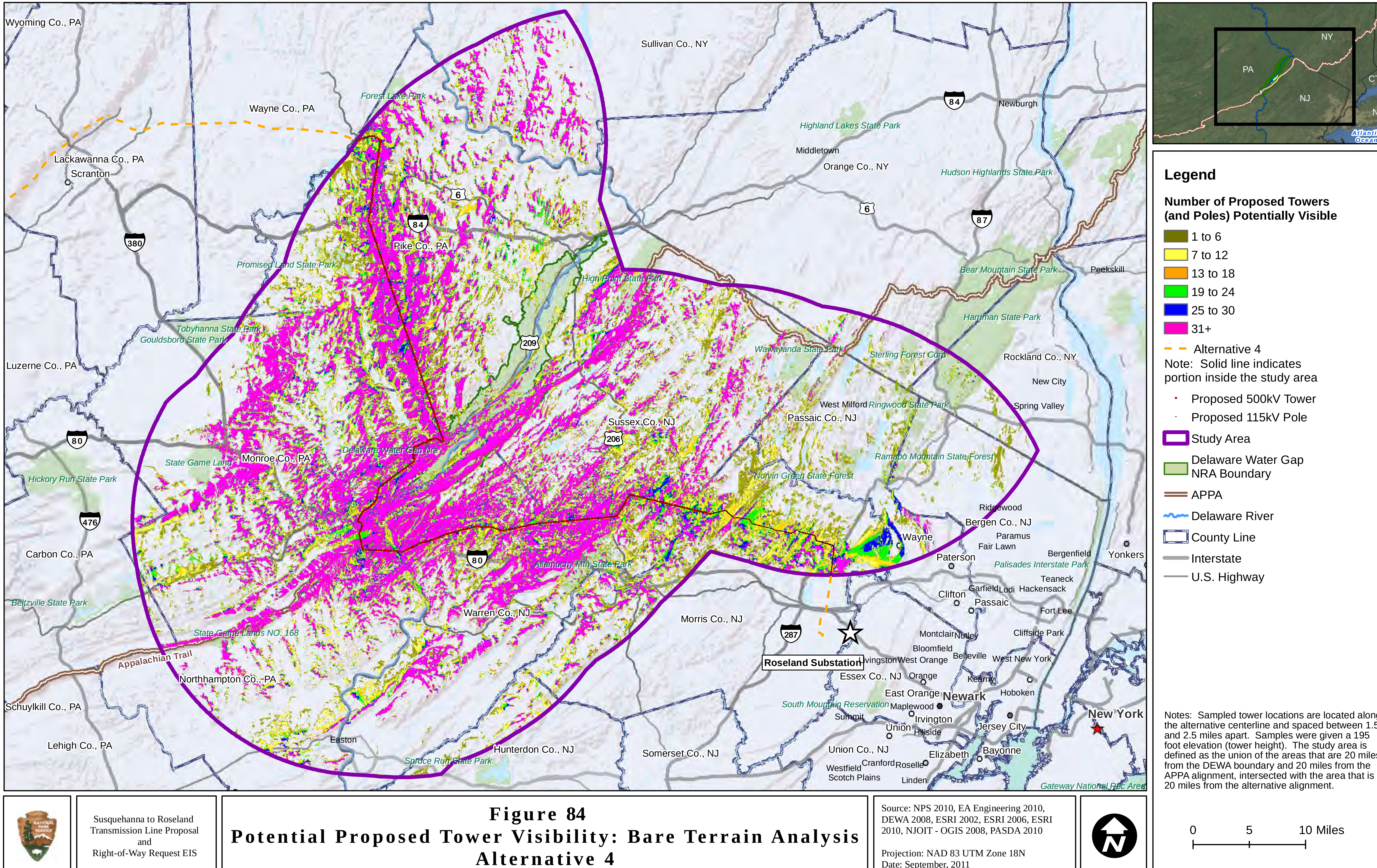
Susquehanna to Roseland Transmission Line Proposal and Right-of-Way Request EIS

Figure 83

Potential Existing Pole Visibility: Bare Terrain Analysis Alternative 4

Source: NPS 2010, EA Engineering 2010, DEWA 2008, ESRI 2002, ESRI 2006, ESRI 2010, NJOIT - OGIS 2008, PASDA 2010

Projection: NAD 83 UTM Zone 18N
Date: September, 2011

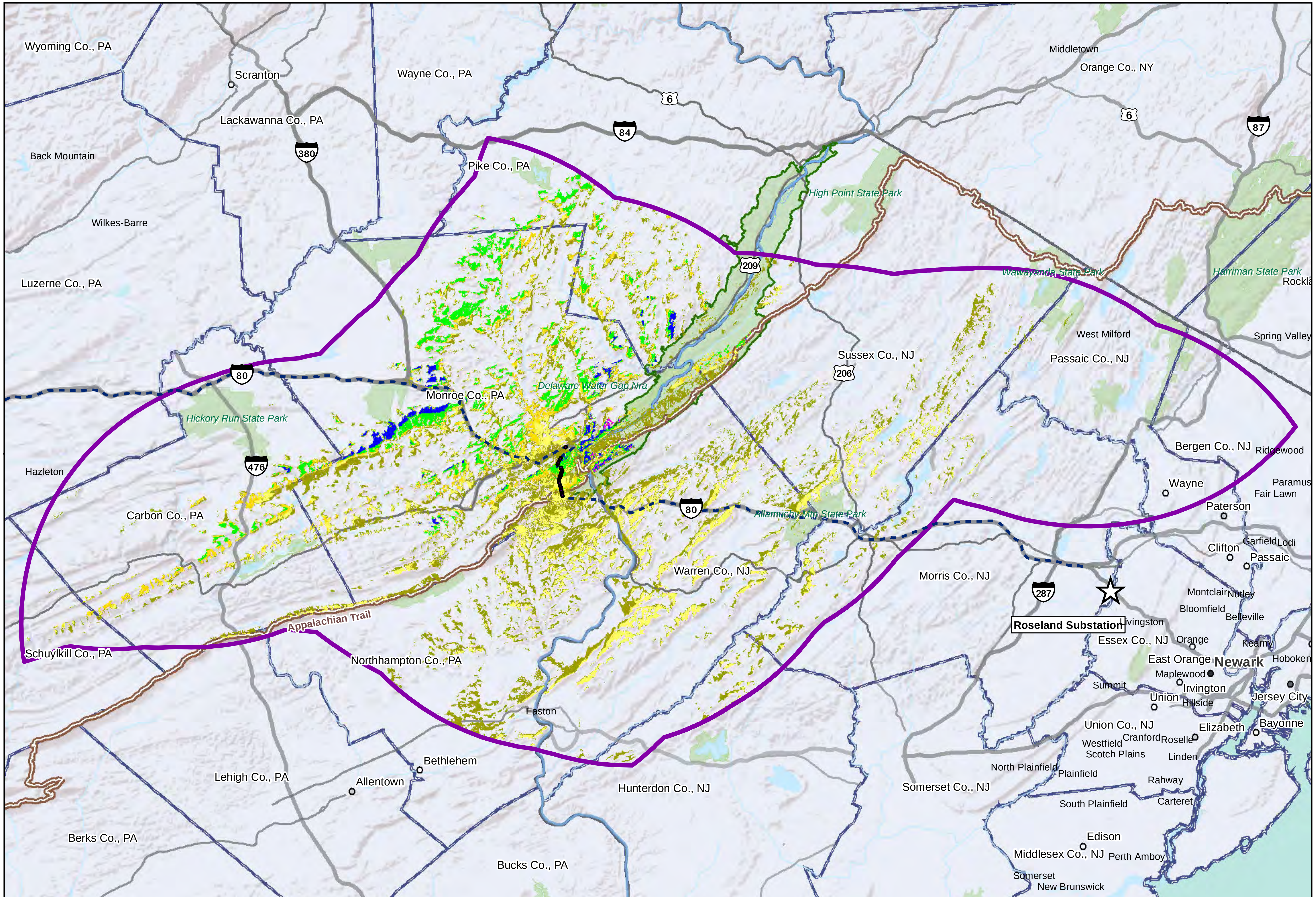


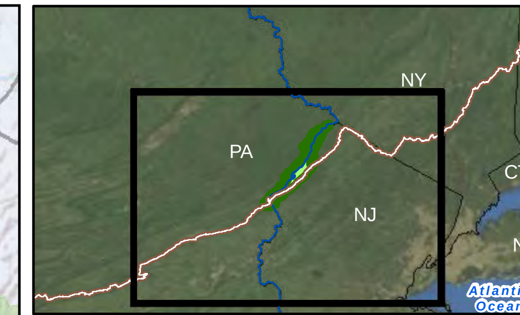
Susquehanna to Roseland Transmission Line Proposal and Right-of-Way Request EIS

Figure 84
Potential Proposed Tower Visibility: Bare Terrain Analysis
Alternative 4

Source: NPS 2010, EA Engineering 2010, DEWA 2008, ESRI 2002, ESRI 2006, ESRI 2010, NJOIT - OGIS 2008, PASDA 2010

Projection: NAD 83 UTM Zone 18N
Date: September, 2011





Legend

Number of Existing Poles Potentially Visible

- 1 to 6
- 7 to 12
- 13 to 18
- 19 to 24
- 25 to 30
- 31+
- Alternative 5
  Note: Solid line indicates portion inside the study area
- Existing Pole
- Study Area
- Delaware Water Gap NRA Boundary
- APPA
- Delaware River
- County Line
- Interstate
- U.S. Highway

Notes: Existing tower locations are located along existing transmission lines. Large towers were given an 85 foot elevation (tower height) and small and medium towers were given a 65 foot elevation. The study area is defined as the union of the areas that are 20 miles from the DEWA boundary and 20 miles from the APPA alignment, intersected with the area that is 20 miles from the alternative alignment.

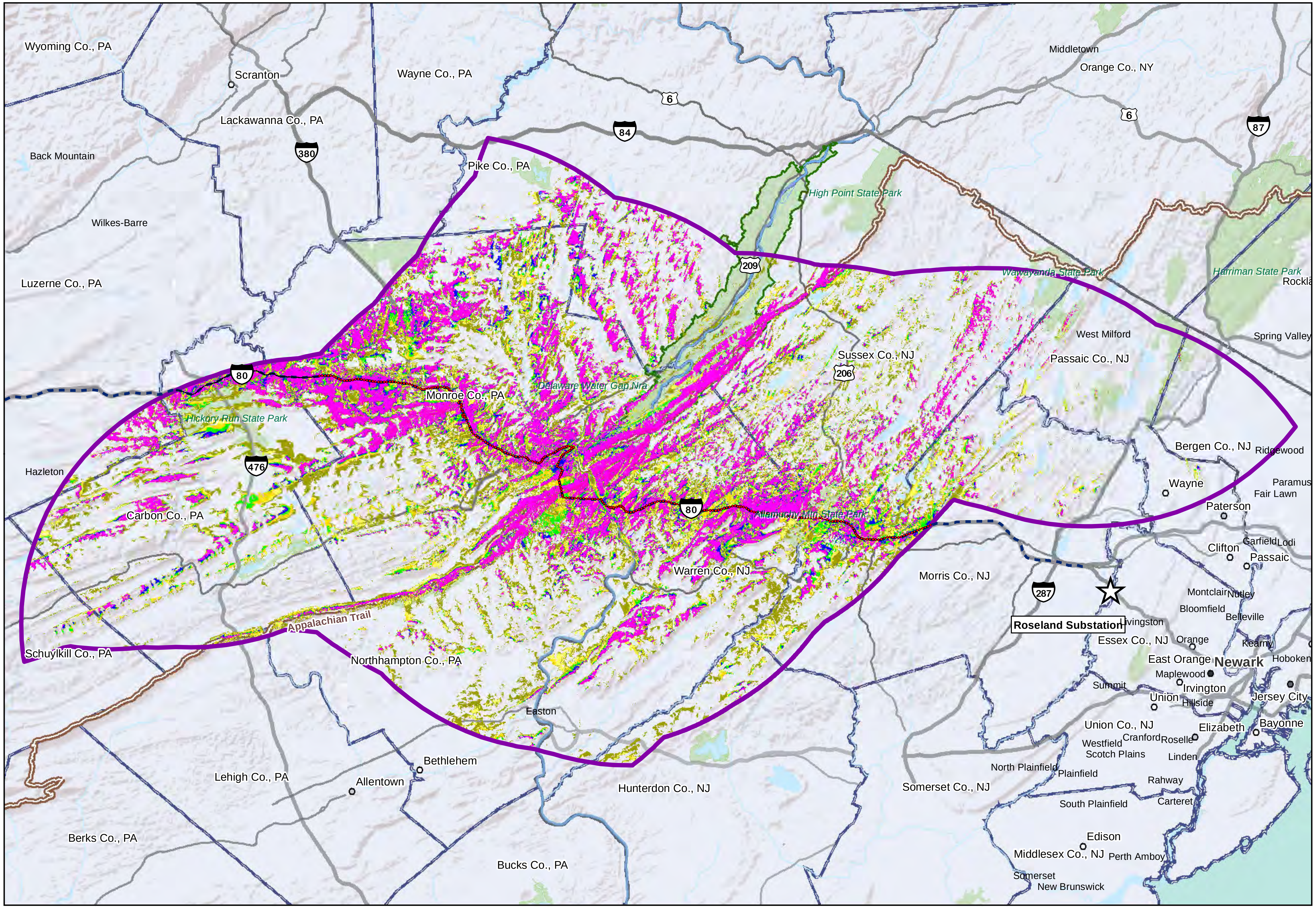
0 5 10 Miles

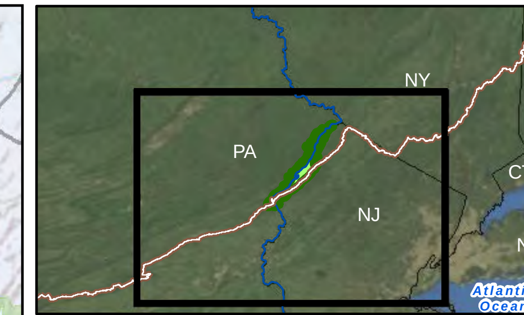
Susquehanna to Roseland Transmission Line Proposal and Right-of-Way Request EIS

Figure 85
Potential Existing Pole Visibility: Bare Terrain Analysis
Alternative 5

Source: NPS 2010, EA Engineering 2010, DEWA 2008, ESRI 2002, ESRI 2006, ESRI 2010, NJOIT - OGIS 2008, PASDA 2010

Projection: NAD 83 UTM Zone 18N
Date: September, 2011





Legend

Number of Proposed Towers (and Poles) Potentially Visible

- 1 to 6
- 7 to 12
- 13 to 18
- 19 to 24
- 25 to 30
- 31+
- Alternative 5

Note: Solid line indicates portion inside the study area

- Proposed 500kV Tower
- Proposed 115kV Pole
- Study Area
- Delaware Water Gap NRA Boundary
- APPA
- Delaware River
- County Line
- Interstate
- U.S. Highway

Notes: Sampled tower locations are located along the alternative centerline and spaced between 1.5 and 2.5 miles apart. Samples were given a 195 foot elevation (tower height). The study area is defined as the union of the areas that are 20 miles from the DEWA boundary and 20 miles from the APPA alignment, intersected with the area that is 20 miles from the alternative alignment.

0 5 10 Miles

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

Figure 86
Potential Proposed Tower Visibility: Bare Terrain Analysis
Alternative 5

Source: NPS 2010, EA Engineering 2010, DEWA 2008, ESRI 2002, ESRI 2006, ESRI 2010, NJOIT - OGIS 2008, PASDA 2010

Projection: NAD 83 UTM Zone 18N
Date: September, 2011

The past, present, and reasonably foreseeable projects identified along the length of APPA would produce adverse cumulative impacts on the trail as explained in the “Cumulative Impacts” section. When the impacts on visual resources as a result of alternative 5 are combined with other projects that affect APPA, an overall adverse cumulative impact would be expected.

Conclusion

The impacts on visual resources at the KOPs under alternative 5 would be the same as described for alternative 4 where the alignments coincide. Adverse impacts under alternative 5 in the study area would affect APPA. Two sets of structures would be constructed within the ROW, increasing the visual impact due to increased visual clutter and the removal of vegetation caused by the expanded ROW clearing. Construction-related and maintenance impacts would be localized and of short duration. When combined with the impacts on visual resources under alternative 5, the effects of past, present, and reasonably foreseeable future projects would result in adverse cumulative impacts on visual resources inside the study area, and adverse cumulative impacts specifically on APPA.

SOUNDSCAPES

This section evaluates the impacts of noise associated with the proposed alternatives on park soundscapes. The effects of these impacts on people and wildlife are evaluated in the “Visitor Use and Experience,” “Landscape Connectivity, Wildlife Habitat, and Wildlife,” and “Special-status Species” sections.

METHODOLOGIES

The analysis of impacts for soundscapes assesses the potential impacts associated with constructing, operating, and maintaining the proposed transmission lines along the alternate alignments being evaluated as part of this EIS. The analysis also includes the potential impact associated with decommissioning the existing transmission line as part of the action alternatives.

The methodology used to assess soundscape impacts in this document is consistent with NPS *Management Policies 2006* (NPS 2006a) and Director’s Order 47: *Soundscape Preservation and Noise Management* (NPS 2000a). The NPS Natural Sounds and Night Skies Division is currently working to establish standards and protocols for acoustic studies in national parks. This work includes establishing acoustic zones in each park unit based on vegetation, land cover, topography, elevation, and climate. Acoustic zones are areas in which these attributes are similar; therefore, they may have similar natural sound sources, sound levels, and propagation and attenuation properties. At this time, acoustic zones have not been established for the parks in the study area. The soundscapes research and analysis conducted for this EIS did not establish acoustic zones in DEWA, but did establish a baseline condition for the purposes of assessing the impacts of the proposed action.

Resource Systems Group, Inc. conducted background sound level monitoring between October 7 and November 14, 2010, to establish a baseline condition for soundscapes near the proposed alternatives. The data gathered included ambient sound levels (natural and existing), sources of sound, and frequency of human-generated sources of sound. This baseline was compared to predicted sound levels and the propagation of sound modeled for the proposed alternatives to identify potential impacts on the soundscape. The level of impact was assessed based on the type of sound introduced (including the frequency, magnitude, and duration), the degree of change from existing conditions, and the management objectives for the location.

Construction Activities: The analysis estimates that 6,400 feet (1.2 miles) from construction activities is the distance at which construction sound would decrease to the existing background sound levels. The sound from construction equipment can vary from intermittent to fairly continuous. Assuming that a truck (90 dBA), scraper-grader (87 dBA), moveable crane (82 dBA), tractor (85 dBA), and two power saws (78 dBA) are operating in the same area, peak construction period sound would generally be about 93 dBA at 50 feet from the construction site (USEPA 1971). Assuming a sound level decrease of approximately 7.5 dBA for every doubling of distance from the sound source across a soft surface such as vegetation (Caltrans 1998, 27), peak construction sound would be approximately 40 dBA at a distance of 6,400 feet (1.2 miles) from the source. This is close enough to the background sound levels in the study area that it would be barely perceptible or not perceptible at all (see the discussion of sound level monitoring in chapter 3).

Operations: The area of potential effects for soundscapes over the life of the project was determined using sound propagation modeling. As detailed in appendix A of *Soundscapes Summary Report* (DEA 2010c), the predicted transmission line sound levels of the proposed alternatives were calculated using an empirical formula developed by the Bonneville Power Administration based on measurements of existing power lines. The following design assumptions for the proposed alternatives were used for the calculation:

- radius of conductor = 0.019 meters
- radius of bundle = 0.264 meters
- conductors per bundle = 3
- distance between conductors in a bundle = 0.457 meters
- conductor height above ground = 8.2 meters
- voltage = 500 kV
- configuration of phases = vertical

Terrain models developed for each alternative were used to estimate the propagation of transmission line sound moving away from the alternatives. The Cadna A acoustical modeling software used for this analysis takes into account the source sound power levels, surface reflection and absorption, atmospheric absorption, geometric divergence, meteorological conditions, walls, barriers, berms, and terrain. The resulting sound level isolines (noise contours) surrounding the proposed alternatives show that the sound from the proposed transmission lines would decrease to the existing background sound levels within 350 feet from the centerline of the alternatives. This distance would be much less for some alternatives, as discussed in the “Impacts of the Alternatives on Soundscapes” section. This analysis was performed in the fall of 2010 using the alternative alignments that were current at that time. Since then, some refinements to the alternative alignments have been made. Consequently, the results presented in this section may slightly overestimate the area in specific management zones that would be affected by noise associated with the operation of the proposed alternatives.

Maintenance Activities: Maintenance operations are conducted at various times of the year for selective clearing or for repairing damaged transmission lines, resulting in periodic, temporary sources of sound. Routine inspection and maintenance of the transmission lines is accomplished by vehicular access from access roads. Pickup trucks and chainsaws are examples of equipment that may be used in maintenance activities. The area potentially affected by these activities would be similar to the area that would be affected by construction noise. However, the impacts of maintenance differ in that their duration would be much more brief and the impacts would recur periodically.

STUDY AREA

The geographic study area for soundscapes, similar to other resources, is divided as inside the study area and outside the study area. Inside the study area, areas where noise associated with the proposed action could be heard above the existing background sound levels were assessed for direct effects on the soundscape. The maximum distance out from the centerline where operations noise would be audible is 350 feet. For construction sound, potential direct effects on the soundscape were evaluated within 6,400 feet of construction activities. Outside the study area, the potential indirect effects of the proposed action were generally evaluated based on the types of noise-sensitive receptors that could be near the alignments.

DURATION OF IMPACT

Duration describes the length of time an effect would occur. Impacts related to site preparation, construction, and postconstruction restoration would be temporary. Impacts related to operations and maintenance would continue throughout the period of analysis. Maintenance-related impacts would be much shorter in duration but would recur periodically throughout the life of the project.

CUMULATIVE IMPACTS COMMON TO ALL ALTERNATIVES

Actions inside and outside the parks can affect the ability of visitors to experience the natural sounds that compose the natural soundscape of the parks. Inappropriate human-generated sound (noise) can adversely affect park resources or values, including, but not limited to, natural soundscapes, cultural resources, wildlife, and visitor use and experience. For this EIS, human-generated sounds that were recorded above the natural ambient sound levels in the parks were considered along with the past, present, and reasonably foreseeable activities that would have beneficial or adverse impacts on soundscapes in the parks and inside and outside the study area. Overall, inappropriate sounds associated with past, present, and reasonably foreseeable actions inside and outside the parks would have an adverse impact on the natural soundscape, as described here.

Sound level monitoring was conducted for this EIS at six different sites representing a variety of settings, including remote ridgetop areas, accessible areas adjacent to the Delaware River, visitor use areas, and wetland areas. Human-generated sound was audible at all these sites, which suggests that much of the natural soundscape is currently affected by human-generated sound to some degree. Sources of human-generated sound recorded during the monitoring period include visitors/hikers, vehicular traffic, gunshots, construction equipment, sirens, car doors, dogs, aircraft overflights, and ORVs.

Human-generated sound in DEWA is audible 10% to 60% of the daytime hours, depending on the monitoring location. The existing ambient sound levels were within 3 dBA of the natural ambient sound levels at all of the monitoring sites. This 3 dBA difference would be barely perceptible to the human ear.

Projects Inside the Study Area

A variety of completed, current, and future activities inside the parks may have effects on soundscapes due to sound associated with road rehabilitation, vegetation clearing/burning, and utilities installation, upgrades, and maintenance. These projects would not result in lasting changes to the soundscape. No projects inside the study area would have cumulative impacts on soundscapes.

Projects Outside the Study Area

Outside the study area, current and reasonably foreseeable projects that would result in adverse cumulative impacts on soundscapes include the following development projects: airport improvements, the high speed passenger train from northeastern Pennsylvania to New York City, and the Alpine Rose Auto Racetrack. Airport and passenger rail improvements outside the study area might affect soundscapes if the improvements led to an increase in noise from increased flights and passenger rail trips, resulting in an adverse impact. However, the magnitude of this possible increase is unknown. Beneficial impacts would occur due to the expiration of commercial use on US Route 209 in 2015, because a reduction in noise levels in that area would occur due to the prohibition of commercial truck traffic. However, an overall population increase expected in the study area would lead to more passenger traffic on this road. The beneficial impacts of the expiration of commercial use on US Route 209 are not expected to offset the adverse impacts expected from a possible increase in noise from increased flights, passenger rail trips, and additional passenger motor vehicle traffic. Therefore, overall cumulative impacts outside the study area would be adverse, but the intensity of these impacts is unknown.

IMPACTS OF THE ALTERNATIVES ON SOUNDSCAPES

Common to All Alternatives

Outside the Study Area: Outside the study area, regardless of which alternative is selected, the transmission line could pass through Carbon, Lackawanna, Luzerne, Monroe, Northampton, Pike, and Wayne counties in Pennsylvania and Morris, Sussex, and Warren counties in New Jersey. A wide variety of land uses would be traversed. Where more undeveloped rural lands exist, such as along Rattlesnake Ridge, existing ambient sound levels may be similar to those measured in DEWA. The residential and urban areas on the west side of the parks are likely to have higher ambient sound levels. In these areas, the noise associated with the transmission lines would not likely be audible.

Outside the study area under the no-action alternative, existing ambient sound levels would remain unchanged. Impacts on soundscapes would be similar to those described for inside the study area. Human-generated noise associated with maintenance activities would have intermittent adverse impacts on the soundscape. The impacts associated with the action alternatives would be similar to those in the study area. There would be impacts from the decommissioning of the existing line and from construction and maintenance activities. There would be adverse soundscape impacts within 350 feet of the alignment centerline from the noise associated with the continued operation of the existing transmission line. The cumulative impacts from past, present, and reasonably foreseeable projects on the natural soundscape outside the study area are unknown. When the indirect impacts on soundscapes as a result of activities outside the study area are combined with other past, present, and reasonably foreseeable projects outside the study area, the overall cumulative impact would be expected to be adverse.

Alternative 1: No Action

Baseline sound level monitoring shows that the sound associated with the existing transmission line is not audible over the existing background sound levels. There would be no increase in the existing ambient sound levels, which would continue to range from 34 to 48 dBA in the daytime. The soundscape would continue to include a mix of natural and human-generated sounds. There would be no construction activities along the transmission line alignment inside the study area.

The operation of the existing transmission line would require periodic vegetation maintenance every year at a minimum, including the clearing of vegetation in the ROW. Temporary disturbance to the soundscape from these activities would continue. Access roads in the ROW would also require periodic maintenance to provide access for system repairs and maintenance. Sound from equipment such as pickup trucks and chainsaws would continue to be audible periodically. The sound levels associated with these activities may be audible within approximately 6,400 feet of the sound source, which would affect approximately 11.8% of the natural zone in DEWA. Areas as much as 3,200 feet from the alignment may experience temporary sound level increases of more than 13 dBA, which would be consistently audible. Sound levels would increase less than 5 dBA at approximately 6,400 feet from the alignment, which would be barely detectable. Human-generated noise associated with maintenance activities would continue to have intermittent adverse impacts on the soundscape.

Cumulative Impacts

No projects inside the study area would have cumulative impacts on soundscapes, as described previously in the “Cumulative Impacts Common to All Alternatives” section. However, human-generated noise associated with maintenance activities during operation of the existing transmission line would have impacts on the soundscape. Therefore, cumulative soundscape impacts from alternative 1 would be adverse.

Conclusion

Alternative 1, the no-action alternative, would result in the continued operation and maintenance of the existing B-K Line route. Intermittent adverse impacts on soundscapes would continue inside the study area due to maintenance activities associated with continued operation of the existing transmission line. There would be no cumulative impact on the soundscape associated with alternative 1.

Common to All Action Alternatives

Mitigation Measures: Mitigation measures would be implemented to reduce construction-related impacts on soundscapes and are taken into consideration in the impact analysis. Mitigation measures are described in appendix F.

Removal of Existing Structures: All action alternatives (2, 2b, 3, 4, and 5) include the removal of all or a portion of the B-K Line as described in chapter 2.

Construction Activities: Under all action alternatives, temporary disturbance to the soundscape would be expected from noise associated with construction activities, including the decommissioning of the existing B-K Line. Of the 56,606 acres of natural zone areas in DEWA, 11.8% would be affected by this action. As discussed in chapter 3, the sound associated with construction activities could be audible within approximately 6,400 feet of the sound source. Areas as much as 3,200 feet from the alignment could experience sound level increases of more than 13 dBA, which would be consistently audible. Sound levels would increase less than 5 dBA at approximately 6,400 feet from the alignment. Sound-control devices and muffled exhaust would be installed on all construction equipment and vehicles, respectively, which would help reduce noise during construction.

As shown in table 89, between 11.8% and 26.3% of the surrounding natural zone in DEWA would be temporarily affected assuming ground-based construction activity. Alternatives 3, 4, and 5 would also affect between 11% and 24.2% of the surrounding special use zone designated as nonfederal public land. If helicopters are used at times during construction, sound levels would be higher and a larger area would be affected as compared with ground-based construction activity. Construction disturbance would occur throughout most of the daytime hours (12 hours per day), six days a week for as long as eight months.

TABLE 89: SOUNDSCAPE IMPACTS FROM CONSTRUCTION ACTIVITIES

	Construction Activity	Maximum Natural Zone Affected (%)	Maximum Special Use Zone Affected (%)
Alternatives 2, 2b	Decommissioning and construction of transmission line	11.8	N/A
Alternative 3	Decommissioning and construction of transmission line	26.3	24.2
Alternatives 4, 5	Decommissioning and construction of transmission line	18.9	11

Adverse soundscape impacts would result from activities associated with decommissioning the existing transmission line and the construction of new transmission lines for all action alternatives, with the most severe impacts occurring under alternative 3. These impacts would last for as long as eight months. However, the construction would be confined to the locations of the transmission line features and the construction noise would not occur over the entire length of the alignment for the full eight months. Impacts would be minimized by sound control devices placed on construction equipment.

Operation of Transmission Lines: Existing ambient sound levels were measured at 36 to 37 dBA along the alternative alignments, as identified in table 90. The exception is near the Watergate Recreation Site, where the existing ambient sound level along the alternative 2 and 2b alignment was measured at 48 dBA, and was dominated by the sound of the Delaware River. Although no monitoring was conducted adjacent to the Delaware River for alternatives 3, 4, and 5, it is anticipated that the sound level where the alignments cross the river would be similar to the river crossing location along alternative 2 and 2b, which was measured at 48 dBA.

TABLE 90: SOUNDSCAPE IMPACTS FROM THE OPERATION OF TRANSMISSION LINES

Alternative	Existing Ambient Sound Levels (dBA)	Maximum Natural Zone Affected (%)	Maximum Special Use Zone Affected (%)	Noise Levels at C/L (dBA)	Distance from C/L Where Noise Levels Reach 40 dBA (Feet)	Distance from C/L Where Noise Levels Reach 35 dBA (Feet)
Alternatives 2, 2b	36–37[a]	0.47	N/A	44	150	350
Alternative 3	36	0.07	1.28	44	150	300
Alternatives 4, 5	37	0.13	N/A	44	130	350

C/L = centerline; N/A = not applicable.

a. Except near the Watergate Recreation Site, where the existing ambient sound level was measured/estimated at 48 dBA.

Inside the study area, the operation of the proposed transmission line for all action alternatives would affect less than 0.5% of the surrounding natural zone in DEWA, as identified in table 90. This is considered a small area of disturbance. The operation of the proposed transmission line along the alternative 3 alignment would also affect a maximum of 1.28% of the surrounding special use zone designated as nonfederal public land. This is considered a small area of disturbance.

The noise from the proposed transmission line could reach 44 dBA directly at the centerline of the alignments during unfavorable weather conditions (see table 90). For alternatives 2, 2b, 3, 4, and 5, this represents a 7 to 8 dBA increase from existing ambient noise levels, which would be readily detectible to the human ear. Within 130 to 150 feet of the alignment centerlines, transmission line noise would reduce to 40 dBA (see table 90). This represents a 3 to 4 dBA increase from ambient sound levels for alternatives

2, 2b, 3, 4, and 5, which is barely perceptible to the human ear. These conditions would occur approximately 14% of the time Approximately 86% of the time (during fair weather conditions), the noise from the proposed transmission line would not be audible over the existing background sound levels. Within 300 to 350 feet of the alignment centerlines, transmission line noise would reduce to 35 dBA (see table 90), which would not be audible because it would be below the existing background sound levels for all action alternatives. These conditions would occur approximately 14% of the time. Under all action alternatives, the direct effects of the proposed transmission line operation would result in adverse impacts to soundscapes.

Maintenance of Transmission Lines: Under all action alternatives, temporary disturbance to the soundscape would be expected from noise associated with periodic maintenance activities, including the clearing of vegetation in the ROW. Access roads in the ROW would also require periodic maintenance to provide access for repairs and maintenance. Noise from equipment such as pickup trucks and chainsaws would be audible periodically. Noise levels associated with these activities would be similar to those described above for construction activities. This disturbance would be expected every year or as deemed necessary by the applicant.

Alternative 2

The adjacent townships of Middle Smithfield in Pennsylvania and Hardwick in New Jersey do not have sound ordinances applicable to the proposed action. Therefore, no conflicts with local ordinances are anticipated.

As stated in the “Common to All Action Alternatives” section above, there would be adverse soundscape impacts from decommissioning of the existing line and from construction and maintenance activities under alternative 2. With the implementation of mitigation measures to reduce construction noise as described in appendix F, construction-related impacts would be minimized. Some readily detectable noise associated with the continued operation of the new double 500-kV transmission line would be expected within 350 feet of the alignment centerline.

Cumulative Impacts

No projects inside the study area would have cumulative impacts on soundscapes, as described previously in the “Cumulative Impacts Common to All Alternatives” section. However, human-generated noise associated with decommissioning of the existing line and construction and maintenance of the new 500-kV line under alternative 2 would have adverse impacts on the soundscape. Therefore, cumulative impacts from alternative 2 would be adverse.

Conclusion

Inside the study area, adverse soundscape impacts would result from disturbance during decommissioning, construction, and maintenance activities. Some readily detectable adverse impacts on the soundscape would be expected within 350 feet of the alignment centerline from the operation of the line. Cumulative impacts are expected due to the adverse effects to the soundscape associated with construction and operation of alternative 2.

Alternative 2b

The alternative 2b alignment follows the same route as the alternative 2 alignment, along the existing B-K Line. The alternative 2b towers would be the same height as the alternative 2 towers, although two additional towers would be required for alternative 2b. The addition of two towers for alternative 2b would not measurably change the expected impacts. Thus, the adverse impact of alternative 2b would be the same as alternative 2.

Cumulative Impacts

The cumulative impacts under alternative 2b would be the same as those described for alternative 2, adverse, when combined with the other past, present, and reasonably foreseeable projects inside the study area.

Conclusion

Alternative 2b would result in adverse impacts on soundscapes inside the study area from the operation of the line. Cumulative impacts are expected due to the adverse effects to the soundscape associated with construction and operation of alternative 2b.

Alternative 3

The adjacent townships of Smithfield in Pennsylvania and Blairstown in New Jersey do not have sound ordinances applicable to the proposed action. Therefore, no conflicts with local ordinances are anticipated.

As stated in the “Common to All Action Alternatives” section above, there would be adverse soundscape impacts from the decommissioning of the existing line and from construction and maintenance activities. With the implementation of mitigation measures to reduce construction noise as described in appendix F, construction-related impacts would be minimized. Some readily detectable adverse impacts would be expected within 300 feet of the alignment centerline from the noise associated with the continued operation of the new double 500-kV transmission line.

Cumulative Impacts

No projects inside the study area would have cumulative impacts on soundscapes, as described previously in the “Cumulative Impacts Common to All Alternatives” section. However, human-generated noise associated with decommissioning of the existing line and construction and maintenance of the new 500-kV line under alternative 3 would have readily detectable impacts on the soundscape. Therefore, cumulative impacts from alternative 3 would be adverse.

Conclusion

Inside the study area, adverse soundscape impacts would result from disturbance during decommissioning, construction, and maintenance activities. Some readily detectable impacts on the soundscape would be expected within 300 feet of the alignment centerline during operation and maintenance. Adverse cumulative impacts are expected due to the soundscape impacts associated with construction and operation of alternative 3.

Alternative 4

Construction activities between the hours of 6:00 p.m. and 8:00 a.m. would violate the Stroud Township noise ordinance if construction-related sound exceeds the limits. The Upper Mount Bethel Township also has an ordinance that may be applicable to the proposed action, but specific information was not available from the jurisdiction.

As stated in the “Common to All Action Alternatives” section above, there would be adverse soundscape impacts from the decommissioning of the existing line and from construction and maintenance activities. With the implementation of mitigation measures to reduce construction noise as described in appendix F, construction-related impacts would be minimized. There would be some readily detectable adverse impacts from the noise associated with the continued operation of the new double 500-kV transmission line within 350 feet of the alignment centerline.

Cumulative Impacts

No projects inside the study area would have cumulative impacts on soundscapes, as described previously in the “Cumulative Impacts Common to All Alternatives” section. However, human-generated noise associated with decommissioning of the existing line and construction and maintenance of the new 500-kV line under alternative 4 would have readily detectable impacts on the soundscape. Therefore, cumulative impacts from alternative 4 would be adverse.

Conclusion

Inside the study area, adverse soundscape impacts would result from temporary disturbance during decommissioning, construction, and maintenance activities. Some readily detectable adverse impacts on the soundscape would be expected within 350 feet of the alignment centerline during operation and maintenance. Adverse cumulative impacts are expected due to the soundscape impacts associated with construction and operation of alternative 4.

Alternative 5

Inside the study area, the alignment for alternative 5 would follow the same route through DEWA and APPA as alternative 4, with the exception of the portion of the B-K Line from the Bushkill Substation to the western boundary of DEWA. The adverse impacts of alternative 5 on soundscapes would be the same as those described for alternative 4.

Cumulative Impacts

The cumulative impacts under alternative 5 would be the same as those described for alternative 4, adverse, when combined with the other past, present, and reasonably foreseeable projects inside the study area.

Conclusion

Alternative 5 would result in adverse impacts on soundscapes inside the study area from the operation of the line. Cumulative impacts are expected due to the adverse effects to the soundscape associated with construction and operation of alternative 5.

VISITOR USE AND EXPERIENCE

This section evaluates impacts on visitor use and experience. Impacts were determined by considering the effect of the existing conditions and the proposed construction and operation of the transmission lines on the overall use of recreational opportunities provided by the parks and the resulting experience visitors have while visiting the parks.

METHODOLOGIES

Visitors use a variety of park resources based on personal goals and interests, and the feeling they experience during their visit is the result of multiple actions and encounters. This analysis considers how the proposed alternatives would affect how people use park lands, as well as how the alternatives would alter visitors' experiences. Although several factors contribute to the quality of experience, the proposed actions would affect visitor use and experience primarily through visual and noise disruptions. Therefore, this analysis incorporates the findings from the "Soundscapes" and "Visual Resources" sections of this chapter to help determine how impacts on those park resources would affect visitor use and experience.

Aesthetic value is an important consideration in the management of recreation settings, especially where most people expect a natural-appearing landscape with limited evidence of "unnatural" disturbance of landscape features (USFS 1995, F-1). Scenic qualities can affect park visitors, residents of the local area or nearby communities, and a broader constituency who may either occasionally visit the parks or simply have an interest in their scenic qualities (USFS 1995, 3-3).

Landscapes are viewed to varying degrees from different locations, and subsequently differ in their importance (USFS 1995, 4-8). Visual impacts on visitor experience would depend on viewer exposure (which includes physical location, number of viewers, and view duration) and viewer sensitivity (which includes activity and awareness, personal values, and the cultural significance of a scene) (FHWA n.d., 97). Sometimes, only small numbers of people view certain landscapes (viewer exposure), but they may have high concern for scenic quality and high expectations of outstanding scenic beauty (viewer sensitivity). When associated with other related experience opportunities, such as introspection or spiritual quests, these landscapes have even higher scenic importance and value. Other natural resource values, such as wilderness, wildlife, or old-growth vegetation (cultural significance), may raise the importance of scenic quality and landscape settings (USFS 1995, 4-4). The particular activity in which people are engaged may encourage them to look at the landscape, such as nature photography, or distract them from doing so, such as driving during bad weather. A response by the viewer to a change can also be affected by expectations or awareness of the change, such as individual preconceptions about the landscape or an unexpected landscape transition (FHWA n.d., 69). In addition, the longer a view would be seen, the higher the impact. For example, motorists driving under a cleared canopy opening would be exposed to the change for a very short period, experiencing only a fleeting glimpse or a peripheral view of the effect. Hikers resting at an overlook along APPA would be exposed to a change for several minutes or longer. In assessing impacts on visitor use and experience, the analysis considers the duration of viewer exposure and viewer sensitivity based on location and activity, as described earlier. The types of activities in which visitors would likely engage at certain locations were used to estimate the duration of the activity as well as potential viewer sensitivity.

Visual impact research identifies the following factors that influence how people are affected by visual change (USFS 1995, 4-4, 4-7), which were incorporated into the analysis based on the location of visitors at specific sites in relation to the proposed actions:

- Landscapes seen close up are more visually sensitive than those seen in muted detail from greater distances.
- When people view landscapes at middleground distances, they often view them more coherently and in better context with their surroundings than they do foreground landscapes.
- When people view middleground landscapes that are evenly textured, human activities that dominate natural form, line, or texture create noticeable contrast.

- Scenic values increase as the terrain provides longer views, particularly where clean air allows for viewing crisp detail.
- Seasonal differences may affect viewer sensitivity; "leaf-on" and "leaf-off" conditions in deciduous forests will modify landscape visibility.
- Areas with important scenic features, such as national parks, attract a higher percentage of people with high concern for scenic quality.

As described in the "Affected Environment" chapter, most DEWA recreation sites exist in park development zones, which include intensive visitor use areas (NPS 1897a, 16–21). These areas are surrounded by lands zoned as natural, with a resource management subzone that includes natural and human-made features that have contributed to the scenic diversity of the area. Impacts within or extending into the natural zone, where all lands and resources are to be maintained to enhance scenic diversity and other values, would result in higher impact intensities than those confined to the development zone. Therefore, this analysis considers the zone in which visitor activities take place to further determine the level of impact.

Inappropriate sound can also adversely affect park visitor experiences. Visitors usually have high expectations regarding a national park experience. The impacts of inappropriate sound on visitor experience are especially evident where visitor expectations include solitude, serenity, tranquility, contemplation (as in wilderness), or a completely natural or historic environment. Because exposure to significant and constant levels of noise in urban and/or suburban settings is part of daily life for many people, a degraded natural soundscape would not provide visitors with a contrasting environment, which national parks are generally assumed to provide, and would represent a direct impact on visitor experience. To the extent that noise might displace animals from viewing areas, for example, it could indirectly impact visitor experience by precluding visitors from enjoying the sights and sounds of wildlife. Locations where visitors would expect characteristics of solitude, as described earlier, were considered in this analysis as having higher impacts than locations focused on more group-centered recreation.

STUDY AREA

The study area for visitor use and experience is the same as described for the "Visual Resources" section in chapter 3.

CUMULATIVE IMPACTS COMMON TO ALL ALTERNATIVES

For this EIS, actions inside and outside the parks can affect visitor use and experience by offering additional or improved opportunities for recreational pursuits and experiences, such as replacing a boat launch. Conversely, opportunities could be degraded or eliminated by activities such as expanding or relocating a gas pipeline or adding cell phone towers near a recreation site. Completed, current, and future activities that could have beneficial or adverse impacts on visitor use and experience in the parks, inside and outside the study area, are summarized below, with anticipated impacts identified. A full list of cumulative projects can be found in appendix H. Under the discussion of each alternative, the impacts associated with these projects were analyzed in conjunction with the impacts expected for the alternatives.

Projects Inside the Study Area

Inside the study area, projects that would result in adverse impacts on visitor use and experience include the following utility projects: the PADOT SR 2001 road project, the repair of failing Watergate Dam #10, the US Route 209 Raymondskill Creek Bridge rehabilitation, the Delaware River Joint Toll Bridge

Commission Delaware River bridge projects, the Tennessee Gas Line Proposal, the Columbia Gas Transmission Company pipeline increase, the DEWA prescribed-burn program, the DEWA hazard fuel reduction program, and existing utility towers within 5 miles. These projects would adversely affect visitor experience by lessening the natural feel of the parks and would affect visitor use through construction or other impacts that would inhibit easy access to recreation for visitors to the parks. Illegal activities, such as arson, vandalism, and trespassing, would also have adverse impacts on visitor use and experience. Licenses and permits for special use and incidental business/commercial visitor permits may affect visitor use and experience, and could be adverse for other visitors near the permitted activities.

Several cumulative development and utility projects inside the study area would have beneficial impacts on visitor use and experience, including the following: Smooth Ride Initiatives, US Route 209 road improvements, Sustainable Comfort Stations, the Pocono Environmental Education Center, New Jersey Swim Beach (Turtle Beach), hazardous structure demolition/deconstruction, the Kittatinny Point Visitor Center storm recovery, the Kittatinny Point Boat Launch replacement, the river campsite restoration of flood-damaged sites, the APPA relocation near the Columbia Gas pipeline crossing, and the Metropolitan Edison removal of unused power poles and transformers. These projects would improve facilities and resources available to visitors in the parks. Licenses and permits for special use and incidental business/commercial visitor permits may affect visitor use and experience, and the impacts would be beneficial for the permit recipients.

Although some projects would provide beneficial impacts that would positively affect visitor use and experience, the beneficial impacts would not outweigh the adverse impacts from the above-mentioned projects. Cumulative impacts on visitor use and experience inside the study area would be adverse.

Projects Outside the Study Area

Outside the study area, projects that would result in adverse impacts on visitor use and experience include the following utility and development projects: the PPL proposal for a 138/12-kV substation, the Tennessee Gas Line proposal, the Columbia Gas Transmission Company pipeline increase, Marcellus shale natural gas drilling, the Blue Mountain Ski Resort community-scale wind turbine, airport improvements, the Alpine Rose Racetrack, and wind turbines in northeastern Pennsylvania. These projects would result in adverse impacts from construction, the restriction of access, and the destruction of the natural feel of the parks and of the resources used by visitors. County and township open space and conservation plans would have beneficial impacts on visitor use and experience.

Although some projects would provide beneficial impacts that would positively affect visitor use and experience, the beneficial impacts would not outweigh the adverse impacts from the above-mentioned projects. Cumulative impacts on visitor use and experience outside the study area would be adverse.

Projects Specifically Affecting APPA

For APPA, the geographic range for cumulative impacts is Maine to Georgia, and includes any interruption in wilderness experience (roads, bridges, ROWs). The trail is already experiencing substantial impacts from other actions. Although some visitors use APPA for day hiking, the impacts for long-distance hikers is also considered for the entire length of APPA. For regional hikers, only projects within 20 miles of the S-R Line project are considered. Projects closer to the S-R Line are weighted heavier in the analysis. Projects along APPA are concentrated between northern Virginia and New Hampshire.

The development and utility projects listed above, particularly the Marcellus shale drilling and Columbia and Tennessee pipelines, would also adversely affect APPA. The resource management and restoration plans and activities would offer beneficial effects. Additional adverse impacts would result from activities planned along the entire length of the trail, including 317 antennas greater than 200 feet tall (e.g., cable television, communication towers) located within five miles of APPA (the vast majority, 113, are in Pennsylvania; Virginia has the next highest at 59; New Jersey has 9); 63 pipelines (the vast majority, 28, are in Pennsylvania; Massachusetts has the next highest at 14; New Jersey has 1); and 94 electrical power lines (the vast majority, 34, are in Virginia; Pennsylvania has the next highest at 17; New Jersey has 4). In addition, approximately 1,500 transportation infrastructure facilities, including local roads, park roads, highways and interstates, and railroads, are in (or proposed for development in) the vicinity of APPA. The majority, 316, are in Virginia, with Pennsylvania the next highest at 228. New Jersey has 85 proposed activities.

IMPACTS OF THE ALTERNATIVES ON VISITOR USE AND EXPERIENCE

Common to All Alternatives

Outside the study area: Regardless of which alternative is selected, the transmission line could pass through Carbon, Lackawanna, Luzerne, Monroe, Northampton, Pike, and Wayne counties in Pennsylvania and Morris, Sussex, and Warren counties in New Jersey. The clearing, construction, and vegetation maintenance activities outside the study area would be consistent with those described in the analysis of each alternative. Because the NPS cannot dictate where the line would actually go, the direct impacts from the construction and maintenance of the transmission line outside the study area cannot be determined. Additionally, the specific resources that would be affected by the transmission line outside the study area cannot be identified until the route is chosen by the applicants.

Outside the study area, visitors would continue to recreate in those areas described in chapter 3. Where the transmission line corridor had been established prior to creation of the recreation area, repeat visitors would have developed a tolerance for the presence of the facility. New visitors to sites near the transmission line corridor may be more affected by the unexpected presence of the line in a recreational setting. Impacts would also vary based on the type of recreation area visited and on the activities supported. As indicated in chapter 3, the transmission line would cross a variety of different types of recreation areas, offering various recreational uses and resulting experiences. Under the action alternatives, a wider ROW, taller structures, and additional access roads would likely have more impact on people seeking solitude and naturalness than to those engaged in off-roading on drivable trails. Adverse impacts to visitor use would result from construction and ongoing maintenance activities. The intensity would depend on the location and duration of the activity, season and time of week, and visitor sensitivity.

Outside the study area, views from APPA would be affected during the approach to the transmission line, as described under "Common to All Action Alternatives." Depending on the route outside the study area, the transmission line could cause visual impacts, especially if the line causes disruptions to the middleground, creating a noticeable contrast and affecting how visually coherent the landscape would appear to visitors

Outside the study area, indirect adverse impacts on visitor use from vegetation clearing, the construction of the transmission line, the operation and maintenance of the transmission line, and vegetation maintenance would occur.

Alternative 1: No Action

Under the no-action alternative, the existing transmission line ROW would not be widened. Visitors would experience no new sound impacts, because sound associated with the existing transmission line is currently not audible over the existing background sound levels, and there would be no increase in existing ambient sound levels. Visitors to DEWA and APPA segments in the study area have been exposed to views of the existing transmission line since the line was established. Although repeat visitors, particularly those who return to favorite recreation sites, may accept the presence of the transmission corridor and lines, new visitors may be adversely affected by their existence. It is also possible that repeat visitors currently avoid locations where the lines are most obvious, such as the Watergate Recreation Site. New visitors to sites like the Watergate Recreation Site may experience an unfavorable impression of DEWA due to the close proximity and visual intrusion of the existing structures. However, visitation to DEWA has steadily risen, demonstrating a 5% increase from 1999 to 2009 (NPS 2010ae). In addition, 96% of DEWA river users are satisfied overall with park facilities, services, and recreational opportunities (University of Idaho 2009).

Hikers using APPA may expect a different type of experience from those recreating at DEWA, specifically an experience that is focused more on being close to nature and enjoying the views along the trail (Manning et al. 2000). As described in the “Visual Resources” section in chapter 3, hikers would experience adverse effects from the abrupt vegetation opening created by the alternative 1 alignment’s cleared ROW for about 400 to 500 feet, as well as the close presence of two large galvanized steel lattice tower structures, before reentering the woods. The presence of the towers would diminish the sense of naturalness experienced by walking the trail through settings primarily undisturbed by large, human-made structures. However, the clearing would also provide views to the east and west, which some hikers may experience as a benefit. Despite the presence of such structures and clearings, the number of long-distance hikers has nearly doubled from the 1990s (3,283) through the 2000s (6,302) (ATC 2009b), indicating increasing interest in hiking the trail. Although an increased number of hikers on APPA, particularly long-distance hikers, would be affected, there would be no changes from existing conditions.

The operation of the existing transmission line would require periodic maintenance, including the clearing of vegetation in the ROW. Access roads in the ROW would also require periodic maintenance to provide access for repairs and maintenance to the system. All maintenance activities have the potential to adversely affect visitor use and experience near the actions due to noise and visual intrusions. These impacts would be more intense for hikers expecting solitude and a sense of naturalness. Most visitors would likely be unaware of the maintenance activities. There would be no noticeable change to visitor use and experience from operation of the existing transmission line.

Cumulative Impacts

Cumulative impacts on visitor use and experience inside the study area would be adverse, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the adverse impacts on visitor use and experience as a result of alternative 1 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected.

Conclusion

Alternative 1, the no-action alternative, would result in the continued operation and maintenance of the existing transmission line. Impacts in the study area 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. The continued operation of the existing transmission line would result in minimal impacts. Overall adverse cumulative impacts on visitor use and experience would be expected inside the study area.

Common to All Action Alternatives

Mitigation Measures: Mitigation measures would be implemented to reduce impacts on visitor use and experience and are taken into consideration in the impact analysis. Mitigation measures, such as an NPS-approved blasting plan, are described in appendix F.

Removal of Existing Structures: All action alternatives (2, 2b, 3, 4, and 5) include the removal of all or a portion of the B-K Line described in chapter 2. During the removal and disposal of existing structures, visitors would experience adverse noise and visual impacts from the creation of access roads, the transportation of construction equipment to and from the decommissioning sites, the removal of the crane pads and equipment at wire pulling locations, the removal and disassembly of lattice towers, and grading activities. Possible helicopter use would result in additional noise and visual impacts. As the decommissioned route returns to natural conditions, vegetation would fill the corridor, which would gradually disappear over time. Although some visitors may prefer the views the transmission line ROW opening would provide, returning the corridor to natural conditions would enhance the natural environment that most visitors enjoy. The elimination of the visual impact of the existing transmission line would result in a primarily beneficial impact on visitor experience.

Project Construction and Components: Adverse impacts would result from the construction of the new facilities, including grading activities to create level pads for tower sites, the construction of foundations, and the construction of steel towers, including wire installation. New pulling and splicing sites, as well as new construction staging locations, would further affect visitors due to noise and visual disruptions. Some existing roads, new access roads, and spur roads would require clearing and grading. Upon completion of the transmission lines, all roads except the spur roads would be permanently maintained. During construction, visitors may also experience temporary road closures or reroutes, which could cause delays or the inability to access and use preferred recreation sites. To help minimize these effects, construction activities would be coordinated with NPS and other managers of affected recreation areas to avoid peak visitor use periods and notify visitors of construction. Prior to construction, a media strategy/notification plan would be developed to notify local residents and visitors of closures (see appendix F).

Because some of the ROW expansion is necessary for construction safety and maneuverability, after construction is completed a portion of the corridor along the ROW would be allowed to revegetate. Only the width of the ROW necessary to maintain access roads and the transmission line would continue to be maintained. Such revegetation would take many years and would indirectly benefit visitor use and experience by potentially creating a visual screen in some locations and restoring a sense of naturalness, including restored wildlife habitat. Similarly, mitigation measures to minimize impacts on natural resources as described in chapter 2 would benefit park visitors' experience of those resources.

Under all action alternatives, devices placed on transmission line conductors (wires) to deter birds would increase the visibility of the lines by making the conductors more prominent. This could increase the level of adverse impacts where visitors would be visually exposed to these devices. The impact would vary based on the location, activity, and viewer sensitivity. For example, drivers passing underneath the lines may not notice the devices. Visitors relaxing at an overlook along APPA would be more affected, increasing the overall level of impact.

The addition or improvement of access roads and spur roads called for under all action alternatives could result in ORV and dirt bike use, which is illegal in the parks. Such use would result in increased noise, which would adversely affect visitor experience. This engine noise would be incompatible with the natural, park-like setting. In addition, visitors could see damage to vegetation and scars from these vehicles, and would potentially see the roads being used in this manner. The presence of these vehicles and their resulting damage would also decrease the possibility of wildlife sightings. These impacts would increase the level of impacts on visitor experience of the parks, and may influence visitors' use of the parks, because they may avoid such areas. To help minimize these effects, an OHV/ATV deterrent plan would be developed prior to construction activities, and temporary access roads would be permanently closed and revegetated to discourage such use (see appendix F).

As noted in chapter 3, many river users would pass below the transmission line under all action alternatives. Kittatinny Point, at the southern end of DEWA and downstream of the proposed transmission lines, is a popular river trip endpoint (Blotkamp et al. 2010, 48). The presence of the taller towers, thicker lines, and bird diverters (depending on the type used) would be seen not only as boaters pass below the wires, but during the approach from farther upstream. Under alternatives 3, 4, and 5, two sets of transmission lines would be visible. Sixty-four percent of DEWA visitors surveyed in 2010 indicated that power line expansion through DEWA and MDSR would detract from their park experience. For these reasons, changes proposed under the action alternatives would adversely affect the visitor experience of many boaters.

Similarly, visitors hiking long sections of trails, including APPA from both inside and outside DEWA boundaries, would be exposed to intermittent views of the transmission line during their approach to it. The towers would be taller, the ROW wider (with the exception of alternative 2b), and, in the case of alternatives 3, 4, and 5, two sets of transmission lines would be seen. The transmission lines would be more noticeable than existing conditions, so they would be seen from greater distances during the approach and would have a greater impact due to their larger presence. Therefore, the adverse impact on the "linear" experience of hiking a trail, especially APPA, would vary in intensity depending on visitor sensitivity and environmental conditions (e.g., leaf-on or leaf-off).

As noted in chapter 3, hunting is allowed throughout DEWA and is not concentrated in any particular area in relation to the proposed alternatives. Because hunters enjoy the natural aesthetics of their surroundings, they would experience similar impacts to other visitors. The canopy openings created by the transmission line would benefit some wildlife species but harm others. For example, some small game species may prefer canopy openings, depending on habitat (e.g., riparian areas), whereas deer prefer edge habitat but not direct openings. However, cleared openings are generally not suitable for hunting deer, because hunters would be visible to game. In addition, waterfowl hunters may not want to fire overhead toward the transmission lines and would therefore avoid these areas. As a result, widening the ROW would decrease the area's suitability for hunting. The most extensive impacts would result from deconstruction and construction activities. Natural quiet is important for hunters, particularly bow hunters. Noise from deconstruction and construction activities would frighten game from the area and degrade the naturalness of the hunting experience. Noise impacts would be greater under alternatives 3 and 4, which include the deconstruction of the existing B-K Line, the deconstruction of the existing transmission line along the alternative 3 or 4 corridor, and the construction not only of the S-R Line, but of the parallel replacement lines along the alternative 3 or 4 corridor. During these activities, hunters could choose to hunt in other parts of DEWA, possibly leading to crowding, which has been identified by 43% of all hunters as "unsatisfactory" in the park (Penn State 1989, 75). Once the existing B-K Line was revegetated under alternatives 3 and 4, beneficial impacts would result from increased habitat, improved habitat connectivity, and restored naturalness.

The NPS is mandated to preserve natural, historic, and scenic resources in perpetuity for the benefit and enjoyment of the public. Adverse impacts resulting from the action alternatives that would endure for the period of analysis would diminish the parks' ability to meet this mandate.

Under all action alternatives, adverse impacts on visitor experience may affect visitors to the extent that they do not return. This may be particularly true if access to a specific destination is closed during deconstruction/construction activities. There is no way of knowing the degree to which this could occur, making the impact unquantifiable.

Alternative 2

As noted in chapter 3, the Delaware River is one focal point of DEWA, and 26% of visitors engage in some type of canoeing, kayaking, or tubing on the river as part of their visit. Nearly 170,000 visitors canoe the river annually. In addition, 16% of visitors engage in fishing. The alternative 2 alignment would follow the existing transmission line, which crosses the river. Visual simulations indicate a substantial change to views for river users, resulting from higher structures and additional, thicker conductors. Because paddling, floating, and fishing the river is popular, many visitors would be affected. Boaters would pass below the transmission line quickly, but the line would be seen in the distance for some time during the approach, detracting from the naturalness of the setting (see “Common to All Action Alternatives” above). This would be particularly true for paddlers, whose approach is slower than motorboats. Corona noise, which is not heard from the existing line, would be heard during bad weather days as described in chapter 3 of the “Soundscapes” section. Motorboating is allowed on the river, but speeds are limited to 10 mph, helping to keep noise minimal and retain a sense of naturalness. Anglers fishing from the shore may avoid the transmission line crossing, but several other shoreline fishing options exist. For these reasons, overall visitor satisfaction would begin to decline, because visitors would be aware of the change and the duration of the impact would be prolonged. However, visitors may still recreate in this manner along the river, but may choose to recreate in different areas.

Construction vehicles would use River Road to access work sites. River Road could also be used if detours were needed during construction, increasing congestion. Bushkill, a small town just outside NPS boundaries that provides access to DEWA, is also the location of the Bushkill Substation, where alternatives 2, 2b, 3, and 4 would connect before changing direction. Visual simulations show a considerable visual change at Bushkill under alternative 2. The towers would be much more visible due to a substantial height increase and three rows of conductors. Although Bushkill is a commercial area, the sight of the large structures may diminish visitors’ initial impressions of DEWA before turning onto River Road or continuing along US Route 209 into the park. Many visitors would be affected by the visual change, which would be continuous and may change some critical characteristics of the desired visitor experience. During bad weather events, corona noise would increase while approaching and traveling under the line, as described earlier. Motorists would not likely notice the noise, but pedestrians would. Although adverse impacts on visitor experience would occur, visitor use of this area is not likely to change because the location is a main entrance to DEWA.

Expanding the ROW and building new and/or clearing existing access roads would adversely affect scenic motoring and cycling on Old Mine Road near mile marker 11, where the existing transmission line currently creates an abrupt opening in the vegetation canopy. This opening would be larger under alternative 2 due to the expanded ROW. The historical integrity of this section of the road would be additionally diminished, which would further affect the experience for visitors focused on historical landscapes. Impacts on cyclists, who would pass through the opening more slowly than motorists, would be greater. During unfavorable weather conditions, cyclists would also experience a 7 to 8 dBA increase in noise levels to 44 dBA as a result of corona noise as they pass directly under the centerline, which motorists would not likely hear. Within 150 feet of the centerline, this noise would decrease to 40 dBA, which is barely perceptible to the human ear (see the “Soundscapes” section for more information). Adverse noise impacts on cyclists, who represent some, but not all, DEWA visitors, would be slight and detectable but intermittent. Overall visitor satisfaction would remain constant, and visitors would continue to recreate in this manner. Motorists would either be unaware of the impacts or would experience them as slight but detectable. The experience would be fleeting, lasting only a few seconds.

Visitors hiking or mountain biking the McDade Trail would experience a wider canopy opening where alternative 2 would cross the trail. Currently the canopy opening is difficult to distinguish standing on the trail below. Removing the existing B-K Line and constructing the new one would create an abrupt canopy opening where one barely exists. The existing B-K Line is visible when approaching it from the south, but the structures only slightly clear the treetops. Visual simulations show a substantial change resulting from taller structures, which would be much more visible and would raise the conductors above the treetops, where they would also be clearly visible. Upon approaching the corridor, visitors would experience a 3 to 4 dBA increase in corona noise — a barely perceptible impact — within 150 feet of the centerline during unfavorable weather conditions, which would increase to 44 dBA as they pass directly under the centerline. These adverse impacts would be greater on hikers, who would pass more slowly under the transmission line than cyclists. Because the structures would be visible on the approach to the crossing, the duration of the visual impact would be more prolonged than if only visible at the crossing. However, the linear nature of the trail means that visitors may experience impacts on views as they approach the transmission line from a distance, as described under “Common to All Action Alternatives.” The presence of access roads would also increase noise and visual impacts compared to existing conditions. However, visitors would likely continue using this trail.

Visitors who use Community Drive in the area near McDade Trail would also be affected where the transmission line would cross the road. The towers would be taller and the line would be more visible, particularly where the corridor would be cleared and widened.

The S-R Line corridor would not be visible or audible from Bushkill Access. Visitors would experience noise from the nearby road and from boat launching activities, particularly motorboats. Visitors who come to the area during winter to watch bald eagles would not be affected by any visual intrusion, even during the leaf-off season. No impacts are expected on visitors using this recreation site.

Widening the ROW and adding new or clearing existing access roads would affect Watergate Recreation Site, where the existing B-K Line abuts the southern boundary of the area and can be clearly seen from many vantage points in the site. Trees that currently partially screen views of the corridor and structures would be removed. The corridor would be more visible along hills to the east and west. If the existing large lattice towers were replaced with single tubular structures, visual quality may improve, because the existing towers currently occupy sizable amounts of space. However, the new towers would be substantially taller and would rise above the treetops, which would be more obvious from various vantage points at this site. Noise from the transmission line would be audible by an increase of 3 to 4 dBA within 150 feet of the lines during unfavorable weather conditions. The trail to the Upper Glen parking lot starts below the existing transmission line. Due to the obvious presence of the transmission line at the trailhead, some visitors may choose not to hike this trail, particularly those who believe there are health risks associated with exposure to transmission lines (see the “Human Health and Safety” section for a discussion of this issue). Visitors who hike this trail from Watergate Recreation Site to the Upper Glen would experience a 7 to 8 dBA noise increase directly under the transmission centerline during unfavorable weather conditions. Visitors hiking this trail from the Upper Glen parking lot to the south would experience an abrupt canopy opening after walking past the natural setting created by a creek and wooded area. Visual impacts would also be permanent for visitors to the Upper Glen trail, potentially changing some critical characteristics of the desired visitor experience. Visitors would be aware of the change, which may affect their decisions to recreate there.

The S-R Line would not be visible or audible from the trail that is used to access the Van Campens Glen Picnic Site. However, due to its proximity to the Watergate Recreation Site, Van Campens Glen may experience additional use, and potentially crowding, if visitors relocate to a nearby area less affected by the presence of the transmission line. In addition, visitors hiking from Van Campens Glen to the Watergate Recreation Site would be adversely affected by the wider, abrupt canopy opening after following the heavily wooded trail. These intensity of these impacts would vary depending on the time of year and week (e.g., peak vs. nonpeak visitation, leaf-on vs. leaf-off). Van Campens Glen would be adversely affected by construction in the area and visitors may avoid Van Campens Glen during that time. Adverse impacts would vary during construction depending on the season, the day of the week, the location, the extent of construction closure, and the sensitivity of visitors.

Visitors hiking the Hamilton and Pioneer trails currently experience an abrupt opening in the canopy where the B-K Line crosses the trail. The opening currently creates a bright, sunny break in an otherwise shaded and tree-lined walk, and the cleared corridors can be seen east and west. The corridors would be even more visible if the ROW is widened. Widening the ROW and adding new or clearing existing access roads would increase the effect of this irregularity. Large lattice towers are currently close to both trails. Replacing these towers with single tubular structures may improve visual quality, because the existing towers currently occupy sizable amounts of space. The new towers would be substantially taller, which would make those in the middleground and background more obvious. As noted in “Methodologies” in this section, human activities in middleground landscapes can create a more noticeable contrast. During unfavorable weather conditions, corona noise would increase by 3 to 4 dBA to 40 dBA within 150 feet of the lines, increasing again to 44 dBA directly under the transmission centerline. Compared to existing conditions, impacts would be detectable but would not appreciably change the experience for visitors. Visitors would likely continue to use these trails although adverse impacts would occur.

The wider ROW and new access road would affect the Hamilton River campsites by intruding into the wooded camping area. The wider ROW and road would also more clearly indicate the presence of the transmission line compared to existing conditions and would detract from the natural camping experience for overnight boaters who use this site. This would be particularly true during unfavorable weather conditions, when noise from the line would be detectable 150 feet from the centerline, although 40 dBA is barely perceptible to the human ear. This would also be true when the access roads are in use by the applicants. Views across the river from the campsite would change as a result of the wider ROW and taller structures. The intrusion of the line into the campsite may influence boaters to bypass this campsite in favor of one in a more natural setting. In addition, several Hamilton River campsites would have to be permanently closed because of expansion of the transmission line. This would reduce the number of available campsites along the river and impact a very popular camping location. Visitors would have to use other locations. The change would be persistent at this location, and visitors would be aware of the change.

Visitors using the Rivers Bend campground would be affected where the alternative 2 alignment would be visible. A view from an overlook through the trees at the southern end of the campground that provides views of the Walpack Bend region and downstream would also include the ROW. Visitors who do not visit this overlook would not be affected.

The existing B-K Line is minimally visible from Millbrook Village, although it can be seen from the parking lot and the entrance to the village near the Wagon Wheel shop. Visual simulations show that the higher towers would raise the conductors, making them visible to the south against the sky and background vegetation. No noise would be heard from the conductors, which would be more than 0.5 mile away. Visitors would hear noise from nearby roads and other people, particularly during NPS-sponsored historical events. Visiting historic sites is a popular visitor activity at DEWA, and the presence of the conductors would detract from the historical setting of the village. The level of adverse impacts would depend on visitor sensitivity level. The presence of a modern structure in a historical setting would noticeably alter visitor enjoyment, and thus their experience, of the area. However, the change to visitor experience at this location would not likely affect the use of this area.

Where the alternative 2 alignment would cross APPA, hikers would experience adverse effects from taller towers, more conductors, a wider ROW, and new or cleared existing access roads. The expanded ROW would clear an additional 50 to 200 feet beyond existing conditions. As shown in the visual simulation in the “Visual Resources” section in chapter 3, replacing the large lattice towers with single tubular structures would improve visual quality at this location to a slight degree, because the existing towers currently occupy sizable amounts of space. The absence of the large lattice towers would also improve views by removing foreground visual clutter at this location. However, the simulation provides a snapshot in time from one specific viewpoint. As noted in “Methodologies” in this section, people are more visually sensitive to landscapes seen close up. The increased height of the new towers would adversely affect visitors as they approach the transmission line during their hike, as described under “Common to All Action Alternatives.” The wider ROW, taller towers, and more noticeable conductors would result in an adverse effect on hikers approaching the transmission line. Overall, there would be a slight benefit to visitor experience at the specific simulation viewpoint due to increased visibility, but these impacts would be offset by the adverse impacts in other locations along the trail approaching the alternative 2 alignment. During unfavorable weather conditions, noise from the conductors under alternative 2 would be barely audible within 150 feet of the lines, increasing again to 44 dBA directly under the transmission centerline. Visitor use of the trail would not change.

Human activity during deconstruction and construction near recreation sites would adversely affect visitors’ experience and possibly affect the use of certain areas, as described in the “Common to All Action Alternatives” section. Under alternative 2, construction impacts would be most apparent along NPS 602 (Millbrook-Blairstown Road) and Old Mine Road in New Jersey. Affected sites potentially include Van Campens Glen, Upper Glen, Hamilton and Pioneer trails, the Watergate Recreation Site, and Millbrook Village. Deconstruction and construction activities would be coordinated with NPS events at Millbrook Village to avoid access issues to the extent practical. Impacts would also depend on the extent to which deconstruction and construction activities could be seen or heard, as well as the location of spur roads. As described in the “Soundscapes” section, sound levels could increase by more than 13 dBA in areas as far as 3,200 feet from the activity, resulting in an adverse impact during most of the daytime hours when deconstruction and construction activities would take place. Such an impact, particularly during peak season for visitors, would adversely affect visitor experience, and may cause visitors to use different recreational sites. However, many visitors are attracted to specific recreational locations in DEWA and regularly return to those locations rather than visiting other park areas. Such visitors may choose to avoid the park altogether during deconstruction and construction activities if their favorite site is affected, noticeably altering visitor use and experience. Mitigation measures to avoid peak visitor use periods and notify visitors of construction activities and closures would help minimize these impacts.

Impacts related to the maintenance of the transmission line would be similar to alternative 1. However, access roads would be cleared, compacted, and possibly widened under alternative 2, resulting in a slight change from existing conditions.

Cumulative Impacts

Cumulative impacts on visitor use and experience inside the study area would be adverse, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the adverse impacts on visitor use and experience as a result of alternative 2 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected. Alternative 2 would contribute an appreciable adverse increment to the overall cumulative impact.

Conclusion

In the study area, alternative 2 would result in impacts to visitor use and experience, with the most intense impacts at Watergate Recreation Site. Visitors would experience overall adverse impacts where the transmission line crosses APPA, although some benefits would be expected from the removal of visual clutter. Impacts related to deconstruction and construction would be localized, particularly related to noise. Ongoing maintenance activities would be of limited duration and in specific locations. Cumulative impacts inside the study area would be adverse.

Alternative 2b

The alternative 2b alignment would follow the same route as alternative 2, and all towers would be the same height, although two additional towers would be required. The width of the ROW would not change from existing conditions. Although no visual impacts would result from a wider ROW, adverse impacts on visitor use and experience would be similar to those described for alternative 2 due to increased tower height and thicker conductors. Adverse impacts related to noise would also be similar to alternative 2, as described in the “Soundscapes” section.

Adverse impacts on DEWA would be similar to alternative 2, Impacts on APPA would also be similar to alternative 2 due to the taller towers and more noticeable conductors, even though the ROW would not change from existing conditions. Ongoing maintenance activities would be of limited duration and in specific locations. Adverse impacts would result from construction and ongoing maintenance activities.

Cumulative Impacts

Cumulative impacts on visitor use and experience inside the study area would be adverse, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the adverse impacts on visitor use and experience as a result of alternative 2b are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected. Alternative 2b would contribute an appreciable adverse increment to the overall cumulative impact.

Conclusion

Inside the study area, alternative 2b would result in similar impacts to alternative 2. Impacts on APPA would also be similar to those under alternative 2 even though the ROW width would remain the same as existing conditions. Adverse impacts to visitor use and experience would result from construction and ongoing maintenance activities. Overall cumulative impacts inside the study area would be adverse.

Alternative 3

Visual simulations indicate a substantial change to views for river users where alternative 3 would cross the Delaware River resulting from taller structures and additional, thicker conductors, as well as the second set of structures. Because paddling, floating, and fishing the river is so popular, many visitors would be affected (see “Common to All Action Alternatives,” above). Views of the riverbank on the New Jersey side would change dramatically due to the 90-degree bend to the northeast that would be included at that location. That bend and the continuation of the existing transmission line beyond it currently cannot be seen, but the corridor and structures (for the S-R Line and the replaced transmission/distribution line) would be clearly visible under alternative 3. As with alternative 2, the line would also be seen in the distance by boaters for some time during the approach, detracting from the naturalness of the setting. Corona noise would be heard during bad weather days as described earlier. This noise is not currently heard from the existing line. For these reasons, overall visitor satisfaction may begin to decline because visitors would be aware of the change, and the duration of the impact would be persistent. However, people would continue to recreate in this manner. Anglers fishing from shore may avoid the transmission line crossing, but other opportunities exist throughout the parks. Overall, adverse impacts to visitor use and experience would occur.

The existing transmission line that the alternative 3 alignment would follow cannot currently be seen from Turtle Beach. Visual simulations show a barely perceptible change in the distance. Visitors would be unaware of the change. Similarly, the alternative 3 alignment would not be visible from Poxono Access or Ricks Rocks. No impacts are expected at these locations.

The alternative 3 alignment would cross River Road just north of Hialeah Picnic Site. Visual simulations show the impact of a wider ROW and taller structures along the hillside to the west. Motorists driving on River Road may not notice the change to the hillside as much as passengers would, because motorists typically focus on the road while driving. Minimal changes are expected where the lines would cross the road.

The existing ROW traverses Worthington State Forest in DEWA and, like alternative 2, would be widened an additional 50 to 100 feet. Alternative 3 would cross Old Mine Road in Worthington State Forest with similar impacts on motorists and cyclists as described for alternative 2. Visual simulations show substantial changes due to widening the ROW and erecting taller structures. Upon crossing the road, the alignment would take an almost 90-degree bend to the northeast, which currently is not visible to motorists and cyclists approaching from the south. The wider ROW under alternative 3 would make this bend visible, exposing the wider corridor and taller structures that would continue up a hill beyond it, changing the visitor experience. This increased exposure due to the wider ROW would also make the towers on the hillside, which currently cannot be seen, more visible. Noise impacts during unfavorable weather conditions would be similar to those experienced under alternative 2. As described for alternative 2, cyclists would be more affected by the visual and auditory impact than motorists. The duration of the impact would be fleeting for motorists, and more prolonged, but still intermittent, for cyclists. However, visitors would continue to recreate in this manner.

Soon after visitors begin hiking or mountain biking north of the McDade trailhead from the Hialeah Picnic Site, the existing transmission line that the alternative 3 alignment would follow becomes barely visible on the hillside to the west. Visual simulations of the Hialeah Picnic exit road, which is close to McDade Trail in this area, show a substantial change resulting from the wider ROW and taller structures, which would be clearly visible across an open crop field as the line crosses the hillside. These impacts represent a new visual intrusion visible from the trail. Because the structures would be visible until visitors reach a wooded area, the duration of the visual impact would be more prolonged than if only visible at the crossing. Similarly, the linear nature of the trail means that visitors may experience adverse impacts on views as they approach the transmission line from a distance, as described under “Common to All Action Alternatives.”

Currently, farther along McDade Trail, the existing canopy clearing is obvious, creating a bright, sunny opening in a heavily wooded area. The opening provides views of the river, which cannot otherwise be seen after starting from the trailhead at Hialeah Picnic Site. A wider ROW would enlarge this clearing and provide more expansive views. Visual simulations show that the view across the river would change considerably because the 90-degree bend that the route would take just east of Old Mine Road would become clearly visible. Visitors looking across the river from this opening would see structures for both the S-R Line and the replaced transmission/distribution line.

Noise impacts at this location would be similar to those experienced under alternative 2. These impacts would occur in unfavorable weather conditions and would be greater on hikers, who would pass more slowly under the transmission line, than cyclists. The presence of access roads would also increase noise and visual impacts compared to existing conditions, thereby adversely affecting visitor experience, although visitors would continue to recreate in this manner, they may choose to use other sections of the McDade Trail to avoid the adverse impacts from the transmission line and access roads.

In addition to the impacts from paddling or floating the river described below, river users camping at campsite #106, which is adjacent to McDade Trail and the river (although open only to river users), would likely experience adverse impacts from alternative 3 at the campsite. These impacts would be similar to those shown in visual simulations for campsites at the Walters Tract river campsites. Again, the 90-degree bend in the transmission line on the east side of the river would create a more pronounced impact because the corridor and structures would be more visible compared to existing conditions. However, the impact would only be visible to the north from the edge of the river. Upon reaching the campsite, the transmission line would be behind (upstream of) boaters. In the campsite, vegetation surrounding the site would block views of the line, which would also be too distant to be audible. The visual impact would be intermittent from this site, and would not appreciably limit the visitor experience. Visitors would continue to use this campsite. Impacts at the Hialeah Island campsites would be similar because alternative 3 would be upstream from the campsites, primarily visible from the edge of the river.

Although McDade Trail originates at the Hialeah Picnic Site, the existing transmission line that the alternative 3 alignment would follow cannot be seen due to distance and substantial vegetation that blocks views. Therefore, no impacts are expected on visitors using this picnic area. As visitors leave the picnic area, the transmission line would be visible to the north, as described earlier for McDade Trail. Drivers would not likely see the new transmission line, as it would be out of their line of sight. But passengers looking to the north would see it for a short time. Therefore, only some visitors would be affected, and the effect would be slight but adverse.

Similar impacts would be expected at Hialeah Air Park just north of Smithfield Beach. Although the alternative 3 alignment would be farther south, visual simulations show a dramatic change at the air park. The experience of some visitors flying model planes or watching the activity would be adversely affected. The visual change would be persistent, although the transmission lines would not be audible from this location. Visitors would continue to recreate in this manner. Impact intensity would vary depending on visitor sensitivity to and awareness of the visual change.

The alignment for alternative 3 would be visible from vantage points along APPA. Where the alternative would cross the trail, two sets of structures would be visible. The corridor would be more visible in the distance compared to existing conditions due to the wider ROW and taller structures of the S-R Line, as well as the presence of two parallel lines. Impacts would vary based on viewer sensitivity. Visitors would likely be adversely affected by the visual change in the distance, and scenic values increase with longer views. Changes in visitor experience would be detectable but would not appreciably limit the experience.

At the future APPA relocation site in DEWA, the existing transmission line in the alternative 3 alignment cannot currently be seen. Visual simulations show that a taller tower and conductors would be clearly visible in the distance, creating a new visual intrusion where one had not previously existed, thereby changing the desired visitor experience. However, visitor use of the trail would continue.

Raccoon Ridge is a vantage point along APPA just north of the transmission line crossing. The towers and conductors would be clearly visible where none exist under current conditions. The change would represent a large, human-made intrusion into a predominantly natural viewscape, noticeably altering the experience for most, if not all, APPA hikers.

Farther north, the alternative 3 alignment would closely parallel APPA for approximately 2.5 miles on the east side of DEWA. APPA follows a high ridgeline in this area, and the existing transmission line that the alternative 3 alignment would follow is below the ridge but visible from the trail. This transmission line would be replaced parallel the new S-R Line, remaining visible in conjunction with the S-R Line under alternative 3. Many locations along the trail provide wide openings from which the existing transmission line can be seen for several miles to the north and south. Visual simulations show a dramatic and substantial change resulting from the wider ROW, taller structures, and dual sets of structures. The taller towers would raise the conductors considerably higher, making them far more visible compared to existing conditions. Trail hikers would be exposed to this change for the duration of their journey through the area. The change would noticeably alter the visitor experience, and hikers, particularly long-distance hikers, would be highly aware of and sensitive to the change. Overall visitor satisfaction along this area of the trail would likely markedly decline. However, visitor use of the trail would not change. The result would be an adverse impact on visitor experience.

Human activity during deconstruction and construction in proximity to recreation areas would adversely affect the visitor experience and possibly affect the use of certain areas, as described in the “Common to All Action Alternatives” section. Impacts would also depend on the extent to which deconstruction and construction activities could be seen or heard, as well as the location of spur roads. Deconstruction and construction impacts would be of longer duration under alternative 3 because the B-K Line would be removed, the existing structures along the alternative 3 alignment would be removed prior to construction of the S-R Line, and the existing line would be replaced. Therefore, alternative 3 would require two deconstruction activities (the B-K Line and the existing alternative 3 line) and two separate construction activities (the S-R Line and the replacement of the existing alternative 3 line). These activities would affect large sections of the study area, and would be most apparent where the line would cross McDade Trail. As described for alternative 2, sound levels could increase by more than 13 dBA in areas as far as 3,200 feet from construction activity. Visitors using McDade Trail may not become aware of the adverse impact until they reach the crossing. It is therefore unlikely that visitors would avoid hiking or mountain biking the trail. Impacts on the visitor experience of these trail users would result where the transmission line would cross McDade Trail. During construction the affected portions of the McDade Trail would be closed to visitors. Mitigation measures to avoid peak visitor use periods and notify visitors of construction activities and closures would help minimize these impacts.

Impacts related to the maintenance of the transmission line would be similar to those under alternative 2, although more access roads would be created under alternative 3. In addition, two lines would need to be maintained under alternative 3. The presence and use of new permanent access roads may adversely affect visitors, but the effect would be slight, localized, and intermittent. Visitor use and experience would not measurably change.

Cumulative Impacts

Inside the study area, the adverse impacts resulting from alternative 3 were evaluated in the context of other projects in the region mentioned in the “Cumulative Impacts Common to All Alternatives” section. Similar to alternative 2, the primarily beneficial impacts expected in the study area would not be sufficient to offset the impacts expected in DEWA from other actions, such as possible increased crowding. These impacts would be combined with the mostly visual impacts resulting from a wider ROW, taller structures, and dual sets of structures under alternative 3, which would be adverse in DEWA. The resulting adverse cumulative impacts in DEWA would be adverse.

Cumulative impacts on visitor use and experience inside the study area from other past, present, and reasonably foreseeable projects would be adverse, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the adverse impacts on visitor use and experience as a result of alternative 3 are combined with the other projects in the study area, an overall adverse cumulative impact would be expected. Alternative 3 would contribute an appreciable adverse increment to the overall cumulative impact.

Conclusion

Inside the study area, the 90-degree bend the line would take at Old Mine Road would affect views from several vantage points, affecting many visitors. The alternative 3 alignment would also create new visual intrusions at Raccoon Ridge along APPA, and would be seen from other vantage points along the trail. Most of the adverse impacts on APPA would occur where the alternative 3 alignment would parallel the trail for approximately 2.5 miles. Two sets of structures would be constructed in the expanded ROW, increasing the visual impact. Construction-related adverse impacts would occur from impacts on soundscapes based on location. Multiple deconstruction/construction activities would occur. Maintenance impacts would be the same as alternative 2. Overall cumulative impacts inside the study area would be adverse.

Alternative 4

Because alternative 4 would originate at the Bushkill Substation, impacts on the Bushkill area would be as described for alternative 2.

Resort Point Overlook, Point of Gap Overlook, and Arrow Island Overlook along the Delaware River in the southern end of DEWA would not be affected by the alternative 4 alignment, which would not be visible from these locations. Similarly, neither would the Kittatinny Point Visitor Center. Across the highway, Red Dot (Tammany) Trail climbs 1,250 feet in 1.5 miles, providing views of Mount Minsi and the Delaware Water Gap. Although Mount Minsi would block views of much of the alignment, visual simulations show that the alignment would be clearly visible east of the mountain. Under existing conditions, the current transmission line is barely visible, if at all. Red Dot (Tammany) Trail is a demanding hike; the sweeping views are the reward for a difficult effort. Visitor experience would be diminished by the intrusion of the alternative 4 corridor in the viewshed, and the change would be persistent. Visitors who often hike this trail would notice the change, although overall visitor satisfaction would remain constant and visitors would continue to hike this trail. Therefore, adverse impacts on visitor experience would occur.

Visitors hiking APPA north of the river would not be exposed to views of the alternative 4 alignment. Visitors hiking the trail south of the river would not be affected by alternative 4 until reaching the transmission line crossing. The wider ROW would be a considerable and noticeable change, particularly in views to the northwest. Taller structures would be substantially higher than the existing wood towers, which would be removed and replaced. The change would be clearly detectable, but would not appreciably alter the visitor experience. The use of the trail would not change. Adverse impacts on visitor experience would occur.

Farther south along APPA, Lunch Rocks and Nelson Overlook provide views from high vantage points. At both locations, the existing transmission line that the alternative 4 alignment would follow is barely perceptible. The view from Lunch Rocks would change substantially as the wider ROW would create a far more visible corridor, and the taller towers would be clearly seen from the ridgetop in the middleground. Disruptions to the middleground may create a noticeable contrast and would affect how visually coherent the landscape would appear to visitors. The impact would affect the majority of the viewing area. At Nelson Overlook, the view would be affected primarily by the larger corridor, although it would not fill the entire viewframe. In both cases, the change would represent a new visual intrusion into the viewscape and would create adverse impacts to visitor experience.

The southern section of Karamac Trail is in DEWA adjacent to Worthington State Forest and begins at the traffic light on Old Mine Road. Visitors use the trail to access the river and spend time on the rocks. The existing transmission line that the alternative 4 alignment would follow is on the west side of the Delaware River and cannot currently be seen from the Karamac trailhead. However, it is visible at the terminus of the trail at the river, where hikers spend more time. Under alternative 4, one tower and conductors would be visible across the river. The remainder of the line would be obscured by vegetation. Visitors would either be unaware of the impact, or the impact would be slight and detectable. Few to some visitors would be affected, but the change would not appreciably limit critical characteristics of the visitor experience. Visitors would continue to use this trail.

Human activity during deconstruction and construction near recreation sites would adversely affect visitor experience and possibly affect the use of certain areas, as described in the “Common to All Action Alternatives” section. Impacts would depend on the extent to which deconstruction and construction activities could be seen or heard, as well as the location of spur roads. Under alternative 4, construction impacts would be most apparent where the line would be close to APPA. The access road would veer east outside the ROW and would cross APPA about 600 feet from the transmission line. This would represent two crossings of the trail under alternative 4. As described for alternative 2, sound levels could increase during construction by more than 13 dBA in areas as far as 3,200 feet from the activity. In addition, more visitors would be adversely affected because there would be two rounds of deconstruction activities and two rounds of construction activities, which may not be conducted simultaneously and would affect visitors in different locations. Visitors hiking APPA may not become aware of the impact until they reach the crossing and access road. Because the access road would be several hundred feet from the transmission line, impacts related to construction and maintenance would be greater. Noise impacts on these trail users would occur where the alternative would cross APPA. Despite these impacts on visitor experience, visitors would continue to use this trail. Mitigation measures to avoid peak visitor use periods and notify visitors of construction activities and closures would help minimize these impacts.

Adverse impacts related to maintenance of the transmission line would be the same as for alternatives 2 and 3.

Cumulative Impacts

Cumulative impacts on visitor use and experience inside the study area would be adverse, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the adverse impacts on visitor use and experience as a result of alternative 4 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected. Alternative 4 would contribute an appreciable adverse increment to the minimum overall cumulative impact.

Conclusion

Adverse impacts would occur at the Red Dot (Tammany) Trail and Karamac Trail. However, most of the adverse impacts under alternative 4 in the study area would affect APPA. Two sets of structures would be built in the ROW, increasing the visual impacts. Construction-related impacts and maintenance impacts would be the same as alternative 3. Overall cumulative impacts inside the study area would be adverse.

Alternative 5

Adverse impacts on visitor use and experience would be the same in the study area as described for alternative 4.

Cumulative Impacts

Cumulative impacts under alternative 5 would be the same as those under alternative 4. Alternative 5 would contribute an appreciable adverse increment to the minimum overall cumulative impact.

Conclusion

Impacts inside the study area under alternative 5 would be the same as for alternative 4.

WILD AND SCENIC RIVERS

The Wild and Scenic Rivers Act of 1968 calls for the protection of specific U.S. rivers that “possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values” (16 USC 1271, 1526). This policy is to preserve selected rivers “in their freeflowing condition to protect the water quality of such rivers and to fulfill other vital national conservation purposes” (16 USC 1271, 1526). These rivers are to be protected “for the benefit and enjoyment of present and future generations” (16 USC 1271, 1526). Section 1274 of the Wild and Scenic Rivers Act identifies MDSR and the land adjacent to it as a component of the national wild and scenic rivers system to be administered by the Department of the Interior, specifically the NPS (16 USC 1274, 1530; 16 USC 1281[c], 1572). Wild and scenic rivers administered by the NPS are part of the national park system, and are subject to all laws, regulations, and policies applicable to that system (NPS n.d.b). The DEWA GMP states that, although the national recreation area and the scenic and recreational river have separate origins, they are considered an integrated whole for the purposes of park planning. As a scenic and recreational river, MDSR must be managed in accordance with the Wild and Scenic Rivers Act.

Section 10(a) (16 USC 1281(a)) directs managers to “protect and enhance” the values for which these rivers are designated. The “protect and enhance” language of Section 10(a) is interpreted in the Secretaries’ Guidelines as “a non-degradation and enhancement policy for all designated river areas, regardless of classification.” See Secretaries’ Guidelines, Section III, “Management.” The Interagency Guidelines interpret Section 10(a) as a “non degradation and enhancement policy for all designated river areas, regardless of classification.”

The Wild and Scenic Rivers Council advises that Section 10c of the Wild and Scenic Rivers Act requires the NPS to use their general statutory authorities to protect wild and scenic river values, meaning that it shall be (16 USC 1281(a), 1572) administered in such manner as to protect and enhance the values which caused it to be included in [the wild and scenic rivers] system without … limiting other uses that do not substantially interfere with public use and enjoyment of these values. In such administration primary emphasis shall be given to protect [the area’s] aesthetic, scenic, historic, archeological, and natural features.

METHODOLOGIES

The analysis of impacts on MDSR was based on a qualitative assessment of how the proposed alternatives would affect those values for which the river was designated, specifically those identified by the Wild and Scenic Rivers Act as having primary emphasis: aesthetic, scenic, historic, archeological, and natural features, including water quality. These resources are further defined in chapter 3 as water resources, scenery, recreation, wildlife, and vegetation. In addition, this analysis considers the protection and enhancement of MDSR for the benefit and enjoyment of the public, as called for under the act. Therefore, this analysis refers to those sections of this chapter that address these resources and values.

STUDY AREA

The study area for this topic includes the entire 40-mile designated segment of the MDSR, all of which flows within DEWA. The analysis under Section 10c of the Wild and Scenic Rivers Act includes lands adjacent to the river because the scenic values that fall under Section 10c review are associated with lands outside the immediate corridor of the river.

CUMULATIVE IMPACTS

Past, present, and reasonably foreseeable future actions within the park could affect the values for which the river was designated. The addition of roads, clearing of vegetation, or enhancement of environmental resources could have an effect on the river's values and the public's experience of the river. Projects outside the park would be less likely to affect the scenic or recreational values of the river, unless the effects are extensive; for example, a dam upstream of DEWA would likely compromise the qualities of the river that made it eligible for classification under the Wild and Scenic Rivers Act. Completed, current, and future activities that would have beneficial or adverse impacts on MDSR inside and outside the study area are summarized below. A full list of projects considered for the cumulative impacts analysis can be found in appendix H. Under each alternative, projects within and outside the study area that may contribute to cumulative effects on MDSR in addition to the actions described under the proposed alternative, are described and analyzed.

Projects Inside the Study Area

The primary emphasis for the protection of MDSR includes the area's aesthetic, scenic, historic, archeological, and natural features. See the "Visual Resources," "Cultural Resources," and "Visitor Use and Experience" cumulative impacts sections for actions that could affect those specific values of the recreational river, as well as enjoyment of those values. Activities that would affect the qualities that the Wild and Scenic Rivers Act emphasizes for protection, as well as the ability of visitors to enjoy those qualities (addressed under separate impact topics), include the following:

Projects that would have an adverse effect on aesthetic and scenic qualities include the Columbia Gas pipeline crossing, the Columbia Gas Transmission Corporation pipeline expansion, the Tennessee Gas Line proposal, and communications tower development. The following projects would affect aesthetic and scenic characteristics inside the study area by improving aesthetics through restoration and preservation and diminishing aesthetics in the short term through construction and staging activities: the Kittatinny Point Visitor Center storm recovery, the Delaware River bridge projects, and the improvement of the Delaware Water Gap Toll Bridge. Several projects would cause a change in the significance of archeological resources inside the study area through restoration of architectural resources, other structures, and recreational sites. These projects include the stabilization and repair of damaged structures, the New Jersey Swim Beach (Turtle Beach), the river campsite restoration of flood-damaged sites, and the McDade Trail realignment. The beneficial impacts on park facilities from actions within DEWA undertaken by the NPS would have more relevance under this topic than under "Visitor Use and Experience," particularly those actions adjacent to the river, such as restoration of river campsites. These actions include the New Jersey Swim Beach (Turtle Beach) and the river campsite restoration of flood-damaged sites.

Projects Outside the Study Area

Outside of the study area, the Marcellus Shale natural gas drilling and residential and commercial development in contributing watersheds would result in adverse impacts on the river through degradation of water quality. Beneficial impact on the river from conservation of resources would result from county and township open space and conservation plans and Pike County agricultural security leases.

IMPACTS OF THE ALTERNATIVES ON THE MIDDLE DELAWARE SCENIC RIVER

Alternative 1: No Action

Under the no-action alternative, the existing B-K Line ROW would not be widened. The features and attributes of MDSR would not change compared to existing conditions. According to the applicant's project website, the existing transmission line was built in the 1920s (PSE&G 2010b), prior to the designation of MDSR and DEWA. Therefore, alternative 1 would not further affect the values for which the river was designated.

The operation of the existing transmission line would require periodic maintenance, including clearing vegetation within the existing ROW. Access roads within the existing ROW would also require periodic maintenance to provide access for repairs and maintenance. These activities would not be visible from the river corridor and best management practices would minimize impacts such as erosion and sedimentation from vegetation management and access road maintenance. The existing line crossing of the MDSR would continue to conflict with the natural scene in that section of river but to no greater extent than what existed at the time that the MDSR was designated. The public would continue to enjoy the river as it has since the river's designation.

Cumulative Impacts

Because no impacts would occur on MDSR under alternative 1, there would be no cumulative impacts on MDSR under alternative 1.

Conclusion

Alternative 1, the no-action alternative, would result in the continued operation and maintenance of the existing transmission line. No additional impacts on MDSR are expected. Therefore, there would be no cumulative impacts on MDSR under alternative 1.

Common to All Action Alternatives

For all action alternatives, the existing B-K Line within the park boundaries would be removed to the extent feasible as described in chapter 2, and the existing corridor would be allowed to revegetate, ultimately returning to forested habitat over the long term. Under any of the action alternatives some ROW expansion is necessary for construction safety and maneuverability, after which, a portion of the corridor along the ROW would be allowed to revegetate. Only the width of the ROW necessary to maintain access roads and the transmission line would be maintained. Such revegetation would indirectly reduce adverse impacts to the aesthetic and scenic qualities of MDSR by potentially creating a visual screen that would restore a sense of naturalness, albeit limited to some degree in some locations.

Alternative 2

Alternative 2 would result in widening the existing B-K Line ROW through DEWA and MDSR for approximately 4.3 miles. The existing structures and lines would be removed and replaced with new towers and lines as described in chapter 2, resulting in a permanent loss of vegetation along the existing ROW. An additional 50 to 200 feet beyond the width of the existing ROW would be required to construct, operate, and maintain the new transmission line. Adverse impacts would occur primarily on scenic qualities. Adverse impacts on historic structures and on archeological and natural resources would occur as described under these respective topics. Therefore, many of the values for which the river was designated would be perceptibly changed. As indicated in the “Visitor Use and Experience” section, visual simulations demonstrate a substantial change to views for river users as a result of taller structures and additional, thicker conductors. The presence of the taller towers, thicker and more numerous lines, and bird diverters would be seen not only as boaters pass below the wires, but as they approach from both upstream and downstream directions. Bird diverters would increase the visibility of the transmission lines. Boaters would see this, in addition to the conductors crossing the river, in the distance approaching from either direction, detracting from the scenic quality of the setting and thereby interfering with enjoyment of the river’s features and recreation benefits. Visitors using river campsites within sight of the lines would be impacted for the duration of their stay at the campsite. The visual intrusion of the lines would detract from the scenic quality of the otherwise natural setting. Because paddling, floating, and fishing the river is so popular, many visitors would be affected, which would diminish public enjoyment of the river’s features and outdoor recreation benefits from what visitors experience today. The adverse impact to the visual qualities of the river would extend beyond the river itself and would be experienced by visitors who view the river from locations beyond the immediate crossing, representing a change that would affect a relatively large area and large number of visitors. For these reasons, adverse impacts to wild and scenic rivers would occur.

The preparation of existing access roads and construction staging areas would result in the additional loss and disturbance of natural areas along the existing ROW. Access roads would be constructed within 200 feet of the banks of MDSR. It is possible that an additional 1.2 miles of access roads outside the ROW, as well as temporary spur roads, may be required, although none are anticipated to be visible from MDSR. The alternative 2 alignment would cross MDSR generally perpendicularly at only one location before continuing to the Susquehanna and Roseland substations. The corridor for alternative 2 would not follow the river nor would it be in proximity to the river along these routes. Therefore, there would be no impacts outside the study area other than those discussed in the “Cumulative Impacts Common to All Alternatives” section.

Cumulative Impacts

Within the study area, the impacts resulting from alternative 2 were evaluated in combination with other projects mentioned in the “Cumulative Impacts” section above. Additional clearing of corridors for new or expanded pipelines and the proliferation of communication towers could further degrade the scenic qualities of the MDSR. The possibility of future water quality degradation from Marcellus Shale natural gas development and other land use changes exists and would further impact the values of the MDSR. Beneficial impacts would occur as a result of land protection, restoration, and enhancement projects within and outside the parks; however, it is unlikely that these beneficial impacts would substantially reduce the adverse impacts from other development projects that would continue, particularly those affecting water quality.

Conclusion

The impacts on MDSR from alternative 2 would result in visual changes that would adversely affect a relatively large area, a large number of users, and would exist for the life of the project. Impacts related to construction activities would be of short duration when compared to the life of the project but one time visitors who were impacted by river closures or construction noise may have their experience of the MDSR forever diminished.

Alternative 2b

The alternative 2b alignment would follow the same route as alternative 2. All towers would be the same height as under alternative 2, but two additional towers would be required. As in alternative 2, taller towers would create more adverse visual and noise impacts compared to existing conditions (see the “Visual Resources” and “Soundscapes” sections for discussions related to those topics). Adverse impacts on historic, archeological, and natural features would occur as described for alternative 2. Therefore, many of the values for which the river was designated would be perceptibly changed as a result of taller structures and additional, thicker conductors compared to existing conditions; creating an overall adverse impact.

Cumulative Impacts

Cumulative impacts for alternative 2b would be the same as expected under alternative 2.

Conclusion

The impacts on MDSR from alternative 2b would be the same as expected under alternative 2.

Alternative 3

Inside the study area the alternative 3 alignment would cross MDSR using an existing transmission line ROW that would be expanded from its current 100-foot width by an additional 50 to 100 feet. Similar to alternative 2, adverse impacts would occur primarily on scenic qualities. Adverse impacts on historic structures and archeological and natural resources would occur as described under these respective topics. Therefore, many of the values for which the river was designated would be perceptibly changed. The S-R Line and the replaced transmission/distribution lines would cross the river perpendicularly, but on the New Jersey side of DEWA both sets of parallel transmission lines would turn sharply northeast, paralleling the river for approximately 1 mile. The presence of two sets of structures close to MDSR would increase the adverse impact on aesthetics and scenery. As noted in the “Visitor Use and Experience” section, views of the riverbank and the Kittatinny Ridge on the New Jersey side would change dramatically due to this 90-degree bend. The transmission line corridor and structures would be clearly visible under alternative 3. Bird diverters would increase the visibility of the transmission lines. Boaters would see this, in addition to the conductors crossing the river, in the distance approaching from either direction, detracting from the scenic quality of the setting and thereby interfering with enjoyment of the river’s features and recreation benefits. Visitors using river campsites within sight of the lines would be impacted for the duration of their stay at the campsite. Visitors to the popular river access sites and swimming beaches along that section of river would also have the scenic quality of the setting degraded. The change would extend beyond the river itself and would impact visitors who view the river from locations beyond the immediate crossing, representing a change that would affect a relatively large area. The adverse visual impacts from alternative 3 would be experienced by a greater number of visitors than other alternatives due to the concentration of recreational facilities within sight of the transmission line corridor.

Alternative 3 would require the development of new access roads and temporary spur roads; however, views from the river would likely be protected by existing trees, and access roads would not be placed closer than 200 feet to the river. All roads except for temporary spur roads would be permanently maintained.

As with alternative 2, there would be no impacts to MDSR from outside the study area other than those discussed in the “Cumulative Impacts Common to All Alternatives” section.

Cumulative Impacts

Cumulative impacts would be similar to alternative 2. Slight differences would result from the additional aesthetic and scenic impacts expected under alternative 3 due to the 90-degree bend the two sets of transmission lines would make on the east side of the river, exposing more of the corridor and structures to view.

Conclusion

Adverse impacts on MDSR scenic resources from alternative 3 would occur, and the visual change would affect a relatively large area and affect a large number of visitors. The decommissioning and restoration of the B-K Line Alignment would enhance the values of the MDSR along that section of river but those benefits would be negated by the impacts to scenic values along Alternative 3.

Alternatives 4 and 5

The transmission lines for both alternatives would cross the Delaware River just outside DEWA, and thus outside the boundary of MDSR. The river has no special designation where it would be crossed by the alignments for alternatives 4 or 5. A beneficial impact would result from decommissioning and restoring the B-K Line, which does cross MDSR. However, the transmission lines for alternatives 4 and 5 may be visible by some people from the southernmost end of MDSR, which could adversely affect the aesthetic and scenic qualities of MDSR. This adverse impact would be localized and would occur along a stretch of river where the scenic values are already compromised by existing transportation corridors.

Approximately 1.73 miles of new access and spur roads would be required under these alternatives, including 0.67 mile outside DEWA and APPA boundaries. However, these roads would not be located near the river. No impacts are expected on MDSR as a result of construction of these access roads.

For the remainder of the proposed route outside the study area, the alternative 4 and 5 alignments would follow different routes. As with alternatives 2, 2b, and 3, there would be no impacts outside the study area other than those discussed in the “Cumulative Impacts Common to All Alternatives” section.

Cumulative Impacts

Within the study area the beneficial and possibly negative impacts related to aesthetic and scenic values under alternatives 4 and 5 were evaluated in the context of the effects of other projects in the region as mentioned in the “Cumulative Impacts” section above. When combined with the impacts expected under alternatives 4 and 5, cumulative impacts would likely remain adverse due to activities in the surrounding area that impact visual qualities. Alternatives 4 and 5 do not contribute to the adverse cumulative impact in any substantial way.

Conclusion

The alignments for alternatives 4 and 5 would not cross MDSR. Impacts on MDSR would be beneficial due to decommissioning and restoring the B-K Line alignment, which currently does cross MDSR. It is possible that under alternatives 4 and 5 the transmission line may be seen from the MDSR boundary by some people but adverse impacts would be minimal in comparison to transportation corridors that exist next to that segment of river.

PARK OPERATIONS

This section discusses the impacts of the proposed S-R Line alternatives, including the no-action alternative, on management and operations of the parks. The operations and management of the parks include the following departments: the Division of Visitor Management and Resource Protection, the Maintenance Division, the Resource Management and Science Division, and the Interpretation Education and Partnership Division.

METHODOLOGIES

Impacts on park operations are assessed with regard to staffing and annual operating budget. Elements of the alternatives could change the parks' existing staff requirements and budgetary expenditures.

The evaluation of impacts on park operations focuses on the number of staff members available to perform management practices, the ability of park staff to protect and preserve resources given current funding and staffing levels, and the projected need for additional staff time and materials in relationship to accomplishing additional tasks under each of the alternatives.

The impact analysis is based on the current description of park operations presented in "Chapter 3: Affected Environment" of this document. The required level of effort is discussed in terms of "full-time equivalents," or FTEs, which represent the hours worked by staff. One full-time equivalent equals 2,080 hours, the equivalent of one person working full-time year-round, or two part-time staff each working six months of the year.

Indirect impacts outside the study area are not addressed for park operations.

STUDY AREA

The study area for park operations includes all areas of the parks that may be affected by the proposed alternatives.

CUMULATIVE IMPACTS COMMON TO ALL ALTERNATIVES

Park operations include several facets of work in the parks, such as maintenance of facilities, interpretation, and resource protection. Numerous projects throughout the parks also affect park operations due to management, staffing, and budgeting requirements and the need to coordinate with entities that may be managing those efforts. It is likely that additional past, present, and reasonably foreseeable projects in the parks would have cumulative impacts on park operations because of the diversity of projects and responsibilities of the parks. Actions inside and outside of the parks can affect park operations, but actions outside the study area would not have an impact on park operations, and therefore are not included. Past, present, and reasonably foreseeable projects inside the study area (inside the parks) that would have beneficial or adverse impacts on park operations are listed below and discussed under each alternative as applicable. These projects were taken from the entire list of cumulative projects for the S-R Line that can be found in appendix H. Cumulative impacts were then determined by combining the impacts of the alternative being considered with the impacts from the projects listed below. An overall cumulative impact analysis was determined for each alternative and is presented at the end of the impact analysis discussion for each alternative.

Projects Inside the Study Area

Inside the study area, cumulative projects or activities that would result in adverse impacts on park operations include the following: the Metropolitan Edison vegetation management and tree removal; the Columbia Gas Transmission Company pipeline increase; illegal activities, including arson, vandalism, hunting, and trespassing (requiring law enforcement response); and the licensing and permitting of special events and incidental business / commercial visitor permits. These activities would result in adverse impacts on park operations due to the increases in park staff, staff time, and budget that may be required. Beneficial impacts would result from the Smooth Ride Initiatives project, the expiration of the commercial use of US Route 209 in 2015, and the demolition/deconstruction of hazardous structures. These projects would result, or have resulted, in a reduced need for law enforcement. While some of these projects may have reduced the need for law enforcement to focus on specific issues, they have not reduced the need for law enforcement to address numerous other significant issues faced by law enforcement every day in the park. Overall, cumulative impacts on park operations inside the study area would be adverse.

IMPACTS OF THE ALTERNATIVES ON PARK OPERATIONS

Alternative 1: No Action

Under the no-action alternative, the operations and maintenance of the parks would continue to include the following programs/divisions: the Division of Visitor Management and Resource Protection (includes law enforcement), the Resource Management and Science Division, and the Maintenance Division.

Although the maintenance of vegetation is performed by the applicant, natural resource staff in the Resource Management and Science Division would monitor and oversee maintenance activities in the existing ROW. Existing staff would be used for these monitoring tasks.

The maintenance of vegetation on an annual basis would result in an increase in ORV traffic in the cleared ROW. Law enforcement staff would increase patrols in the maintenance area to curb illegal ORV use and to protect visitors. Existing law enforcement staff would be responsible for these patrols because new staff members would not be hired.

During the vegetation maintenance of the existing ROW, the interpretation, education, and partnerships staff in the visitor centers would be responsible for communicating the news of any temporarily closed trails, roads, or areas to park visitors. Closures may also be communicated through the parks’ websites.

If trails, roads, or other park areas are closed temporarily for the vegetation maintenance of the existing ROW, personnel in the Maintenance Division would be responsible for posting closure notices and barricading or fencing off these closed areas. There is a potential that maintenance staff may assist in monitoring the maintenance activities performed by the applicant. It would be the responsibility of law enforcement to enforce this closure, which could impact the ability of law enforcement staff to focus on other responsibilities, including the primary duties of protecting the park visitors and resources.

Overall, park staff would be responsible for monitoring the vegetation maintenance activities, but the maintenance would not be conducted on a regular basis. In addition, 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. Annual vegetation maintenance activities would not have a noticeable or measurable impact on park operations.

Cumulative Impacts

Cumulative impacts on park operations inside the study area from past, present, and reasonably foreseeable projects would be adverse, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the impacts on park operations as a result of alternative 1 are combined with other projects in the study area, an overall adverse cumulative impact would be expected. Alternative 1 would not alter the level of impact.

Conclusion

Overall, there would be adverse impacts on park operations associated with the no-action alternative. The parks' staff would have few responsibilities associated with the transmission line; therefore, no additional staff would be hired. During maintenance activities, some staff members would be on site to monitor the activities of the applicant. Staff would also be responsible for communicating the news of any temporary closures to the parks' visitors at the visitor centers, through the parks' websites, or by posting closure signs and fencing in affected areas. There would be impacts because maintenance activities would only occur on an annual basis. In addition, the parks' role in the vegetation maintenance would not affect the parks' or divisions' budgets because it is assumed that the applicant would be responsible for the costs associated with the NPS managing the permit. When the impacts on park operations as a result of alternative 1 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected.

Common to All Action Alternatives

Removal and Disposal of Existing Structures: The removal of the existing B-K Line would be expected to result in adverse impacts on park operations. Impacts would occur because some staff members would be involved with monitoring the removal activities and would be distracted from normal daily tasks and responsibilities. During the removal of the transmission line, Division of Visitor Management and Resource Protection staff would be responsible for communicating with park visitors about any trail, road, or park area closures related to the removal activities. Law enforcement would likely patrol these closed or affected areas and roads on a more regular basis. Maintenance Division staff would be responsible for posting signs or fencing off areas where park visitors would be restricted. Maintenance staff would also be needed on site to monitor the removal of the transmission line by the applicant. Resource Management and Science Division staff would be on site to monitor the removal of the transmission lines to ensure that no special-status plants or wildlife, sensitive habitats, or cultural resources are affected. In addition, to prevent these impacts, staff would assess or survey the area before removal activities begin. If the priorities of law enforcement staff are shifted to focus on the removal of the transmission lines, it would impact the division's responsibilities to protect park resources and visitors in other areas, particularly if the majority of the law enforcement staff were redirected to focus on this task. It may be necessary to hire one additional staff member for monitoring during the 10-week removal period. If a staff member is not hired, priorities among current staff members would change. Overall, impacts would occur because staffing would increase or staff priorities would change.

Alternative 2

Due to the length of the transmission line through the parks and the extensive access roads associated with alternative 2, it is anticipated that two to three new DEWA staff members would be hired under alternative 2 to assist in park responsibilities associated with construction and postconstruction monitoring. Under alternative 2, DEWA staff would be responsible for monitoring actions along APPA.

Prior to construction activities, Resource Management and Science Division staff would need to assess/survey the proposed ROW and access roads to ensure that no special-status species, sensitive habitats, or cultural resources are located in the construction area. If any potential resources of particular concern are found in the project area, resource specialists would oversee construction activities. If cultural resources are located, the artifacts would be removed and logged into the parks' museum collections. The increase in museum collections would add to park staff operations because this division is currently understaffed. Resource specialists would also ensure that mitigation measures are being implemented during construction.

During the construction of the transmission line, park staff, likely from the Maintenance Division or a park representative, would be needed to monitor construction activities during the eight-month construction period. Maintenance staff would also be responsible for posting signs or fencing at road and trail closures and ensuring safe conditions for park staff and visitors. Park maintenance staff would also increase inspections of the roads frequently used by the construction vehicles to monitor for eroded areas or damage to the road surface that may cause safety issues for the public. Visitor Management and Resource Protection Division staff would be responsible for communicating the news of trail closures and road closures to the public, answering the public's questions and concerns, and coordinating with the applicant and construction staff. Law enforcement would increase patrols in closed areas to ensure that no illegal activities are occurring and that visitors are abiding by temporary closures. If any incidents occur related to the construction activities, such as vehicle accidents, law enforcement would be required to report to the scene. Increasing patrols and responding to incidents within the construction would impact the responsibilities of law enforcement staff to perform their normal duties and would greatly impact operations. This operation would take at least half of the normally schedule patrol staff and assign them to oversee this maintenance operation which would result in an overall reduction in the efficiency of the patrol function within the park.

The two to three new staff members proposed to be hired would assist with some tasks related to construction activities. However, priorities for current employees would shift or change during the eight-month construction period because some staff members would have responsibilities associated with construction. There would be no change to the parks' budgets because the applicant would be responsible for the costs associated with the NPS managing the permit.

Upon completion of the transmission line, park staff would monitor soil erosion along access roads; vegetation restoration, including the possible spread of invasive species; water quality in water bodies receiving eroded sediments; and illegal activities occurring along the access roads and ROW for up to five years. Staff would also monitor raptors for up to two years to ensure that mitigation measures intended to avoid impacts on raptors are being implemented and are effective. Additionally, the maintenance of vegetation by the applicant would occur annually at minimum for the period of analysis. Park staff or park representatives would be on site to monitor or oversee maintenance activities. It may be necessary for resource specialists to assess/survey the area prior to maintenance activities. Visitor Management and Resource Protection staff would communicate the news of any closures in the parks to visitors. Maintenance staff would be responsible for posting signs or fencing for temporarily closed areas. There is a potential that illegal activities, such as the use of ORVs, would increase after the completion of the transmission line; therefore, law enforcement would increase patrols of the new access roads and ROW after construction and maintenance activities are complete. In order to perform these additional tasks, two to three new staff members would be hired for DEWA/MDSR. The new staff would perform these tasks along the affected areas of APPA.

Overall, adverse impacts on park operations would be expected. Impacts on park operations from construction-related activities would only last the duration of the construction period. Following construction, standard monitoring would last up to five years and the monitoring of maintenance activities would be required annually for the period of analysis. Adverse impacts would occur because an additional two to three staff members would be hired and the workloads and priorities of existing staff members would be altered for the duration of the construction activities. Tasks and roles among park divisions may be shifted to fill voids and park staff may rely more heavily on volunteers. Although the overall impacts on park operations would occur, 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.

Cumulative Impacts

Cumulative impacts on park operations inside the study area from past, present, and reasonably foreseeable projects would be adverse, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the impacts on park operations as a result of alternative 2 are combined with other projects in the study area, an overall adverse cumulative impact would be expected. Alternative 2 would not alter the level of impact.

Conclusion

Inside the study area, adverse impacts on park operations would occur during the construction of the new transmission line and access roads. There would also be adverse impacts during postconstruction monitoring because two to three additional staff members would be hired and the workloads and priorities of current staff members would be altered. Tasks and roles among park divisions would be shifted to fill any voids and park staff may rely more heavily on volunteers. Additional tasks would include the monitoring of construction activities, assessment for resources of particular concern in the study area, increased patrols by law enforcement, the monitoring of roads used by construction vehicles in the parks, the installation of closure signs throughout the parks, vegetation restoration, water quality monitoring, raptor monitoring, and the monitoring of maintenance activities. When the impacts on park operations as a result of alternative 2 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected.

Alternative 2b

Although the existing ROW under alternative 2b would not be widened, impacts on park operations would be the same as under alternative 2 because 5.3 miles of access roads would be constructed and monitoring efforts would still be substantial. It is anticipated that two to three new DEWA staff members would be hired under alternative 2b to assist in park responsibilities associated with construction and postconstruction monitoring.

During construction, park staff would be responsible for assessing or surveying construction areas prior to construction, monitoring construction activities, communicating information to park visitors, patrolling roads, and increasing enforcement in construction areas. During this period, adverse impacts on park operations would result.

Park staff would be responsible for postconstruction monitoring activities related to park resources, vegetation restoration, soil erosion, and maintenance activities. Law enforcement activities would include monitoring access roads for illegal activities, such as ORV use. Adverse impacts would be expected because an additional two to three staff members would be hired and existing staff workloads and priorities would change for the duration of construction activities. Tasks and roles among park divisions may be shifted to fill voids and park staff may rely more heavily on volunteers. Although there would be overall impacts on park operations, 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.

Cumulative Impacts

Cumulative impacts on park operations inside the study area from past, present, and reasonably foreseeable projects would be adverse, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the impacts on park operations as a result of alternative 2b are combined with other projects in the study area, an overall adverse cumulative impact would be expected. Alternative 2b would not alter the level of impact.

Conclusion

Under alternative 2b, adverse impacts on park operations during and after construction would result, because an additional two to three staff members would be hired and existing staff workloads and priorities would change for the duration of the construction activities. Tasks and roles among park divisions may be shifted to fill voids and park staff may rely more heavily on volunteers. Although the impacts on park operations would occur, 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. When the impacts on park operations as a result of alternative 2b are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected.

Alternative 3

Similar to alternative 2, due to the length of transmission line through the parks and due to the construction of access roads, it is anticipated that two to three new DEWA staff members would be hired under alternative 3 to assist in park responsibilities associated with construction and postconstruction monitoring. Under alternative 3, DEWA staff would be responsible for monitoring actions along APPA.

During construction, adverse impacts on park operations would be the same as described above under alternative 2. Park staff would be responsible for assessing or surveying construction areas prior to construction, monitoring construction activities, communicating information to park visitors, patrolling roads, and increasing enforcement in construction areas.

After construction, adverse impacts would also be the same as alternative 2. Park staff would be responsible for postconstruction monitoring activities related to park resources, vegetation restoration, soil erosion, and maintenance activities. Law enforcement activities would include monitoring access roads for illegal activities, such as ORV use. Impacts would result because an additional two to three staff members would be hired and the workloads and priorities of existing staff members would change for the duration of the construction activities. If current law enforcement staff away was less able to perform their normal patrol functions because of new responsibilities associated with monitoring the project, it could impact park operations, as rangers be less able to focus on visitor safety and resource management. Tasks and roles among park divisions may be shifted to fill any voids, and other areas of work performed by park staff may rely more heavily on volunteers, though volunteers would not be involved in law enforcement duties. Although the overall impacts on park operations would occur, 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.

Cumulative Impacts

Cumulative impacts on park operations inside the study area from past, present, and reasonably foreseeable projects would be adverse, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When impacts on park operations as a result of alternative 3 are combined with other projects in the study area, an overall adverse cumulative impact would be expected. Alternative 3 would not alter the level of impact.

Conclusion

Alternative 3 would have adverse impacts on park operations during the construction period. Postconstruction monitoring would create adverse impacts, because an additional two to three staff members would be hired and the workloads and priorities of existing staff members would change for the duration of the construction activities. Tasks and roles among park divisions may be shifted to fill any voids and park staff may rely more heavily on volunteers. Although the impacts on park operations would occur, 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. When the impacts on park operations as a result of alternative 3 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected.

Alternative 4

It is anticipated that one new DEWA employee would be hired to assist in park responsibilities associated with construction and postconstruction monitoring under alternative 4. DEWA staff would be responsible for monitoring actions along APPA.

During the construction of the transmission line, the responsibilities of park staff would be the same as those described under alternative 2. However, adverse impacts on park operations would be less because the construction area inside the parks would be reduced. Park staff would be responsible for postconstruction monitoring activities related to park resources, vegetation restoration, soil erosion, and maintenance activities. Law enforcement activities would include monitoring access roads for illegal activities, such as ORV use. Adverse impacts on park operations after construction would occur because current levels of staffing would be increased by one employee and priorities may need to be changed among current staff. Although there would be overall adverse impacts on park operations under alternative 4, 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.

Cumulative Impacts

Cumulative impacts on park operations inside the study area from past, present, and reasonably foreseeable projects would be adverse, as described previously in the "Cumulative Impacts Common to All Alternatives" section. When the impacts on park operations as a result of alternative 4 are combined with other projects in the study area, an overall adverse cumulative impact would be expected. Alternative 4 would not alter the level of impact.

Conclusion

Adverse impacts on park operations during the construction activities would still occur, although the transmission line would only traverse the parks for 1.5 miles. Shifts in staff workloads and staff would occur over a relatively short period. Additional staff responsibilities would include assessing the proposed site for special-status species, sensitive habitats, and cultural resources; monitoring construction activities; increasing law enforcement patrols; communicating with park visitors; installing closure signs; and assessing roads. Park staff would be responsible for postconstruction monitoring activities related to park resources, vegetation restoration, soil erosion, and maintenance activities. Law enforcement activities would include monitoring access roads for illegal activities, such as ORV use. Impacts on park operations would occur during this period. Overall there would be adverse impacts because current levels of staffing would be increased by one employee and current staff priorities may need to be changed. When the impacts on park operations as a result of alternative 4 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected.

Alternative 5

Under alternative 5, park staff would be responsible for monitoring 0.9 mile of the transmission line within park boundaries. Although the affected area under alternative 5 is slightly less (approximately 0.5 mile) than alternative 4, overall impacts would be the same.

Cumulative Impacts

Cumulative impacts on park operations inside the study area from past, present, and reasonably foreseeable projects would be adverse, as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the impacts on park operations as a result of alternative 5 are combined with other projects in the study area, an overall adverse cumulative impact would be expected. Alternative 5 would not alter the level of impact.

Conclusion

Adverse impacts on park operations during the construction activities would occur. There would be adverse impacts on park operations after construction, because current levels of staffing would be increased by one employee and current staff priorities may need to be changed. Additional staff responsibilities would include assessing the proposed site for special-status species, sensitive habitats, and cultural resources; monitoring construction activities; increasing law enforcement patrols; communicating with park visitors; posting signs; assessing roads; and postconstruction monitoring. When the impacts on park operations as a result of alternative 5 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected.

HUMAN HEALTH AND SAFETY

This section presents an evaluation of the alternatives as they relate to health and safety impacts on the parks’ visitors and staff, as well as impacts on the health and safety of the general public located outside the parks’ boundaries.

METHODOLOGIES

The analysis of impacts on health and safety considered visitors as well as the staff of the parks. The analysis primarily considered impacts during the construction and operation of the S-R Line, necessary access roads, and other associated activities as proposed under each alternative. Transporting construction equipment and towers on narrow local roads and park roads would affect public roads, including traffic and surrounding communities. Construction equipment would occupy more than one lane, large-radius turns would be a concern, and road closures would be likely to be extensive during construction. In addition, the use of the river would be stopped as necessary during the construction of the S-R Line for visitor safety.

STUDY AREA

The study area for health and safety includes the S-R Line alternative corridors and any area outside the corridors where necessary pulling and splicing sites, staging areas, and access roads are proposed. Indirect impacts outside the study area would also be addressed, which includes the counties the specific alternative alignments would traverse.

CUMULATIVE IMPACTS COMMON TO ALL ALTERNATIVES

Health and safety is a high priority in the parks. Common problems with health and safety are related to injuries sustained in recreational activities and automobile accidents. Many projects in the parks are undertaken to improve health and safety conditions for visitors, staff, and volunteers. Actions inside and outside the parks could affect health and safety in the parks. Past, present, and reasonably foreseeable activities that would have beneficial or adverse impacts on health and safety inside the study area as well as outside the study area are listed below and discussed under each alternative as applicable. These projects were taken from a list of potential cumulative projects developed for the S-R Line that can be found in appendix H. Cumulative impacts were then determined by combining the impacts of the alternative being considered with the impacts from the projects listed below. This cumulative impact analysis was done for each alternative and is presented at the end of the impact analysis discussion for each alternative.

Projects Inside the Study Area

Inside the study area, cumulative projects that would result in beneficial impacts on health and safety for park visitors and staff include the following: New Jersey Swim Beach (Turtle Beach), the Kittatinny Point Boat Launch replacement, the storm recovery efforts at Kittatinny Point Visitor Center, the river campsite restoration of flood-damaged sites, the McDade Trail realignment, the Smooth Ride Initiatives 2006–2007, the US Route 209 road surface and health and safety improvements, the US Route 209 rehabilitation, the Pocono Environmental Education Center cabin replacement, the rehabilitation of Childs Park, the rehabilitation of Old Mine Road South, the repair of Watergate service road, the I-80 weigh station project, the rehabilitation of road bridges throughout the parks, the Delaware River bridge projects, the demolition and deconstruction of hazardous structures, and the stabilization and repair of damaged structures throughout the parks. The improvement projects throughout the parks would benefit the health and safety of visitors and staff over the long term. Benefits would result from reducing fire hazards and improving or restoring park structures, trails, and roads. Improvements throughout the parks would allow safe recreational opportunities for visitors. Adverse impacts may result during construction periods.

Cumulative adverse impacts on the health and safety of park visitors and staff would be likely during the construction of multiple utility projects in the parks. Utility projects inside the study area that might affect health and safety include the following: the Metropolitan Edison vegetation management and tree removal, the Metropolitan Edison removal of unused power poles and transformers, the Columbia Gas Transmission Company pipeline increase, and the Tennessee gas line proposal. Construction equipment and associated activities would create safety hazards for staff and visitors. Visitors to the parks who participate in illegal activities may affect the health and safety of visitors and staff in the parks. Illegal activities include arson, vandalism, hunting, use of ORVs, and trespassing. Overall, adverse cumulative impacts on human health and safety would result from projects inside the study area.

Projects Outside the Study Area

Outside the study area, cumulative projects that would result in adverse impacts on the health and safety of park staff and visitors include the following road and utility projects: the Columbia Gas Transmission Company pipeline increase and Marcellus shale natural gas drilling. Construction activities and equipment would create safety hazards along roads and in communities. Additional adverse impacts from natural gas drilling would create potential impacts on human health from contamination of groundwater. Beneficial impacts on the health and safety of park staff and visitors outside the study area would result from the transportation improvements and replacements in Pennsylvania and New Jersey. Cumulative impacts on health and safety outside the study area would be adverse.

IMPACTS OF THE ALTERNATIVES ON HUMAN HEALTH AND SAFETY

Common to All Alternatives

Outside the Study Area: Outside the study area, regardless of which action alternative is selected, the transmission line could pass through Carbon, Lackawanna, Luzerne, Monroe, Northampton, Pike, and Wayne counties in Pennsylvania and Morris, Sussex, and Warren counties in New Jersey.

The construction of the transmission line outside the study area would be consistent with those activities described for inside the study area. Because the NPS cannot dictate where the line would actually go, the direct impacts from the construction of the transmission line outside the study area cannot be determined. However, it is likely that impacts would be similar to those described for inside the study area. Indirect impacts would occur because construction of the transmission line would traverse communities and other public areas.

Potential safety hazards would include being in the vicinity of construction equipment and the potential for misuse or accidents. There is always the potential for individuals, including children, to access the area, especially if located in residential neighborhoods. An additional safety hazard would include the potential for the public to come into contact with hazardous materials that may leak from the construction equipment during operation or while parked.

Potential safety hazards outside the study area would exist during the transport of construction materials and equipment to and from the construction area. Large trucks hauling wide loads would transport materials along the local roads and highways. Many of the vehicles would use more than one lane and would make wide turns, creating potential safety hazards to other drivers and pedestrians. If construction vehicles travel along neighborhood/local roads, the safety of the public would be jeopardized.

Under the no-action alternative, impacts on health and safety would occur from only annual vegetation maintenance. There would be no construction or changes to roads under alternative 1. The action alternatives would result in adverse impacts on health and safety from being in the vicinity of the construction equipment, potential contact with hazardous materials, and the transport of construction materials and equipment to and from the construction area. Overall, there would be adverse impacts on health and safety outside the study area.

Cumulative impacts outside the study area would result in potential adverse impacts on human health and safety as described previously in the “Cumulative Impacts Common to All Alternatives” section. When the impacts on human health and safety outside the study area are combined with other past, present, and reasonably foreseeable projects outside the study area, an overall cumulative adverse impact would be expected.

Alternative 1: No Action

Within the study area, human health and safety concerns would continue under current conditions. There would be no changes to the public roads throughout the parks under the no-action alternative; however, motor vehicle accidents would continue to be a concern for park staff and visitors. Additional safety concerns in the future could result from the existing 80-year old transmission line potentially deteriorating over time as it continues to age.

During maintenance activities, park staff (e.g., natural resource specialists) would be on site to monitor maintenance activities. To minimize impacts on park visitors, staff would discourage visitors from recreating in areas where maintenance is occurring. Impacts on park staff and visitors would be expected to be minimal during maintenance activities because the effects would be at low levels of detection and no appreciable or measurable effect on human health or safety would occur.

Overall, adverse impacts on human health and safety under the no-action alternative would occur inside the study area.

Cumulative Impacts

Cumulative impacts on human health and safety inside the study area from past, present, and reasonably foreseeable projects would be adverse, as previously described in the “Cumulative Impacts Common to All Alternatives” section. When the impacts on human health and safety as a result of alternative 1 are combined with other projects in the study area, an overall adverse cumulative impact would be expected. Alternative 1 would not alter the level of impact.

Conclusion

Inside the study area, adverse impacts on human health and safety would occur for park staff, visitors, and the general public. Under the no-action alternative, there would be no changes to the current transmission line and no construction or changes to roads. There would be no new traffic patterns associated with the transmission line, so no change to the number of accidents occurring would be expected. The existing transmission line has the potential to deteriorate over time due to its age. Maintenance activities by the applicant would occur on an annual basis and park staff would be on site to monitor these activities. Adverse impacts on visitors and the public would be minimized by discouraging the use of the areas being maintained. Overall, there would be adverse impacts on human health and safety under the no-action alternative. When the impacts on human health and safety as a result of alternative 1 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected.

Common to All Action Alternatives

Removal and Disposal of Existing Structures: Park staff would be on site to monitor the removal of the transmission line. A certified safety manager would be employed by the applicant during this period to ensure the safety of all park staff members, visitors, and the general public (PPL and PSE&G 2008, 15). The use of heavy construction equipment would create the risk of injuries for park staff and visitors near the removal areas or along haul routes. Access to areas associated with the removal of the existing lines would be prohibited to park visitors and the general public to reduce the risk of injuries occurring. A safety representative would also be stationed at removal areas near APPA to ensure the safety of hikers along APPA (PPL and PSE&G 2008, 14).

Accidents or injuries to park staff or visitors could occur as a result of the presence of large, heavy construction equipment. Impacts associated with the construction equipment would include the potential for contact with hazardous materials, such as the accidental release of gasoline, diesel fuel, oil, hydraulic fluid, and lubricants from vehicles or other equipment used in the removal process. In addition, improperly maintained equipment could leak fluids during operation or while parked. Impacts on human health and safety could occur from direct contact with these substances or from surface water and groundwater contamination due to runoff.

Construction equipment and materials needed for removal of the line would be stored at a staging area off park property. Additional impacts on human health and safety could occur during the transport of materials and equipment from the staging area to the transmission line removal area. The local roads and park roads are narrow, are typically only rated for loads less than 10 tons, are restricted to noncommercial traffic, and are subject to constant maintenance issues. The transport of large, heavy equipment would create safety hazards. Traffic control or closure would be necessary on some park roads during the removal of the transmission line and the roads could also physically deteriorate from the excess loads. Potential impacts on park visitors and the general public walking, bicycling, or driving along the roads could occur because construction equipment would occupy more than one lane and would have a wide turning radius. Impacts on the parks' staff would also occur because park staff members would travel the road in order to access the removal areas.

During the removal of the B-K Line, there would be adverse impacts on staff, visitors, and the general public. However, in the long term, impacts on health and safety would result because the possible risks or injuries associated with the deterioration of the existing 80-year old transmission line would no longer exist. After the removal of the transmission line, no impact on health and safety would be expected.

Removal of Vegetation: The removal of vegetation would create impacts on park staff, visitors, and the general public. Park staff would likely be on site to monitor vegetation removal. Potential impacts could include falling or tripping over downed vegetation, accidents related to large trees falling, and being in close proximity to construction equipment. Similar impacts on the general public and park visitors would occur if visitors do not respect park closures. During the removal of vegetation there would be adverse impacts on visitors, staff, and the general public.

Maintenance of Vegetation: Adverse impacts on the health and safety of park staff and visitors could occur during vegetation maintenance activities. Impacts would occur, but maintenance activities would only occur once per year and impacts would be at such low levels of detection that no appreciable or measurable effect on human health or safety would occur. The potential for visitors to trip or fall over removed vegetation would also exist; however, to minimize these risks, visitors would be discouraged from recreating in the areas where maintenance is occurring. Park staff and/or the applicant would monitor maintenance areas to prevent the public from gaining access.

Helicopter Use: The use of a helicopter may be necessary for stringing the wires of the transmission line, as described in chapter 2. The use of a helicopter to construct the transmission line would create impacts on human health and safety. If park staff, visitors, or the general public are in the vicinity of incidents such as collisions with wires, conductors, and towers; engine or tail rotor failure at low altitudes; loss of tail rotor effectiveness; or potential bird strikes, injuries could occur. Other potential risks to health and safety from helicopter use would be related to mechanical failure, operational incidents, or collision. Impacts would result because mitigation measures would be implemented to reduce the risk of the above occurring; these mitigation measures are discussed in appendix F. Additional impacts related to the use of helicopters could occur when people on land are distracted by viewing the helicopters in the air. Incidents could include vehicle accidents, construction equipment incidents, or individuals tripping or falling. The high winds and noise generated by the helicopters flying at low levels could also create potential impacts on park staff, visitors, and the general public close to the construction areas.

Alternative 2

A certified safety manager would be employed through all construction phases to ensure the safety of visitors and the general public (PPL and PSE&G 2008, 15). Park staff would be on site to monitor construction activities. Impacts would result from park staff, visitors, and the public being in the vicinity of potential safety hazards associated with the use of construction equipment and the transport of construction materials to and from the construction area. Impacts would be expected to last the duration of the construction period, approximately eight months.

During the installation of the transmission line and access roads, the use of large pieces of construction equipment would be required, which would create safety hazards for park visitors, the general public, and specifically park staff. Park staff would be on site during the construction activities for monitoring purposes and would be surrounded by the operating equipment. Although park visitors would be discouraged from entering construction areas, the potential for incidents to occur may still exist if visitors do not respect park closures.

Additional adverse impacts on park staff, visitors to DEWA and MDSR, and the general public would result from the transport of construction materials and equipment to and from the construction area. As described above, the local roads and park roads that would be traveled are narrow, typically are only rated for loads less than 10 tons, are restricted to noncommercial traffic, and are subject to constant maintenance issues. Large, heavy equipment use would be a potential problem due to traffic control and physical deterioration from the excess loads. Transporting the large construction equipment as well as the new towers on park roads and public roads would be a safety concern. Construction equipment would occupy more than one lane, and the large-radius turns would also be a concern. Extensive road closures and traffic control may be necessary to minimize the risk of accidents occurring during the construction period. An additional safety concern for park staff and visitors to DEWA and MDSR would be boating traffic on the river during construction. During the stringing of the conductor across the Delaware River, there is a potential for accidents to occur. A safety watchman would be on the river during stringing operations to stop any boat traffic if an incident does occur or if conditions otherwise warrant (PPL and PSE&G 2008, 6).

Adverse impacts on park staff and visitors to APPA would be the same as those discussed for DEWA and MDSR; however, impacts would only affect one APPA crossing under alternative 2. Park staff would be on site to monitor the construction activities; however, the staff time needed for monitoring would be relatively limited because only one trail crossing is needed. Roads associated with APPA access would be less traveled by the large construction equipment and road closures and traffic control would only be needed for a short time. A safety representative would be stationed at the trail during any and all construction to maintain public safety (PPL and PSE&G 2008, 14).

Overall, inside the study area, adverse impacts on DEWA and MDSR staff and visitors and the general public would result from being in the vicinity of construction equipment, from the safety hazards of construction vehicles on roads, and from the hanging of wires across the Delaware River. Adverse impacts on APPA staff and visitors would result because the affected area would be small and the construction period in the APPA area would be relatively short. Therefore, there would be overall adverse impacts on human health and safety for all three parks under alternative 2.

Cumulative Impacts

Cumulative impacts on human health and safety inside the study area from past, present, and reasonably foreseeable projects would be adverse, as previously discussed in the "Cumulative Impacts Common to All Alternatives" section. When the impacts on human health and safety as a result of alternative 2 are combined with other projects in the study area, an overall adverse cumulative impact would be expected. Alternative 2 would not alter the level of impact.

Conclusion

Inside the study area, there would be adverse impacts on human health and safety for the general public and visitors and staff at DEWA and MDSR. Potential safety hazards would include incidents from being in the vicinity of the operation of construction equipment and the transport of construction materials and equipment to and from the construction area. Adverse impacts would occur on park staff because staff would be on site monitoring the construction activities and would also be involved in the road closures and road maintenance. Park visitors could be involved in incidents involving the large construction vehicles traveling on park roads. Adverse impacts on park staff and visitors at APPA would occur. When the impacts on human health and safety as a result of alternative 2 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected.

Alternative 2b

According to the NESC, transmission lines must be designed to provide adequate vertical clearance and to allow for adequate horizontal clearance at the edge of the ROW during high wind conditions. The safety clearance required around the conductors is determined by normal operating voltages, conductor temperatures, short-term abnormal voltages, windblown swinging conductors, and contamination of the insulators. Conductor displacement as a result of high winds is termed "conductor blowout." The applicant determined that a ROW width of 99 feet is needed for the double 500-kV line (calculations are shown in appendix D). However, the NPS found that the applicant's calculations referred to voltages only up to 230 kV and failed to represent the required V-string clearance (21.5 feet from the structure's centerline). The NPS also noted that the required clearance for each side of the ROW should be 20 feet, not 17 feet as the applicant proposed (appendix D). Ultimately, the NPS found that constructing the proposed project according to the proposed plan for the 100-foot ROW would violate NESC. The minimum horizontal clearance to the edge of the ROW under high wind conditions in terms of conductor blowout was determined to be greater than 100 feet. Safety hazards could occur from the operation of the double 500-kV transmission line within the existing 100-foot ROW. Alternative 2b would not comply with ROW width standards for conductor blowouts. If trees are not removed beyond the 100-foot ROW, the double 500-kV transmission line could create fire hazards, especially if a conductor blows out. These fire risks and safety code insufficiencies would create impacts on the health and safety of park staff, visitors, and the general public.

Overall there would be adverse impacts on human health and safety for all three parks under alternative 2b.

Cumulative Impacts

Cumulative impacts on human health and safety inside the study area from past, present, and reasonably foreseeable projects would be adverse, as previously discussed in the "Cumulative Impacts Common to All Alternatives" section. When the impacts on human health and safety as a result of alternative 2b are combined with other projects in the study area, an overall adverse cumulative impact would be expected. Alternative 2b would not alter the level of impact.

Conclusion

Inside the study area, adverse impacts on public health and safety for DEWA and MDSR staff, visitors, and the general public could result during the construction of the transmission line and access roads. Impacts on park staff and visitors at APPA would result due to the smaller area affected by construction. Additionally, adverse impacts on park staff and visitors could result during the operation of the transmission line due to safety hazards and potential fire hazards because of the insufficient horizontal clearance in the ROW. When the impacts on human health and safety as a result of alternative 2b are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected.

Alternatives 3 through 5

Under alternatives 3 through 5, the removal of the existing B-K Line would eliminate the generation of EMFs at the line's current location. Although there remains a lack of consensus in the scientific community with regard to the public health impacts associated with the EMF levels generated by transmission lines, there would be no impact on human health and safety from EMFs under these alternatives because there would no longer be transmission lines generating EMFs at this location.

Alternative 3

Adverse impacts on human health and safety would be similar to those under alternative 2, because the potential safety risks would be the same.

Overall, inside the study area adverse impacts on DEWA and MDSR staff and visitors and the general public would occur. Impacts on APPA staff and visitors would result but the affected area would be small and the construction period would be relatively short. Therefore, overall adverse impacts on human health and safety under alternative 3 would occur.

Cumulative Impacts

Cumulative impacts on human health and safety inside the study area from past, present, and reasonably foreseeable projects would be adverse, as discussed previously in the "Cumulative Impacts Common to All Alternatives" section. When the impacts on human health and safety as a result of alternative 3 are combined with other projects in the study area, an overall adverse cumulative impact would be expected. Alternative 3 would not alter the level of impact.

Conclusion

Inside the study area, adverse impacts on public health and safety for DEWA and MDSR staff, visitors, and the general public would occur during the construction of the transmission line and access roads. Impacts on park staff and visitors at APPA would result due to the smaller area affected by construction. When the impacts on human health and safety as a result of alternative 3 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected.

Alternative 4

Under alternative 4, the transmission line would traverse fewer miles of land in the parks compared to alternatives 2 and 3; however, adverse impacts would be similar because the same safety hazards to park staff, visitors, and general public would exist.

Overall, inside the study area adverse impacts on the health and safety of DEWA and MDSR staff and visitors and the general public would result from being in the vicinity of construction equipment and from the safety hazards caused by construction vehicles on park roads. Adverse impacts on APPA staff and visitors would occur but the affected area would be small. Potential incidents in APPA would be the same as those in DEWA and MDSR; however, the construction period would be relatively short. Therefore, overall adverse impacts on human health and safety for all three parks would occur under alternative 4

Cumulative Impacts

Cumulative impacts on human health and safety inside the study area from past, present, and reasonably foreseeable projects would be adverse, as previously discussed in the "Cumulative Impacts Common to All Alternatives" section. When the impacts on human health and safety as a result of alternative 4 are combined with other projects in the study area, an overall adverse cumulative impact would be expected. Alternative 4 would not alter the level of impact.

Conclusion

Inside the study area, adverse impacts on health and safety of DEWA and MDSR staff and visitors and the general public would result. During the construction of the transmission line and access roads, park staff would be on site monitoring the construction activities. There would be adverse impacts on park staff and visitors at APPA in the small area affected. When the overall impacts on human health and safety as a result of alternative 4 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected.

Alternative 5

Alternative 5 would follow the same route through DEWA and APPA as alternative 4 except it would not include the 0.6-mile portion that connects to the Bushkill Substation and travels to the western boundary of DEWA (along the existing B-K Line). Therefore, adverse impacts for alternative 5 would be the same as those described above for alternative 4.

Cumulative Impacts

Cumulative impacts on human health and safety inside the study area from past, present, and reasonably foreseeable projects would be adverse, as previously discussed in the "Cumulative Impacts Common to All Alternatives" section. When the impacts on human health and safety as a result of alternative 5 are combined with other projects in the study area, an overall adverse cumulative impact would be expected. Alternative 5 would not alter the level of impact.

Conclusion

Inside the study area, adverse impacts on the health and safety of DEWA and MDSR staff and visitors and the general public would occur. During the construction of the transmission line and access roads, park staff would be on site monitoring construction activities. There would be adverse impacts on park staff and visitors at APPA in the small area affected. When the overall impacts on human health and safety as a result of alternative 5 are combined with other past, present, and reasonably foreseeable projects in the study area, an overall adverse cumulative impact would be expected.

SUSTAINABILITY AND LONG-TERM MANAGEMENT

In accordance with NEPA, and as further explained in NPS Director's Order 12: *Conservation Planning, Environmental Impact Analysis, and Decision Making* (NPS 2001a), consideration of long-term impacts and the effects of foreclosing future options should be central to any NEPA document. According to Director's Order 12, and as defined by the World Commission on Environment and Development, "sustainable development is that which meets the needs of the present without compromising the ability of future generations to meet their needs." For each alternative considered in a NEPA document, considerations of sustainability must demonstrate the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity. This is described below for each alternative.

The NPS must consider whether the effects of the alternatives involve tradeoffs between the long-term productivity and sustainability of park resources and the immediate short-term use of those resources. It must also consider whether the effects of the alternatives are sustainable over the long term without causing adverse environmental effects for future generations (NEPA section 102[c][iv]).

Short-term and long-term alterations to and permanent loss of natural vegetation communities have occurred, are occurring, and will occur as a result of natural and unnatural changes inside the study area, including successional changes in vegetation, controlled and uncontrolled fires, invasive species colonization and management, disease and treatment or management of diseased vegetation or organisms, construction or demolition of park facilities, and park operations, including but not limited to law enforcement, interpretation, and conservation programs.

The existing ROW has been in place for more than 80 years and predates the parks. It is an established component of the parks, albeit an unnaturally maintained one that is not consistent with ordinary NPS management; as such, its presence has resulted in a long-term impact on the study area. The natural resources in the existing ROW are productive and sustainable; however, the form of that productivity and sustainability is inherently managed and maintained artificially and is not equivalent to the productivity of the mature forest that once existed in the ROW. Alternative 1, the no-action alternative, and the action alternatives (2, 2b, 3, 4, and 5) presented and analyzed in this EIS would create impacts that could further alter the short-term and long-term productivity of the natural resources inside the study area as discussed below.

THE RELATIONSHIP BETWEEN SHORT-TERM USE AND LONG-TERM PRODUCTIVITY OF THE ENVIRONMENT

Short-term uses of resources in the study area include the disturbance of soils, vegetation communities, and wildlife during construction and regular vegetation maintenance activities. The ecological productivity of the study area would be temporarily reduced but would continue over the long term, although in potentially different ways as a result of long-term alterations. Disturbed soils would be restored and revegetated; wildlife species that have fled disturbance and activity would return to former habitats or take up residence in new areas; vegetation would be reestablished; and feeding and foraging by wildlife would resume. Wildlife species that move between habitats would alter movement and foraging behavior temporarily as a result of limited mobility, or would avoid the area. Although vegetation maintenance would only be performed annually and would be localized along the ROW, vegetation maintenance would continue for the period of analysis and would therefore cause adverse impacts on natural resources. The periodic maintenance would not be frequent enough that wildlife in the vicinity would become habituated to the disturbance.

As noted, a transmission line is not consistent with ordinary NPS management to protect natural, scenic, and recreational resources; the incompatible use of NPS land would have an adverse impact on the natural, scenic, cultural, and recreational resources in the study area as well as on visitor experience.

Alternative 1: No Action

Activities under alternative 1, the no-action alternative, would continue to alter and use park resources for the transmission of electricity. Because the ROW would remain in place and continue to provide electricity under alternative 1, the continued presence of the ROW would require regular maintenance and an early successional plant community would result over the long term. Regular maintenance of vegetation in the ROW is a departure from the maintenance that has occurred in the past. Annual maintenance over the long term would maintain a more visually obvious ROW that would also increase the disconnectedness of adjacent habitats that was created more than 80 years ago. Other effects resulting from the presence of the ROW would include short-term, periodic, and localized disturbance; the disruption of daily and seasonal behaviors; and the direct mortality of individuals of some species. Although the long-term viability of park natural resources would continue, the ecological productivity of the habitats and wildlife in the ROW would be altered. Visual resources and visitor use and experience would continue to be affected over the long term by the presence of the ROW and transmission line components in the viewshed and landscape inside the study area. Although the transmission line would not be as visible as a larger, higher, new line, the regular maintenance of the ROW would ensure its visibility in the landscape and would be experienced by visitors to the parks from a variety of locations.

The NPS has been working with state and local agencies as well as nongovernmental conservation organizations in Pennsylvania and New Jersey to identify lands that connect state and federal lands and to prioritize areas that would establish connectivity on a regional scale. Wildlife species in the parks are directly affected by the natural abundance, biodiversity, and ecological integrity of their habitat. The presence of the ROW in the study area and regular maintenance under alternative 1 would not support the NPS role in establishing regional landscape connectivity.

Common to All Action Alternatives

The activities associated with the construction and maintenance of the ROW for any action alternative would result in a number of impacts that would alter long-term uses of park resources despite mitigation measures and BMPs that would offset the level of the impacts. The blasting of geologic resources; the possible alteration of hydrology from impacts on geology; the clearing of forest communities; permanent alterations of visual aesthetics and changes to visitor experience from the presence of a newer, larger transmission line and permanent access roads; and the annual vegetation maintenance of a wider ROW as early successional stage vegetation are all long-term impacts that would affect resources and the uses of those resources by wildlife, visitors, and park personnel as well as influencing park operations in the long term. Some benefit would be provided by the decommissioning and restoration of the B-K Line in conjunction with the development of another ROW for the transmission line under alternatives 3 through 5; however, the long-term restoration process would not be expected to succeed into mature forest within the period of analysis of this EIS (15 years).

Alternative 2

Alternative 2 would maintain the same use of park resources for the transmission of electricity as alternative 1. The expansion of the ROW and the construction of new towers would cause adverse impacts on natural resources during construction in addition to the adverse impacts associated with the loss of habitat and annual maintenance activities. The presence of the ROW in the study area and regular maintenance would not support the NPS role in establishing regional landscape connectivity.

Ecological productivity would continue under alternative 2; however, the widening of the ROW would alter the ecological productivity of the affected areas in the ROW as a result of the clearing and maintenance-related changes in vegetation communities and the wildlife using the new, maintained, early successional habitat. Disturbance, avoidance/abandonment, and mortality of wildlife would occur during specific periods of activity. Along the ROW in the study area, 52% of the ROW contains rare and unique communities that could be affected by construction and maintenance activities and would be avoided to the extent practicable.

Cultural resources would be affected by construction and the long-term presence of the transmission line, affecting archeological resources, cultural landscapes, and historic structures. Visitor use and experience and visual resources would be affected by the construction activities and the presence of a larger, higher transmission line in the long term. The towers would be twice the height of current towers and the ROW would be expanded and regularly maintained, making the towers, the line, and the ROW much more visible and intruding on visitor experience in the parks.

Alternative 2b

Alternative 2b would maintain the same use of park resources for the transmission of electricity as alternative 1, the no-action alternative. Because the applicants would not expand the ROW, the need for the removal of danger trees would be greater, resulting in long-term changes in the forested area along the ROW; however, the ecological productivity of the adjacent habitats along the existing ROW would be maintained because the habitat would not be cleared or altered. The construction of new towers would cause adverse impacts on natural resources during construction in addition to the adverse impacts associated with the loss of habitat and annual maintenance activities. Rare and unique communities are present as stated for the previous alternative (52%), and the productivity of these areas would be expected to be altered similarly where they could not be avoided. The productivity of the ecological components in the ROW would continue but would be altered by a shift in vegetation community and wildlife use over the long term as a result of regular and thorough maintenance.

Cultural resources would be affected by the construction and the long-term presence of the transmission line, affecting archeological resources, cultural landscapes, and historic structures. Visitor use and experience and visual resources would be affected by the construction and the long-term presence of the transmission line. The towers would be double the height of current towers, making the towers and line much more visible and intruding on visitor experience in the parks.

The presence of the ROW in the study area and the regular maintenance over the long term under alternative 2b would not support the NPS role in establishing regional landscape connectivity.

Alternative 3

Alternative 3 would expand the use of park resources for the transmission of electricity, widening an existing ROW inside the study area. The expansion of the ROW and construction of new towers would cause adverse impacts on natural resources, including rare and unique communities, during construction in addition to the adverse impacts associated with the loss of habitat and annual maintenance activities. For the alternative 3 ROW, 47% of the area is designated as rare and unique communities that could also be affected by construction and maintenance impacts.

Cultural resources would be affected by the construction and the long-term presence of the transmission line, affecting archeological resources, cultural landscapes, and historic structures. Visitor use and experience and visual resources would be affected by the construction and the long-term presence of the transmission line.

As noted, a transmission line is not compatible with NPS protection of natural, scenic, and recreational resources; the incompatible use of NPS land would have a long-term adverse effect on the natural, scenic, cultural, and recreational resources inside the study area as well as on visitor experience. The presence of the ROW in the study area and the regular maintenance under alternative 3 would not support the NPS role in establishing regional landscape connectivity. The towers would be double the height of current towers and the conductors would be doubled, making the towers and lines much more visible and intruding on visitor experience in the parks.

Alternative 4

Alternative 4 would not use park resources for the transmission of electricity to the extent expected for alternatives 1, 2, 2b, and 3. Despite the smaller footprint of the transmission line in alternative 4, the productivity of park resources would be altered from existing levels. The construction of new towers would cause adverse impacts on natural resources during construction and long-term impacts associated with the loss of habitat and annual maintenance activities. Rare and unique communities compose about 42% of the area and the productivity of these areas would be expected to be altered similarly where they could not be avoided. Productivity in forested areas would be reduced and altered (increasing the maintained early successional habitat). Visitor use and experience and visual resources would be affected by the construction and long-term presence of the larger, taller transmission line.

Alternative 5

Alternative 5 would result in the least amount of park resources (0.9 miles) used for the transmission of electricity; however, the proposed route contains the highest percentage of rare and unique communities (58%). The expansion of the ROW and the construction of new towers would cause short-term impacts on natural resources, including rare and unique communities, during construction and long-term impacts associated with the loss of habitat and annual maintenance activities.

Visitor use and experience and visual resources would be affected by the construction and the long-term presence of the transmission line.

Irreversible or Irretrievable Commitment of Resources

The NPS must consider whether the effects of the alternatives are irreversible or irretrievable commitments of resources. Irreversible commitments of resources are commitments where the resource would be permanently lost or consumed. Irreversible commitments would result from the construction of new and permanent access roads and the operation of an upgraded transmission line that would require labor and would consume fossil fuels, would use raw materials such as steel, and would require roadway construction materials such as concrete and aggregate. The NPS must also consider whether the impacts on park resources would mean that once gone, the resource could not be replaced; in other words, the resource could not be restored, replaced, or otherwise retrieved (NEPA section 102[c][v]). The loss of geologic resources, special-status species (individuals), wetlands (through changes to hydrology, soils, vegetation), or wildlife habitat at the park would be considered an irreversible resource commitment. Mitigation would be required for the loss of some resources, but would not fully offset impacts. Blasting and/or excavation could have an irretrievable impact on topography and paleontological resources associated with geologic formations if resources are lost or destroyed. Changes to rare and unique communities could be considered an irreversible resource commitment if blasting or other activities permanently alters the resource such that it can no longer support special-status species or function as a rare and unique community. In addition to natural resources, impacts to historic resources such as archeological sites, historic structures, and cultural landscapes could be considered an irreversible resource commitment if blasting or excavation permanently alters or destroys resource, or the resource is completely lost. Impacts to these resources would be mitigated through various cultural landscape management requirements, but the impact would be irreversible unless the known resources are completely recovered prior to construction activities. The expenditure of federal funds and funds from other sources would be irretrievable. The use of land for permanent access roads and the ROW for the transmission line would be an irretrievable commitment of resources during the period that the land is used for transportation infrastructure or energy requirements. However, the land could be converted to another use at a future date, just as the proposed project would remove and restore some roads and the existing ROW (depending upon the alternative) in the study area.

Alternative 1: No Action

Alternative 1 would continue ongoing impacts on natural resources, especially vegetation; landscape connectivity, wetlands, wildlife habitat, and wildlife as well as rare and unique communities. Some of these impacts could be reversed if the transmission line were to be removed and the natural resources restored. Under alternative 1, tree removal in forested wetlands would result in the conversion of wetland habitat type from a forested wetland to an emergent or scrub shrub wetland. Because northern forested wetlands may take 50 years to reach maturity (Kusler 2006, iii) and because trees in the ROW under alternative 1 would continue to be maintained/removed, wetland areas within the ROW would not recover during the period of analysis to become fully functioning forested wetlands. Mitigation would be required for the loss of wetlands, but would not fully offset impacts. Changes to rare and unique communities (that may also include wetlands) could be considered long-term and/or an irreversible resource commitment if maintenance activities permanently alters the resource such that it can no longer support special-status species or function as a rare and unique community. Although vegetation removal and maintenance efforts would continue, no new development, construction, excavation, or blasting would occur under alternative 1.

Alternatives 2 and 2b

Alternatives 2 and 2b would result in the irreversible and irretrievable commitment of geologic resources. The construction of the towers involves blasting bedrock and approximately 25% of the towers would be sited in geologic resources that are rare or unique. These impacts would be permanent and irreversible and could not be mitigated. Blasting drilling, and excavation could also have an irreversible and irretrievable impact on topography and paleontological resources associated with geologic formations if resources are lost or destroyed. Unless mitigation involves documenting and recovering these resources prior to construction activities, an irreversible and irretrievable commitment of these resources would occur under alternatives 2 and 2b.

Additionally, the blasting of bedrock has the potential to cause impacts on groundwater and surface water resources, ultimately affecting hydrology in rare and unique communities as well as Exceptional Value Wetlands such as Arnott Fen. These impacts could be permanent and could not be mitigated if hydrology changes such that wetland functions are no longer self-sustaining. Changes to rare and unique communities (that may also include wetlands) could also be considered long-term and/or an irreversible resource commitment if maintenance activities permanently alters the resource such that it can no longer support special-status species or function as a rare and unique community. Special-status plant species could be lost directly during vegetation removal/maintenance activities and/or indirectly due to the spread of invasive plant species from removal/maintenance activities. Special-status wildlife species could be lost through direct mortality with construction equipment or indirectly through loss of habitat or human disturbances. If there is a “take” of special-status species under alternatives 2 and 2b (likely individuals and not entire populations), this would be considered an irreversible commitment of resources.

Under alternatives 2 and 2b, tree removal in forested wetlands would result in the conversion of wetland habitat type from a forested wetland to an emergent or scrub shrub wetland. Because northern forested wetlands may take 50 years to reach maturity (Kusler 2006, iii) and because trees in the ROW under alternatives 2 and 2b would be removed and then maintained, wetland areas within the ROW would not recover during the period of analysis to become fully functioning forested wetlands. Mitigation would be required for the loss of wetlands, but would not fully offset impacts. Other long-term impacts such as those to vegetation; landscape connectivity, wildlife habitat, and wildlife; and visual resources would occur and would be irreversible during the period of analysis. These impacts, however, could only be mitigated or reversed after the period of analysis if the line were to be removed and the area of the ROW were restored in the future.

Under alternatives 2 and 2b, impacts to historic resources such as archeological sites, historic structures, and cultural landscapes could be considered an irreversible resource commitment if blasting or excavation permanently alters or destroys resource, or the resource is completely lost. Visual impacts would also occur due to the presence of the transmission line. Some impacts to these resources could be mitigated through various cultural landscape management requirements, but the impact would be irreversible unless the known resources are completely recovered prior to construction activities.

Alternatives 3 through 5

Similar to alternatives 2 and 2b, alternatives 3 through 5 would result in the irreversible and irretrievable commitment of geologic resources from the drilling, blasting, and excavation activities required for the construction of the towers. The impacts would be permanent and irreversible and could not be mitigated. Along the alternative 3 alignment, approximately 25% of the towers would be sited in geologic resources that are rare or unique; construction and clearing would also impact paleontology and topography. Unless mitigation involves documenting and recovering these paleontological resources prior to construction activities, an irreversible and irretrievable commitment of these resources would occur under alternatives 3, 4, and 5.

There are no rare or unique geologic resources along the corridors for alternatives 4 and 5, but adverse impacts to paleontology and topography resources could result in an irreversible and irretrievable commitment of these resources. Wetlands in rare or unique communities or Exceptional Value wetlands would not be affected under alternatives 3, 4, or 5. Special-status plant or wildlife species could be lost directly and/or indirectly as described above for alternatives 2 and 2b. If there is a “take” of special-status species under alternatives 2 and 2b (likely individuals and not entire populations), this would be considered an irreversible commitment of resources.

Under alternatives 3,4, and 5, tree removal in forested wetlands would result in the conversion of wetland habitat type from a forested wetland to an emergent or scrub shrub wetland and these wetland areas within the would not recover during the period of analysis to become fully functioning forested wetlands. Mitigation would be required for the loss of wetlands, but would not fully offset impacts. Other long-term impacts such as those to vegetation; landscape connectivity, wildlife habitat, and wildlife; and visual resources would occur and would be irreversible during the period of analysis. These impacts, however, could only be mitigated or reversed after the period of analysis if the line were to be removed and the area of the ROW were restored in the future.

Under alternative 3, impacts to historic resources such as known archeological sites, historic structures, and cultural landscapes could be considered an irreversible resource commitment if blasting or excavation permanently alters or destroys resource, or the resource is completely lost. Alternatives 4 and 5 do not contain known archeological resources, but historic structures, and cultural landscapes would be affected and could be considered an irreversible resource commitment. Visual impacts would also occur due to the presence of the transmission line under alternatives 3, 4, and 5. Some impacts to these resources could be mitigated through various cultural landscape management requirements, but the impact would be irreversible unless the known resources are completely recovered prior to construction activities.

UNAVOIDABLE IMPACTS

Unavoidable impacts constitute a substantial change to existing environmental conditions that cannot be completely offset by the implementation of mitigation measures. Unavoidable impacts on geology and visual resources could arise from the action alternatives 2, 2b, 3, 4, and 5 as described in chapter 2.

The extensive excavation and blasting activities required for the construction of the new towers would permanently affect geologic resources. Potential unavoidable impacts to groundwater or surface water from drilling, blasting, or excavating could affect the hydrology (a crucial feature of wetlands) of wetland areas, some of which are considered rare and unique communities and/or Exceptional Value Wetlands. The effects of blasting may not occur or be observed immediately during the activity, but may take months or years to occur. The spread of invasive plant species from construction, excavation, and removal/maintenance activities would be an unavoidable impact to special-status plant and wildlife species as well as to native vegetation and wildlife species through competition of resources and habitat. It is expected that invasive plant species would spread along the ROW, along access roads and off the ROW, as well as into adjacent plant communities.

It is assumed that unavoidable impacts would also occur to unknown archeological and paleontological resources that have not yet been documented. There would also be unavoidable impacts to vegetation, park operations, and infrastructure (roadways).

Visual resources would be significantly affected by the presence of larger, taller transmission lines under all action alternatives, which would constitute an unavoidable impact and would adversely affect aesthetics and the experiences of visitors to the parks.

Cultural landscapes would be altered permanently and would constitute an unavoidable impact.

Landscape scale connectivity would impacted permanently for both existing and potential protection in perpetuity and would constitute an unavoidable impact.

No other unavoidable impacts on resources were identified.

ASSESSMENT OF THE SIGNIFICANCE OF THE IMPACTS OF THE ALTERNATIVES

As stated in the General Methodology section at the beginning of this chapter, the significance of the impacts of the alternatives evaluated in this DEIS is assessed using the CEQ definition of “significantly” (40 CFR 1508.27) which includes consideration of context, duration, and intensity of the impacts. NPS may change the way in which the Environmental Consequences chapter organizes and presents this information in the final EIS, and welcomes public comment on how this information is presented.

Context is described first because context applies across all alternatives. Overall context is presented first, followed by resource-specific context. Following context, each alternative is discussed according to the factors in the CEQ definition of "intensity," concluding with a finding of whether or not the alternative would result in significant impacts.

CONTEXT FOR ASSESSING THE SIGNIFICANCE OF THE IMPACTS OF THE ALTERNATIVES

A. Overall Context for Significance of National Park Units Affected by the Susquehanna to Roseland Transmission Project Proposal

The project proposed by the applicant would cross three separate units of the national park system. Alternatives being analyzed would cross various combinations of those units and some cross the newly established Cherry Valley National Wildlife Refuge. There are no-action alternatives possible that would not cross the APPA.

The Delaware Water Gap National Recreation Area (DEWA) established by Public Law 89-158 on September 1, 1965, created what is now the second largest unit (measured by acreage) in the Northeast Region of the National Park Service (NPS) and normally the eighth most visited unit of the entire system with twice as many visitors as many of the most famous parks in the nation. Its location in the most populated area of the United States makes it a destination within an easy drive of at least 50 million people. Located on both sides of the Delaware River in both New Jersey and Pennsylvania and barely outside of New York State, it is the only park unit that could potentially become a designated national park for the three states in this tri-state area, none of which have any designated national park. DEWA was established for "preservation of the scenic, scientific and historic features contributing to public enjoyment of such lands and waters" (PL 89-158).

In addition to providing outstanding nature based recreational opportunities and to administering the unit in accordance with the Organic Act of 1916 and the Redwood Act amendments, the NPS is charged with specifically protecting the scenic, natural, scientific cultural and archeological wonders that are contained therein. DEWA is one of the most important archeological areas in this nation and is culturally significant to several tribes that are closely associated with the lands. The Tribes work closely with the NPS on numerous issues.

Also contained within the boundaries are the Middle Delaware Scenic and Recreational River and the globally important Appalachian Trail. For the more than 5 million visitors who enjoy these resources annually the park is an outstandingly remarkable place where national heritage and spiritual replenishment are enhanced by a myriad of recreational opportunities. The Delaware River is the longest undammed river in the Eastern United States and the Upper Delaware, Middle Delaware, and Lower Delaware Rivers are designated as scenic and recreational rivers under the Wild and Scenic Rivers Act (WSRA). Combined, over three quarters of the non-tidal Delaware River are included in the Wild and Scenic Rivers System. The WSRA calls for protection of rivers that "possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural and other similar values" (16 USC 1271, 1526). The Delaware River includes all of those attributes.

Since the establishment of DEWA and MDSR, the entire ecosystem has reverted to mostly pristine forest. The adjacent New Jersey State lands enhance the overall opportunities for a natural experience and create a large landscape level portion of contiguous habitat that is one of the largest and most intact in the Northeast Region of the United States. In conjunction with the public lands in Pennsylvania that are still connected to DEWA through private undeveloped lands and therefore the New Jersey State lands, the contiguous habitat is nearly a half a million acres of pristine wildlife habitat and watershed. There are little or no intrusions on the hiking and river experience on the MDSR and in DEWA or along the Appalachian Trail within DEWA. The rare opportunity for such a wilderness experience in the mostly developed metropolitan complex of the Northeast is the core experience the NPS is trying to preserve unimpaired for future generations. Tens of thousands of hikers, birders, and other natural and cultural enthusiasts flock to DEWA weekly to enjoy the Appalachian Trail in what is clearly one of the most pristine areas in Pennsylvania, New Jersey or nearby states. Places like Sunfish Pond, Crater Lake, and Camp Mohican create a memorable experience for the day hiker and the through hiker alike. The 32-mile long McDade Trail shadows the river through the woods providing cyclists, photographers, and birders a unique place to enjoy nature without traveling across the country or crossing excessively difficult terrain. The very nature of the parks makes it possible for children, the elderly, and physically limited people to enjoy experiences often denied. Partners in historic and cultural preservation and environmental education service hundreds of thousands of visitors. Swim beaches along the river are also well used and busy virtually anytime weather allows. Canoeists, kayakers, and others crowd the river and shoreline throughout the warm seasons. Never is there a time, however, when one cannot find solitude and scenic wonder on one of the cliff trails especially in the Pennsylvania portion of the park.

The parks are also part of a cultural landscape. This area is a tapestry woven of natural and cultural resources. Together these parks and the natural features are inextricably interwoven with the history and culture of the Delaware River Valley. Remnants of early Americans, the Dutch, the colonists, the French and Indian War are found even today extending out from Old Mine Road in New Jersey and the River Road in Pennsylvania. Some of the oldest extant buildings in the area are found in the park and many villages are kept alive through the work of partner organizations. Tens of thousands of people come annually for the one weekend event known as Millbrook Days. On a daily basis, the parks provide educational opportunities for school children in history and culture.

Visitors and citizens of the United States who ostensibly are the owners of the National Park units involved herein have expectations that these parks along with all others in the national park system are representative of the pristine remnants of the national heritage of our great and vast nation. Whether they never visit the parks or frequent them on a daily basis they expect those places to hold a special meaning and to be unimpaired for them and for the future generations. The Organic Act of 1916 guarantees that expectation. The park created by a movement of citizens has virtually the same vision as the internationally unique Appalachian Trail. The mountain top in Pennsylvania to the mountain top in New Jersey with the longest undammed river in the eastern United States at its center is what visitors expect when they come to visit DEWA.

People expect to come to a pristine place and hike along the most famous trail in the world to view the magnificent vistas, wildlife, waterfalls and to escape the mundane trappings of civilization for a few hours, days or weeks. Hunters, fishermen, hikers, windshield tourists, swimmers, canoeists, boaters, and explorers expect to find what they do not find in their everyday environments. They expect what the Organic Act, the enabling legislation of all three units and the Redwood Act amendments dictates. Visitors expect to visit all three parks in such a manner as to leave those resources unimpaired for future generations.

B. Resource-Specific Contexts

In addition to the overall context, significance of the various alternatives was considered in light of elements of the context specific to individual resources.

Geologic Resources:

- The uniqueness of the geologic formations found in the parks, including the regionally significant valley-and- ridge formations and the renowned feature of the Delaware water gap;
- The presence of unique limestone formations, which are the foundation of many rare and unique vegetation communities, which in turn support several special status species; and
- The characteristics of geologic resources such as the tendency of limestone to fracture which can have effects on other resources such as groundwater.

Floodplains:

- Executive Order 11988 directs all federal agencies to avoid long and short-term impacts associated with occupancy, modification and development of floodplains when possible.
- NPS Director's Order 77-2 implements Executive Order 11988 and established NPS policy to preserve floodplain values and minimize potentially hazardous conditions associated with flooding.
- The floodplain within DEWA and MDSR lies along the entire length of the Delaware and at the confluences of larger tributaries to the Delaware and is relatively intact with little development or manipulation.
- Floodplain functions and values (store floodwaters, minimize erosion of adjacent soils, provide riparian habitat, etc.) are intrinsic to floodplains and cannot be easily duplicated or replaced.

Wetlands:

- Executive Order 11990 directs the NPS to avoid to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative.
- NPS Director's Order 77-1 adopts a goal of "no net loss of wetlands"; in addition, the NPS will strive to achieve a longer-term goal of net gain of wetlands.
- Wetlands have unique functions and values (groundwater recharge; stormwater storage and discharge; unique habitats; etc.) that are intrinsic to wetlands and cannot be easily duplicated or replaced.
- The quality of the particular wetland being impacted related to the functions and values performed by that wetland.

Vegetation:

- Vegetation is part of the larger, continuous, diverse ecosystem within the Delaware River valley.
- Vegetation is the basis of the ecological community, meaning that other important resources depend on vegetation.

Landscape Connectivity, Wildlife Habitat, and Wildlife:

- Connectivity is essential for healthy wildlife populations, especially those species that are highly mobile and have large home-range requirements.
- DEWA and APPA together provide a mosaic of different habitat types that includes roads and utility rights of way with minimal fragmentation of the contiguous ecosystem which is rare in the Northeast.
- The connections between the parks and other public and undeveloped lands create a larger area for wildlife that provides a refuge amidst increasing development; important populations of animals already use these contiguous blocks of habitat (e.g., the Kittatinny Ridge flyway is an important raptor migration corridor).
- DEWA and APPA serve as regional green space, providing a contiguous connected green space between the parks and other public lands within the larger East Coast.
- Connectivity is a recreational asset (i.e., visitors have an opportunity for a “backcountry” experience away from the interruptions of daily life).
- DEWA, in particular, is positioned within the region to take advantage of connectivity opportunities that do not exist elsewhere.

Special-status Species:

- These species are protected by federal and state laws which means that protection of these species is significant on a national scale and/or regional scale (within the state).
- All federal agencies are specifically charged by the Endangered Species Act to conserve listed species and are prohibited from taking actions that would jeopardize the continued existence of these species; NPS *Management Policies 2006* and DO-77 also direct the NPS to treat state-listed species in the same way that federally-listed species are treated to the extent practicable.
- The presence of Special Status species in the parks is an important component of the visitor experience; bald eagles in particular offer visitors a highly valued opportunity for wildlife observation that is not commonly available in adjacent developed areas.
- Maintaining the integrity of local populations (occurrences) of state- and federally-listed species, and their habitat, is important because these species are rare; have specialized habitat requirements; and because the parks serve as a refuge from surrounding habitat loss and alteration due to development pressure in the region.
- The effectiveness of mitigation measures or best management practices in reducing negative impacts to special status species or their habitat, if such measures are implemented.
- Additional context for bald eagles is the USFWS National Bald Eagle Management Guidelines, which recommend “To avoid collisions, site wind turbines, communication towers, and high voltage transmission power lines away from nests, foraging areas, and communal roost sites.” If these guidelines cannot be followed, a permit must be obtained from the USFWS to authorize “limited, non-purposeful take of bald eagles…in the course of conducting lawful activities…”
- Additional context for bats is the alarming decline in many bat populations throughout the Northeast due to white-nose syndrome. Some species may be in danger of extirpation because of WNS. Any stressor should be evaluated as a possible contributing factor to overall local and regional population health.

Rare and Unique Communities:

- The parks encompass a variety of unique ecosystems and geographic sites, resulting in an unusual concentration of resources with varying scope of importance.
- Contiguous habitat between the parks and with surrounding lands results in a nexus with other individual resources.
- Rare and unique communities are subject to special management treatment needed to maintain their viability; this is recognized by multiple agencies and is important to broad interests.
- Areas designated as state natural heritage sites contribute to biodiversity which warrants this special recognition.

Archeology:

- DEWA is identified in the Congressional record for archeological significance.
- The archeological record in DEWA is unusually complete and contiguous because of the unique geography and the pre-Columbian settlers that it attracted, and because the area has been protected from disturbance.
- The unusually complete archeological record makes this area a national destination for archeological research.
- Archeological resources have been extensively lost elsewhere and are under continuing threat of loss due to development pressures.

Historic Structures:

- Historic preservation is specifically identified in DEWA’s enabling legislation.
- DEWA preserves the theme of the initial westward expansion of coastal colonies.
- DEWA contains some of earliest examples of historical structures in the region; many of these sites retain their original appearance and orientation in largely intact surroundings (e.g., Old Mine Road is the earliest commercial road in the county).
- Historic structures are major draw for visitation (approximately 44% visitors identified these as important).

Cultural Landscapes:

- Encompassing a river valley and the surrounding mountains and gazed down upon by millions of visitors from the AT and hundreds of other trails, the Delaware River Valley is a living ecosystem and an iconic representation of the human environment. This single large cultural landscape is made up of many individual cultural landscapes such that the context of cultural landscapes is larger than simply the individual cultural landscapes analyzed.
- DEWA was established to preserve past land uses and as a whole represents a cultural landscape, encompassing the Delaware River Valley with all of its architecture, history, pre-history, and traditions inextricably interwoven with the magnificent natural resources around which that culture was built.

- APPA is considered a cultural landscape because of its importance to the environmental and outdoor recreation movements and the visionary and volunteer efforts to create the Appalachian Trail.
- DEWA is also important to the past environmental movements due to Tocks Island Dam controversy. Many citizens were seriously aggrieved by the loss of their family homesteads through eminent domain. In the end, however, they asked that the valley be preserved for future generations. Even today many of the people, who sacrificed the most for the creation of the park for the greater good, still ask that it be retained for those higher purposes and never allowed to be denigrated for inappropriate uses.
- A contemporary aspect is the changing relationship of the park to the community around it where the community is increasingly integrating the park into their local community.

Socioeconomics:

- The values of the local social environment; primarily quality of life; and
- Economy of the local communities surrounding the parks and local economic values, including economic benefits and losses to the local communities.

Infrastructure, Access and Circulation:

- DEWA is a linear park with primarily parallel roads; not all roads in DEWA are owned by the NPS.
- Commercial uses of DEWA roads are restricted except for US 209 (which requires a permit); most park roads are very basic and unsuitable for use by heavy equipment because they do not have the necessary foundations, do not have the required turning or overhead clearances, and traverse difficult terrain.
- Typically, no new roads are allowed in national parks that do not benefit park purposes.
- Some DEWA roads are also historic resources (e.g., Old Mine Road and River Road).

Visitor Use and Experience:

- Visitors to national parks have high expectations for a high quality experience.
- APPA is world renowned for hikers and can be a once-in-a-lifetime trip.
- There are few large national parks in the east and DEWA, APPA and the MDSR are uniquely accessible to millions of people (within a day's drive).
- DEWA, APPA and MDSR are an "oasis" offering an opportunity for solitude and escape from urbanized life that is rare in this part of the east coast.
- The visitor base is exceptionally diverse, consisting of local, regional, national and international visitors, including both first-time and repeat users, with the duration of stays ranging from day-use to multi-day trips.
- The parks offer a wide diversity of experiences available to visitors: hunting, paddling, hiking, camping, sightseeing, historic buildings and settings, agricultural practices and remnants of settlement of the valley and past ways of life.

Visual Resources:

- The Organic Act and the enabling legislation for all three park units specifically identifies scenery as a key resource;
- The parks contain views that are unusual in this region in extent, vividness, intactness, and unity (i.e., unbroken views across miles); and
- There is intrinsic value in beautiful scenery or views (a commodity).

Soundscapes:

- The undeveloped nature of the parks protects the natural soundscapes and buffers against non-natural, human-caused sounds, creating oases from civilization and urbanization.
- Natural sounds and escape from every-day noise is an important component of the visitor experience and is anticipated by visitors.

Wild and Scenic Rivers:

- The Wild and Scenic Rivers Act protects rivers that possess “outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values” and preserves their free-flowing condition for the benefit and enjoyment of present and future generations, echoing the NPS Organic Act.
- Wild and scenic rivers administered by the NPS, such as the MDSR, are part of the national park system, and are subject to all laws, regulations, and policies applicable to that system. The DEWA GMP states that, although the national recreation area and the scenic and recreational river have separate origins, they are considered an integrated whole for the purposes of park planning.
- MDSR must be managed in accordance with the Wild and Scenic Rivers Act; Section 10(a) of the Act states that each component of the system “shall be administered in such manner as to protect and enhance the values which caused it to be included in [the wild and scenic rivers] system without … limiting other uses that do not substantially interfere with public use and enjoyment of these values. In such administration primary emphasis shall be given to protect [the area’s] aesthetic, scenic, historic, archeological, and natural features.”
- Section 10c of the Wild and Scenic Rivers Act requires the NPS to use their general statutory authorities to protect wild and scenic river values which includes not only the river itself, but adjacent lands.

Park Operations:

- Parks must operate within the constraints of the unit-specific budget and number of staff positions that have been allocated by Congress and the NPS Director’s office.
- DEWA and APPA are large parks with extensive operational activities that must be covered with available staff and budget.
- The diversity of resources and facilities contained within the parks and their linear nature increases the complexity of operations because of the variety of resources and visitor experiences that must be managed over a wide area.

Health and Safety:

- By their nature, national parks are public lands that provide public services to visitors.
- DEWA and APPA, like all national parks, are “working” parks that are mandated to provide a safe workplace for employees as well as the public.
- DEWA contains numerous in-holdings (privately owned and public-owned lands within the legislated boundary of the park) and local roads that are not owned by the NPS, which means that there is considerable movement between NPS lands and non-NPS lands and access to the park is not entirely under park control.

ASSESSMENT OF SIGNIFICANCE BY ALTERNATIVE

Alternative 1 (No Action)

The impact analysis of alternative 1 examines the condition of the resources along 4.3 miles of DEWA, MDSR and APPA as crossed by the B-K Line and its associated infrastructure. Under this action the NPS would deny the applicant’s request for special use and construction permits and the existing line would remain without replacement and expansion. However, operation and maintenance of the 230-kV transmission line would continue.

The environmental consequences of implementing alternative 1 would not be significant. As the following explains, this determination is made through application of the ten CEQ factors to various elements of the action that are relevant in light of the context in which they occur.

A discussion of impact intensity (for applicable topics) specific to alternative 1 follows.

1) *Impacts that may be both beneficial and adverse. A significant effect may exist even if the federal agency believes that on balance the effect will be beneficial.*

   If the NPS takes no action, the only change would be the result of the applicant’s new vegetation management standards, leading to more clearing of vegetation within the right of way than is the case now or has been the case historically. Continuing maintenance of the existing ROW corridor plus the new vegetation management standards would result in some ongoing adverse impacts to vegetation; wetlands; floodplains; landscape connectivity; special status species; rare and unique communities (Hogback wetlands, Arnott Fen); cultural landscapes; and visual resources. All of these adverse impacts would be confined to the limits of the present right-of-way and none of the adverse impacts change existing conditions with regard to the overall functions and values of the affected resources.

2) *The degree to which the proposed action affects public health and safety.*

   The selection of alternative 1 would not affect public health and safety.

3) *Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetland, wild and scenic rivers, or ecologically critical areas.*

   The geology crossed by alternative 1 is unique due to the presence of limestone and shale formations. These limestone formations support unique calcareous wetland communities (which in turn support rare, threatened and endangered plants and animals) and act as groundwater repositories. Alternative 1 would cross a number of unique ecosystems such as the Hogback and

Arnott Fen; the Delaware River Riparian Corridor; the Van Campens Brook Riparian Corridor; and the Kittatinny Ridge. Key resources contributing to the uniqueness of these ecosystems include state- and federally-listed threatened and endangered species, and their habitats; bald eagles and other migratory birds; hemlock forest and hemlock-dependent wildlife; and a globally-significant rare plant community. They comprise priority sites at the parks and regionally for their contributions to biodiversity. Also, the expansive stretches of intact habitat and contiguous forest within the study area, as crossed by alternative 1, create an important ecological hub upon which natural corridors can be developed to connect other protected lands adjacent or proximate to the parks.

The scenic character within the study area is composed of mostly undeveloped, contiguous tracts of forest. Buffered from human development and encroachment, this stretch of the Appalachian Trail, perched atop the Kittatinny Ridge, is known for the solitary and wilderness-like experience it offers. Likewise, the Walpack Bend, just upstream of the transmission line crossing, is the most natural and least developed section of the MDSR. This area has the least evidence of human occupancy and influence making it a popular river destination because it offers an experience of solitude. The exceptional scenic quality of this area also contributes to the high quality atmosphere of the cultural landscapes (and the historic structures therein). Alternative 1 would effect no change in these unique characteristics and in some cases, would benefit rare and unique communities such as the Arnott Fen by keeping these areas open and controlling succession into woodlands.

4) *The degree to which the effects on the quality of the human environment are likely to be highly controversial.*

Under current ROW vegetation management activities the applicant is cutting danger trees. The applicant defines danger trees as 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). The applicant contends that they can cut danger trees on federal land outside their deeded right. Disagreement over this issue between the NPS and PPL resulted in a court settlement in August 2010. This controversy is not, strictly speaking, a public one over the effects of the applicant’s actions, but is an area of disagreement that would remain unresolved under alternative 1.

5) *The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.*

There is some potential for unknown risks to wintering bald eagles. The wintering population of eagles in DEWA is a mix of resident eagles and winter migrants. The winter residents are nesting eagles that remain in DEWA through the winter. The winter migrants consist of eagles from the northern states and Canada who migrate to DEWA and spend the majority of the winter within the park plus additional eagles that migrate through the Delaware River valley, spending a shorter amount of time in DEWA. The total number of eagles that use the communal winter roost even for just a short period each year is unknown. The potential for eagles to collide with powerlines is also dependent on the visibility of the lines. The present lines do not have mitigation measures installed to increase the visibility of the lines but the height of the lines are at or below tree level and are therefore not in the direct flight path of eagles flying to and from the roost. There is a possibility that some collisions with the power lines have occurred and gone undetected. However, this risk is comparatively low, and, given that the lines are at or below tree level and given that the powerline has been in place for many years, it is likely that the winter roost developed with the existing powerline already present.

6) *The degree to which the action may establish precedent for future actions with significant effects or represents a decision in principle about future conditions.*

   The no-action alternative would not establish any precedent for future actions with significant effects. To the extent it represented a decision in principle about future actions, it would favor the continuation of the status quo, which is not precedent setting in the context of the NPS system, whose primary goal is preservation for future generations.

7) *Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.*

   Under alternative 1, there would be no other related actions with cumulatively significant impacts.

8) *The degree to which the action may adversely affect districts, sites, highways, structures or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.*

   Since no action would be taken under alternative 1, there would be no changes to historic resources affected by the existing transmission line. After applying the Advisory Council criteria for adverse effects, the NPS has determined that implementation of alternative 1 would result in a finding of no historic properties affected with respect to historic structures and no adverse effects to archeological resources and to cultural landscapes.

9) *The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.*

   Operation and maintenance activities associated with alternative 1 have some potential for impacts on federally endangered bog turtles and Indiana bats from disturbance and habitat alteration. These impacts could be effectively minimized by implementing appropriate protection and conservation measures in consultation with the USFWS; therefore, the impacts of alternative 1 are not likely to adversely affect federally listed threatened and endangered species.

10) *Whether the action threatens a violation of federal, state, or local law requirements imposed for the protection of the environment.*

    Selection of alternative 1 would not threaten the violation of any federal, state, or local law requirements imposed for the protection of the environment.

Assessment of the Significance of the Impacts of Alternative 1

Considering the intensity of the impacts of alternative 1 in the context of the purposes for which these parks were established and are managed and of the affected resources, the impacts of alternative 1 are considered to be not significant in the context of visitor experience and expectations of a national park. The existing line was present when the parks and MDSR were established and thus, was part of the existing conditions. Also, the existing transmission line and ROW is virtually invisible from most places and at most times of the year because it is screened by topography or it is surrounded by forest 30 to 40 feet taller than the 85 foot towers.

Alternative 1 would also have adverse impacts to vegetation, wetlands, floodplains, landscape connectivity, special status species, rare and unique communities, cultural landscapes, and visual resources associated with ongoing vegetation management activities, which are changing from their historic pattern. In the context of laws and policies that protect these resources, the impacts are not likely to adversely affect population viability, overall habitat quality, or functions and values of unique communities and resources such as wetlands and floodplains. Adverse impacts to special status species, wetlands, and floodplains would be avoided and minimized through required consultation and permitting processes; thus, the impacts would be consistent with the laws and policies that govern these resources. Many of the adverse impacts, much of the uncertainty, and possibly the controversy (associated with danger tree cutting), may be reduced or eliminated with the development of a park-specific, NPS approved ROW vegetation management plan. The plan would contain best management practices that address existing conditions with regard to existence, location, or characteristics of known occurrences of special status species and key habitats, which is consistent with relevant federal and state laws that protect special status species and with NPS *Management Policies 2006*.

In conclusion, the actions under alternative 1 would be in keeping with the parks' enabling legislations, NPS Management Policies, and all other applicable federal and state laws. Any cumulative impacts to resources would remain adverse primarily from other actions taken outside the study area. While there are adverse impacts associated with the continued operation and maintenance of the 230-kV transmission line, the combined context, duration and intensity of these impacts do not result in significant impacts.

Alternative 2

The impact analysis for alternative 2 analyzes the potential effects from the construction, operation and maintenance of the applicant's proposal. This alternative ROW would cross 4.3 miles of NPS lands and waters, affecting three units of the national park system, DEWA, MDSR and APPA. Under this alternative, the NPS would approve the applicant's request for special use and construction permits to expand the ROW and replace the B-K Line with a double circuit 500-kV line.

The environmental consequences of implementing alternative 2 would be significant. As the following explains, this determination is made through application of the ten CEQ factors to various elements of the action that are relevant in light of the context in which they occur.

A discussion of impact intensity (for applicable topics) specific to alternative 2 follows.

1) *Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.*

   Construction of the line at this location would result in numerous adverse impacts.

   Blasting and drilling required to install the towers has the potential to damage or destroy unique geologic formations, destroy or degrade important rattlesnake habitat, and disturb ground and surface water dynamics that support wetland functions. These activities are particularly worrisome in areas with limestone substrate, which could fracture in unpredictable ways opening fissures that would fill with water. If this happens, it could change wetland functions and alter the composition of the vegetation and wildlife communities therein, creating a cascading effect that further compounds the impacts. Visitors would also experience negative effects during these periods from the noise pollution these activities would cause.

   Clearing and reduction in vegetation from widening the ROW, constructing access roads, creating cane pads, and ongoing maintenance would remove mature forest leaving a scrub shrub habitat in its place, and cause soil compaction inhibiting regeneration. This would cause permanent habitat loss and further fragment habitats on either side of the corridor, particularly for amphibians and other small vertebrates. These activities would also disturb nesting bald eagles to the extent taxa that sensitive individuals may abandon nests; the disturbance would also displace wintering bald eagles from adjacent foraging areas which potentially reduces survival and reproductive success. Clearing and reduction of vegetation also increases opportunities for invasive species to spread and displace native plant communities, particularly in the Hogback and Arnott Fen habitats. Cumulatively, the new transmission line would bisect a key protected land corridor and decrease connectivity on regional scale. It would also decrease future possibilities to connect adjacent lands to create contiguous green space corridors.

Installation of new taller towers would create a collision hazard for raptors and migratory birds in an important flyway and introduce a noticeable visual intrusion that would diminish scenic quality. The presence of large and obtrusive infrastructure in a relatively undeveloped zone would be a distraction and detract from the experience visitors seek when coming to the parks. It would degrade the regionally unique and unusual wilderness-like viewshed for APPA that DEWA and MDSR provide. Larger structures also introduce non-conforming elements to the parks' cultural landscapes and historic sites affected by this alignment and detract from the characteristics that qualify them for protection. This, in turn, would have adverse impacts on the MDSR through degradation of the scenic values for which the river was designated. The visual change would affect a relatively large area and a large number of users.

Construction activities would result in temporary closures of trails, roads, and the MDSR to ensure visitor safety. Road and site closures would interrupt visitor's access and experience in the park and compound safety management challenged during the busy seasons. The movement of heavy construction equipment through the park would also have adverse impacts on DEWA and Worthington State Forest roads because these roads are not constructed to handle heavy equipment. Permanent closures of river campsites in the vicinity of alternative 2 would impact the amount of camping facilities available, putting pressure on other campsites along the MDSR in DEWA. Park operations would also be adversely impacted because of the increased need for staffing to monitor and patrol areas during construction for visitor safety and to mitigate impacts on resources. In addition the expansion of the ROW and creation of access roads would make access for illegal uses such as off-road vehicles increasing the need for law enforcement patrols and resource protection in these areas.

Construction in this location would have some marginal beneficial impacts. Replacement of the existing lattice structures with steel monopoles would reduce visual clutter at close distances, and expansion of scrub shrub habitat would benefit certain wildlife species.

2) *The degree to which the proposed action affects public health or safety.*

Construction activities, the presence of heavy equipment, and alterations to typical traffic flow would create greatly increased risks to visitor and staff safety. However, such impacts would be temporary. Proper management, advanced planning, and park staff expertise dealing with these types of disruptions would minimize these risks; properly managed risks to public safety are expected to be minimal.

3) *Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.*

Alternative 2 would cross in the center part of DEWA, including the MDSR. In general, this area is one of the most undeveloped areas of the park, containing large swaths of contiguous mature forest, few manmade intrusions, unique geological formations, a globally-significant rare plant community, and abundant opportunities for solitude. This part of the park is a particularly sensitive area because it contains high concentrations of many important and unique natural features including, rare limestone formations, the Arnott Fen, the Delaware River riparian corridor, eastern hemlock forests, the Hogback Ridge, the Kittatinny Ridge, and the Van Campens Brook riparian area. Several resources on this alignment are recognized for their superlative biodiversity (e.g., Hogback Ridge and Arnott Fen) and are significant in both park and regional contexts, making any impacts in these locations even more acute. The alternative would bisect a major migratory bird flyway and is adjacent to an important communal roost for wintering bald eagles that is one of only two known winter roosts in DEWA. The crossing area also contains a high concentration of cultural resources including pre-Columbian fishing camps and 32 identified historic structures, owing to a fortuitous combination of topography and land protection. These characteristics attract visitors and it consequently plays host to a large proportion of DEWA users. It also crosses close to a unique river feature, the Walpack Bend, which is a premier visitor attraction in DEWA. The crossing's location in DEWA makes it visible from far way high points like APPA. For APPA, the alternative would transit through what is now a very natural and relatively unspoiled viewshed provided by these undeveloped lands below it.

4) *The degree to which the effects on the quality of the human environment are likely to be highly controversial.*

Public attention surrounding the project is high. There would likely be high degree of controversy over any effects on park resources that are particularly popular with the public, such as scenery, visitor use and experience, rare and unique communities, and historic structures, for any of the alternatives. The inherently uncertain nature of predicting the true degree of some of these impacts would likely heighten this controversy.

Additionally, construction at this particular location in the park is likely to accentuate the controversy due to the unique characteristics present here, discussed in the previous paragraph, and high visitor traffic to this area.

5) *The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.*

The methods used to predict certain key effects at this location are limited. Blasting and drilling can fracture limestone formations and alter groundwater hydraulics in ways that are not predictable. The long-term effects of construction activities in the areas where rare and unique communities are located are difficult to predict accurately because of the nature of these communities (e.g., Arnott Fen exists as a distinct combination of physical and biotic features and seemingly small changes in hydrology, such as placing fill material to construct a permanent access road, may result in disproportionately, unpredictably large changes in the fen system from alterations in the composition of fen vegetation which, in turn, impacts the associated wildlife). Scenic impacts can only be approximated and would not be truly known until after construction is complete. The risks are heightened further for this crossing because of the unique characteristics at stake in this location. The transmission line would be oriented perpendicular to a major flyway for migratory birds, increasing the risk of bird collisions. It is not possible to predict what percentage of migrating birds might be killed or injured from colliding with the wires and/or towers but the height of the towers and number of conductors are believed to greatly increase the potential for bird collisions and resulting mortality or injury. Bird diverters would be used to make the wires more visible but their effectiveness is not known. 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 roost developed with the existing, lower transmission line in place and there have been no know instances of eagle collisions, although some may have occurred; however, the taller towers and more numerous wires directly in the flight path of wintering eagles that use the communal roost on a regular basis, if not daily, presents an extremely high risk of collisions resulting in loss or injury of bald eagles.

6) *The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.*

Permitting the project would adversely affect multiple protected resources inside the parks, in some instances irreversibly. Allowing such adverse effects in order to facilitate private infrastructure expansion would be contrary to NPS practice and principle of protecting and improving these resources, and of removing incompatible infrastructure to do so. This could establish a precedent that may invite similar proposals by other applicants in the future, and create an expectation of like treatment for those proposals; it may make it difficult to deny such proposals. DEWA and APPA both contain numerous other utility crossings, which makes the risk of such precedent particularly concerning for these parks. Furthermore, as units of the national park system, wherein all parks are entitled to co-equal protection, creating such a precedent could have ramifications for parks nationwide. The location of this particular crossing within DEWA – the center of the park– could make such a precedent even more potent. Installing the S-R Line on this alignment may invite future utilities proposing to follow the same route.

7) *Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.*

The transmission line at large would require related actions taken by the applicant to complete construction elsewhere along its expanse. These related actions would further fragment wildlife habitat and reduce landscape connectivity within the broader expanse of these resources in which the parks are located.

The applicant’s project would impact the portions of several resources inside the park that are also under pressure in the surrounding region. Multiple types of development outside of DEWA and APPA are quickly diminishing several of the resources analyzed on a broader scale, such as the Kittatinny migratory bird flyway, contiguous wildlife habitats, scenic viewsheds, rare and unique ecosystems, and archeological sites. The reduction of these resources in the region surrounding the parks increases the scarcity and sensitivity of them inside the parks where they are afforded special protection. Alternative 2 contributes to the cumulative adverse impact on these resources, particularly with regard to fragmentation, loss of landscape connectivity, intrusions into scenic viewsheds, and hazard to migratory birds.

The applicant’s project is one component of a larger regional plan by the RTO to enhance system reliability. Other component projects of this plan have already and would continue to affect APPA, especially in the areas of scenic resources and visitor use and experience, as well as other National Parks in their paths.

8) *The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.*

After applying the Advisory Council criteria for adverse effects, the NPS has determined that implementation of alternative 2 would have an adverse effect on 8 historic structures, on cultural landscapes, and on archeological resources. The adverse effects on historic structures and cultural landscapes would result from the visual intrusion of the larger transmission line that cannot be mitigated and would diminish the integrity of the setting, feeling, and association of these resources. The adverse effect to archeological resources is a preliminary finding based on the potential for discovering significant archeological sites; however, that will not be known until pre-construction surveys are completed and may change, depending on the nature of the archeological sites found.

9) *The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.*

Alternative 2 would have adverse impacts on federally-endangered bog turtles including increased potential for illegal collection of individuals as a result of the establishment and maintenance of access roads; potential alterations of hydrology as a result of blasting that in turn could affect wetland habitat used by bog turtles; and potential for direct mortality from contact with construction vehicles and equipment. Adverse impacts to bog turtles would be minimized through implementation of appropriate mitigation and conservation measures in consultation with the USFWS; however, there would still be potential for direct mortality of bog turtles which would be a “take” under the Endangered Species Act, requiring a permit from the USFWS. Because it is not currently known whether bog turtles are present or how large of a population may exist along alternative 2, the potential for mortality of individual turtles in a local population is considered to be a significant impact; however, it is unlikely that any mortality of bog turtles as a result of alternative 2 would rise to the level of jeopardizing the continued existence of the species.

There is potential for adverse impacts on federally-endangered Indiana bats from tree clearing and construction activities that could interfere with bat foraging and could result in the removal of trees that may contain roost sites or maternity colonies. There is also some potential for adverse impacts on federally-listed freshwater mussels from vegetation clearing and construction activities. These impacts would be minimized by implementing appropriate mitigation and conservation measures in consultation with the USFWS and are not likely to adversely affect Indiana bats or freshwater mussels.

10) *Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.*

A crossing at this location poses high risk for irreparable damage to significant ecological communities and drastic scenic degradation that could violate the Organic Act (impairment). The high risk of bird collisions as a result of creating an aerial hazard on a major migratory flyway coupled with the unknown extent of the potential mortality of and injury to migrating birds and the uncertainty as to the effectiveness of mitigation measures could potentially violate the Act. The siting of a transmission line adjacent to a bald eagle roost is counter to the recommendations in the National Bald Eagle Management Guidelines and the risk of eagles colliding with the lines cannot be mitigated; therefore, it is likely that the potential loss of eagles through collisions would require a permit from the USFWS for “take” of bald eagles associated with operation of the transmission line. “Take” of bald eagles, meaning killing or injury, would occur for as long as the transmission line remains. The impacts on MDSR from alternative 2 would result in significant long term degradation of the scenic values for which the river was designated, which may violate the directives in Section 10(a) of the WSRA to “protect and enhance” those values which caused the river to be included in the system. The visual change would affect a relatively large area, a large number of users, and would exist for the period of analysis. Impacts related to construction activities would be of short duration when compared to the period of analysis but one time visitors who were impacted by river closures or construction noise may have their experience of the MDSR forever diminished.

Assessment of the Significance of the Impacts of Alternative 2

The impacts of implementing alternative 2 would be significant for geologic resources; wetlands; vegetation; landscape connectivity, wildlife, and habitats; rare and unique communities; archeological, historic structures, cultural landscapes, visitor use and experience, scenic resources, park operations, and infrastructure, access and circulation.

Impacts to geologic resources would be significant. Steps necessary to excavate foundations for the new towers would permanently destroy some rare geological features and could fracture important limestone basins that support wetland hydraulics with no means to predict whether or not fracturing would occur and to what extent. Impacts to wetlands would be significant. The aforementioned geologic disruptions and infiltration of invasive species pose serious risk of harm to wetlands. Specific wetlands affected, the Arnott Fen and those along the Hogback Ridge, are arguably DEWA’s most precious biological assets and globally important havens of biodiversity. Impacts to vegetation would be significant. Clearing required to construct and operate the new line would reduce the abundance, diversity, and quality of native vegetation in and around the alignment contrary to the conditions the parks strive to maintain. Impacts to landscape connectivity, wildlife, and habitat would be significant. The de facto permanent removal of vegetation from the corridor would create a new element of fragmentation in the landscape, which would inhibit the transit of certain wildlife and reduce opportunities to create future continuous green spaces. Impacts to rare and unique communities would be significant. A combination of impacts to other resources, such as vegetation and geology, would alter these species habitats leading to their decline in various ways. Impacts to archeological, historic, and cultural landscapes would be significant. Installation of the new, more visibly apparent towers would introduce a non-conforming characteristic into the environment of these resources degrading their relevant integrities. Furthermore, excavation activity could permanently destroy sites in the project area. Impacts to scenic resources would be very significant. The taller towers and wider right-of-way would create a dramatic visual disturbance where very little disturbance currently exists. These impacts in particular would be widely distributed across both APPA and DEWA at any location the line is visible. Impacts to visitor use and experience would be significant. Temporary noise pollution from construction activity, the intrusion of the taller towers into the natural environment, and loss of other resources that visitors come to experience, would appreciably diminish key aspects of the parks that visitors come to enjoy. The operations of the park would need to be augmented in order to adequately manage additional access and ensure the protection of resources from illegal access, off-road vehicle use, and spread of invasive species. In addition other staff would be required to monitor and ensure the use of mitigation during construction and operation and maintenance phases of the line.

Overall, the significance of the impacts of alternative 2 is a result of two considerations: the particularly resource-rich area through which the alternative crosses, and the potential to inflict severe harm to those resources because of the magnitude and duration of the adverse impacts. While it is true that not all impacts can be predicted with great certainty, in the context of the purpose and significance for which DEWA, APPA and MDSR were established and NPS mandates to specifically preserve the natural, cultural, and scenic resources within them, additional precautions are warranted when considering risks to these resources, many of which are of national importance. Similarly, certain resources are non-renewable which makes any impacts to them all the more serious as they cannot be replaced if lost. And some resources are under threat by other actions and outside pressure, which in the context of the function of the parks as an “oasis” or refuge within the highly developed east coast, elevates the need to preserve and protect these scarce, sensitive resources. For these reasons, the environmental consequences of alternative 2 would be significant.

Alternative 2b

The impact analysis of alternative 2b analyzes the potential effects from the construction, operation and maintenance of the applicant’s proposal constructed within the existing ROW. This alternative ROW crosses 4.3 miles of NPS lands and waters, affecting three units of the national park system, DEWA, MDSR and APPA. Under this alternative, the NPS would approve the applicant’s request for a construction permit to replace the 230-kV line with a double circuit 500-kV line. No additional ROW would be required.

The environmental consequences of implementing alternative 2b would be significant. As the following explains, this determination is made through application of the ten CEQ factors to various elements of the action that are relevant in light of the context in which they occur.

A discussion of impact intensity (for applicable topics) specific to alternative 2b follows.

1) *Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.*

   Construction of the line at this location would result in numerous adverse impacts.

   Blasting and drilling required to install the towers has the potential to damage or destroy unique geologic formations, destroy or degrade important rattlesnake habitat, and disturb ground and surface water dynamics that support wetland functions. These activities are particularly worrisome in areas with limestone substrate, which can fracture in unpredictable ways opening fissures that would fill with water. If this happens, it can change wetland functions and alter the composition of the vegetation and wildlife communities therein, creating a cascading effect that further compounds the impacts. Visitors would also experience negative effects during these periods from the noise pollution these activities would cause.

   Clearing and reduction in vegetation from constructing access roads, creating crane pads, and ongoing maintenance would remove mature forest leaving a scrub shrub habitat in its place, and cause soil compaction inhibiting regeneration. This would cause permanent habitat loss and further fragment habitats on either side of the corridor, particularly for amphibians and other small vertebrates. These activities would also disturb nesting bald eagles to the extent that sensitive individuals may abandon nests; the disturbance would also displace wintering bald eagles from adjacent foraging areas which potentially reduces survival and reproductive success. Clearing and reduction of vegetation also increases opportunities for invasive species to spread and displace native plant communities, particularly in the Hogback Ridge and Arnott Fen habitats. Cumulatively, the new transmission line would bisect a key protected land corridor and decrease connectivity on regional scale. It would also decrease future possibilities to connect adjacent lands to create contiguous green space corridors.

   Installation of new taller towers would create a collision hazard for raptors and migratory birds in an important flyway and introduce a noticeable visual intrusion that would diminish scenic quality. The presence of large and obtrusive infrastructure in a relatively undeveloped zone would be a distraction and detract from the experience visitors seek when coming to the parks. It would degrade the regionally unique and unusual wilderness-like viewshed for APPA that DEWA and MDSR provide. Larger structures also introduce non-conforming elements to the parks' cultural landscapes and historic sites affected by this alignment and detract from the characteristics that qualify them for protection. This, in turn, has adverse impacts on the MDSR through degradation of the scenic values for which the river was designated. The visual change would affect a relatively large area and a large number of users.

Construction activities would result in temporary closures of trails, roads, and the MDSR to ensure visitor safety. Road and site closures would interrupt visitor's access and experience in the park and would compound safety management challenged during the busy seasons. The movement of heavy construction equipment through the park would also have adverse impacts on the DEWA and Worthington State Forest roads because these roads are not constructed to handle heavy equipment. Park operations would also be adversely impacted because of the increased need for staffing to monitor and patrol areas during construction for visitor safety and to mitigate impacts on resources. In addition the expansion of the ROW and creation of access roads would make access for illegal uses such as off-road vehicles increasing the need for law enforcement patrols and resource protection in these areas. Permanent closures of river campsites in the vicinity of alternative 2 would impact the amount of camping facilities available putting pressure on other campsites along the MDSR in DEWA.

Construction in this location would have some marginal beneficial impacts. Replacement of the existing lattice structures with steel monopoles would reduce visual clutter at close distances, and expansion of scrub shrub habitat would benefit certain wildlife species.

2) *The degree to which the proposed action affects public health or safety.*

Construction activities, the presence of heavy equipment, and alterations to typical traffic flow create greatly increased risks to visitor and staff safety. However, such impacts are temporary. Proper management, advanced planning, and park staff expertise dealing with these types of disruptions would minimize these risks; properly managed risks to public safety are expected to be minimal.

Operation of the line in areas where clearances are less than required by NERC standards creates a considerable fire hazard. Alternative 2b would be constructed within the existing right-of-way, which is only 100 feet wide in certain places and bordered by 60-80 foot high trees on both sides. NERC guidelines call for clearances between live wires and trees on the edge of the corridor that are greater than what the current right of way would offer. This creates the increased hazard of live wires contacting trees and sparking a forest fire. Additionally, such an event would likely cause an outage of the line that would lead to loss of power to users downstream, which could create uncalculated health and safety issues.

3) *Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.*

Alternative 2b would cross in the center part of DEWA, including the MDSR. In general, this area is one of the most undeveloped areas of the park, containing large swaths of contiguous mature forest, few manmade intrusions, unique geological formations, a globally-significant rare plant community, and abundant opportunities for solitude. This part of the park is a particularly sensitive area as it contains high concentrations of many important and unique natural features including, rare limestone formations, the Arnott Fen, the Delaware River riparian corridor, eastern hemlock forests, the Hogback Ridge, the Kittatinny Ridge, and the Van Campens Brook riparian area. Several resources on this alignment are recognized for their superlative biodiversity (e.g., Hogback and Arnott Fens) and are significant in both park and regional contexts, making any impacts in these locations even more acute. The alternative bisects a major migratory bird flyway and is adjacent to an important communal roost for wintering bald eagles that is one of only two known winter roosts in DEWA. The crossing area also contains a high concentration of cultural resources including pre-Columbian fishing camps and 32 identified historic structures, owing to a fortuitous combination of topography and land protection. These characteristics make it a draw for visitors and it consequently plays host to a large proportion of DEWA users. It also crosses a unique river feature, the Walpack Bend, which is a premier visitor attraction in DEWA. The crossing's location in DEWA makes it visible from far way high points like APPA. For APPA, the alternative would transit through what is now a very natural and relatively unspoiled viewshed provided by these undeveloped lands below.

4) *The degree to which the effects on the quality of the human environment are likely to be highly controversial.*

Public attention surrounding the project is high. There is likely to be high degree of controversy over any effects on park resources that are particularly popular with the public, such as scenery, visitor use and experience, rare and unique communities, and historic structures, for any of the alternatives. The inherently uncertain nature of predicting the true degree of some of these impacts would likely heighten this controversy.

Additionally, construction at this particular location in the park is likely to accentuate the controversy due to the unique characteristics present here, discussed in the previous paragraph, and high visitor traffic to this area.

5) *The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.*

The degree of danger posed to human safety by operating the line with clearances that are below NERC standards is uncertain.

The methods used to predict certain key effects at this location are limited. Blasting and drilling can fracture limestone formations and alter groundwater hydraulics in ways that are not predictable. The long-term effects of construction activities in the areas where rare and unique communities are located are difficult to predict accurately because of the nature of these communities (e.g., Arnott Fen exists as a distinct combination of physical and biotic features and seemingly small changes in hydrology, such as placing fill material to construct a permanent access road, may result in disproportionately, unpredictably large changes in the fen system from alterations in the composition of fen vegetation which, in turn, impacts the associated wildlife). Scenic impacts can only be approximated and would not be truly known until after construction is complete. Under alternative 2b, the removal of danger trees on NPS lands outside of the ROW is a part of the applicant's vegetation maintenance plans. The loss of mature forest through the removal of danger trees cannot be accurately estimated because it is not known how many trees may actually be removed.

The risks are heightened further for this alignment because of the unique characteristics at stake in this location. One area of particular concern is the effects of removal of an unknown number of trees on the heavily forested Hogback Ridge. The ROW is 100 feet wide in this area and it is anticipated that danger tree removal would occur. The extent of the tree removal cannot be predicted; therefore, the impacts of tree removal on the sensitive and unique resources of the Hogback Ridge are unknown. Another area of concern is the increased potential for bird collisions. The transmission line would be oriented perpendicular to a major flyway for migratory birds, increasing the risk of bird collisions. It is not possible to predict what percentage of migrating birds might be killed or injured from colliding with the wires and/or towers but the height of the towers and number of conductors are believed to greatly increase the potential for bird collisions and resulting mortality or injury. Bird diverters would be used to make the wires more visible but their effectiveness is not known. 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 roost developed with the existing, lower transmission line in place and there have been no know instances of eagle collisions, although some may have occurred; however, the taller towers and more numerous wires directly in the flight path of wintering eagles that use the communal roost on a regular basis, if not daily, presents an extremely high risk of collisions resulting in loss or injury of bald eagles.

6) *The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.*

Permitting the project would adversely affect multiple protected resources inside the parks, in some instances irreversibly. Allowing such adverse effects in order to facilitate private infrastructure expansion would be contrary to NPS practice and principle of protecting and improving these resources, and of removing incompatible infrastructure to do so. This could establish a precedent that may invite similar proposals by other applicants in the future, and create an expectation of like treatment for those proposals; it may make it difficult to deny such proposals. DEWA and APPA both contain numerous other utility crossings, which makes the risk of such precedent particularly concerning for these parks. Furthermore, as units of the national park system, wherein all parks are entitled to co-equal protection, creating such a precedent could have ramifications for parks nationwide. The location of this particular crossing within DEWA – the center of the park– could make such a precedent even more potent. Installing the S-R Line on this alignment may invite future utilities proposing to follow the same route.

7) *Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.*

The transmission line at large would require related actions taken by the applicant to complete construction elsewhere along its expanse. These related actions would further fragment wildlife habitat and reduce landscape connectivity within the broader expanse of these resources in which the parks are located.

The applicant's project would impact the portions of several resources inside the park that are also under pressure in the surrounding region. Multiple types of development outside of DEWA and APPA are quickly diminishing several of the resources analyzed on a broader scale, such as the Kittatinny migratory bird flyway, contiguous wildlife habitats, scenic viewsheds, rare and unique ecosystems, and archeological sites. The reduction of these resources in the region surrounding the parks increases the scarcity and sensitivity of them inside the parks where they are afforded special protection. Alternative 2b contributes to the cumulative adverse impact on these resources, particularly with regard to fragmentation, loss of landscape connectivity, intrusions into scenic viewsheds, and hazard to migratory birds.

The applicant's project is one component of a larger regional plan by the RTO to enhance system reliability. Other component projects of this plan have already and would continue to affect APPA, especially in the areas of scenic resources and visitor use and experience, as well as other National Parks in their paths.

8) *The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.*

After applying the Advisory Council criteria for adverse effects, the NPS has determined that implementation of alternative 2b would have an adverse effect on adverse effect on 8 historic structures, on cultural landscapes, and on archeological resources. The adverse effects on historic structures and cultural landscapes would result from the visual intrusion of the larger transmission line that cannot be mitigated and would diminish the integrity of setting, feeling, and association of these structures. The adverse effect to archeological resources is a preliminary finding based on the potential for discovering significant archeological sites; however, that would not be known until pre-construction surveys are completed and may change, depending on the nature of the archeological sites found.

9) *The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.*

Alternative 2b would have adverse impacts on federally-endangered bog turtles including increased potential for illegal collection of individuals as a result of the establishment and maintenance of access roads; potential alterations of hydrology as a result of blasting that in turn could affect wetland habitat used by bog turtles; and potential for direct mortality from contact with construction vehicles and equipment. Adverse impacts to bog turtles would be minimized through implementation of appropriate mitigation and conservation measures in consultation with the USFWS; however, there would still be potential for direct mortality of bog turtles which would be a "take" under the Endangered Species Act, requiring a permit from the USFWS. Because it is not currently known whether bog turtles are present or how large of a population may exist along alternative 2b, the potential for mortality of individual turtles in a local population is considered to be a significant impact; however, it is unlikely that any mortality of bog turtles as a result of alternative 2b would rise to the level of jeopardizing the continued existence of the species.

There is potential for adverse impacts on federally-endangered Indiana bats from tree clearing and construction activities that could interfere with bat foraging and could result in the removal of trees that may contain roost sites or maternity colonies. There is also some potential for adverse impacts on federally-listed freshwater mussels from vegetation clearing and construction activities. These impacts would be minimized by implementing appropriate mitigation and conservation measures in consultation with the USFWS and are not likely to adversely affect Indiana bats or freshwater mussels.

10) *Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.*

A crossing at this location poses high risk for irreparable damage to significant ecological communities and drastic scenic degradation that could violate Organic Act (impairment). The high risk of bird collisions as a result of creating an aerial hazard on a major migratory flyway coupled with the unknown extent of the potential mortality of and injury to migrating birds and the uncertainty as to the effectiveness of mitigation measures could potentially violate the Migratory Bird Treaty Act. The siting of a transmission line adjacent to a bald eagle roost is counter to the recommendations in the National Bald Eagle Management Guidelines and the risk of eagles colliding with the lines cannot be effectively mitigated; therefore, it is likely that the potential loss of eagles through collisions would require a permit from the USFWS for "take" of bald eagles associated with operation of the transmission line. "Take" of bald eagles, meaning killing or injury, would occur for as long as the transmission line remains. The impacts on MDSR from alternative would result in significant long term degradation of the scenic values for which the river was designated which may violate the directives in Section 10(a) of the WSRA to "protect and enhance" the values that caused the river to be included in the system. The visual change would affect a relatively large area, a large number of users, and would exist for the period of analysis. Impacts related to construction activities would be of short duration when compared to the period of analysis but one time visitors who were impacted by river closures or construction noise may have their experience of the MDSR forever diminished.

Assessment of the Significance of the Impacts of Alternative 2b

The impacts of implementing alternative 2b would be significant for geologic resources; wetlands; vegetation; landscape connectivity, wildlife, and habitats; rare and unique communities; archeological, historic structures, cultural landscapes, visitor use and experience, scenic resources, park operations, and infrastructure, access and circulation.

Impacts to geologic resources as a result of the steps necessary to excavate foundations for the new towers would permanently destroy some rare geological features and could fracture important limestone basins that support wetland hydraulics with no means to predict whether or not fracturing would occur and to what extent. Impacts to wetlands would be significant. The aforementioned geologic disruptions and infiltration of invasive species pose serious risk of harm to wetlands. Specific wetlands affected, the Arnott Fen and on the Hogback Ridge, are arguably DEWA's most precious biological assets and globally important havens of biodiversity. Impacts to vegetation would be significant. Clearing required to construct and operate the new line would reduce the abundance, diversity, and quality of native vegetation in and around the alignment contrary to the conditions the parks strive to maintain. Impacts to landscape connectivity, wildlife, and habitat would be significant. The de facto permanent removal of vegetation from the corridor would create a new element of fragmentation in the landscape, which would inhibit the transit of certain wildlife and reduce opportunities to create future continuous green spaces. Impacts to rare and unique communities would be significant. A combination of impacts to other resources, such as vegetation and geology, would alter these species habitats leading to their decline in various ways. Impacts to archeological, historic, and cultural landscapes would be significant. Installation of the new, more visibly apparent towers would introduce a non-conforming characteristic into the environment of these resources degrading their relevant integrities. Furthermore, excavation activity could permanently destroy sites in the project area. Impacts to scenic resources would be very significant. The taller towers and wider right-of-way would create a dramatic visual disturbance where very little disturbance currently exists. These impacts in particular would be widely distributed across both APPA and DEWA at any location the line is visible. Impacts to visitor use and experience would be significant. Temporary noise pollution from construction activity, the intrusion of the taller towers into the natural environment, and loss of other resources that visitors come to experience, would appreciably diminish key aspects of the parks that visitors come to enjoy. The operations of the park would need to be augmented in order to adequately manage additional access and ensure the protection of resources from illegal access, off-road vehicle use, and spread of invasive species. In addition other staff would be required to monitor and ensure the use of mitigation during construction and operation and maintenance phases of the line.

Overall, the significance of the impacts of alternative 2b is a result of two considerations: the particularly resource-rich area through which the alternative crosses, and the potential to inflict severe harm to those resources because of the magnitude and duration of the adverse impacts plus the uncertainty associated with some of the potential impacts. While it is true that not all impacts can be predicted with great certainty, in the context of the purpose and significance for which DEWA, APPA and MDSR were established and NPS mandates to specifically preserve the natural, cultural, and scenic resources within them, additional precautions are warranted when considering risks to these resources, many of which are of national importance. Similarly, certain resources are non-renewable which makes any impacts to them all the more serious as they cannot be replaced if lost. And some resources are under threat by other actions and outside pressure, which in the context of the function of the parks as an “oasis” or refuge within the highly developed east coast, elevates the need to preserve and protect these scarce, sensitive resources. For these reasons, the environmental consequences of alternative 2b would be significant.

Alternative 3

The impact analysis for alternative 3 analyzes the potential effects from the construction, operation and maintenance of an alternative to the applicant’s proposal and the removal of the Bushkill-Kittatinny line (an integral component of mitigation) on NPS resources. This alternative ROW crosses 5.4 miles of NPS lands and waters, affecting three units of the national park system, DEWA, MDSR and APPA. This alternative would also cross Worthington State Forest which is entirely within DEWA’s legislative boundary.

The environmental consequences of implementing alternative 3 would be significant. As the following explains, this determination is made through application of the ten CEQ factors to various elements of the action that are relevant in light of the context in which they occur.

A discussion of impact intensity (for applicable topics) specific to alternative 3 follows.

1) *Impacts that may be both beneficial and adverse. A significant effect may exist even if the federal agency believes that on balance the effect will be beneficial.*

   Construction of the S-R Line along alternative 3 would have many adverse and a few beneficial impacts.

   Excavation, blasting and construction of access roads would have adverse impacts on the prevalent rare and unique geological limestone formations and associated paleontological resources which would be permanently altered from leveling areas for towers and crane pad placement due to the steep slopes. Blasting could also lead to fracturing of the limestone that may impact the hydrology in the vicinity adversely impacting the function of wetlands and other surface waters. Additionally, blasting could have an adverse impact on wildlife along the talus slopes through dispersal or destruction of habitat and potential mortality of species of special concern such as the New Jersey state-listed timber rattlesnake. Impacts from the noise of blasting and other construction activities would have an adverse impact on visitor experience along this heavy visitor use area of the MDSR and visitor recreation sites such as Smithfield Beach. The construction of additional access roads within the floodplain of the Bushkill Creek would have adverse impacts reducing the floodplains to function and increasing flooding risk to facilities near the creek.

   The movement of heavy construction equipment through the park would also have adverse impacts on the DEWA and Worthington State Forest roads because these roads are not constructed to handle heavy equipment. Construction activities would result in temporary closures of trails, roads, and the MDSR to ensure visitor safety. These temporary closures would have an adverse impact on visitor experience making traversing the park difficult and denying access to popular visitor use sites. Park operations would also be adversely impacted because of the increased need for staffing to monitor and patrol areas during construction for visitor safety and to mitigate impacts on resources. In addition the expansion of the ROW and creation of access roads would make access for illegal uses such as off-road vehicles increasing the need for law enforcement patrols and resource protection in these areas.

The vegetation clearing for access roads and 350 foot ROW would have an adverse impact on the mature forests, including Eastern Hemlock stands and within the MDSR floodplain. The wider ROW would be more visible adding to the impacts to the visual resources. The increased ROW and additional access roads would also increase the fragmentation of habitat through this area, increasing the edge habitat and breaking up habitats of mature forests which in turn could adversely affect some wildlife species and create barriers for sensitive herpetological species. The clearing of vegetation and transition from mature forests to artificially maintained shrub-scrub lands also increases the potential for the spread of invasive species within the ROW and surrounding area and the parks. The restoration of the existing B-K Line, however would in the long-term would have a beneficial impact on the region by restoring a large forested block through a natural and wild area of the Middle Delaware River Valley.

The construction of an additional line with taller towers would adversely impact the scenic nature of APPA, DEWA, and MDSR which is counter to their enabling legislation and mandates to protect scenery. Alternative 3 would cross and then parallel the Kittatinny Ridge which APPA traverses. The transmission line corridor and structures would be clearly visible under alternative 3 and the presence of two sets of structures would increase the impact on aesthetics and scenery. Because of the route up the Kittatinny Ridge, the visibility of the tall towers would be greatly increased along the MDSR, and would also visible from the McDade Trail and popular recreational sites like Smithfield Beach and Hialeah Air Park, and the scenic drives and cultural landscapes of Old Mine Road in New Jersey and River Road in Pennsylvania. The visual impacts from alternative 3 would be experienced by a large number of visitors due to the concentration of recreational facilities within sight of the transmission line corridor. The integrity of national register eligible historic structures and cultural landscapes would also be adversely impacted by the visual intrusion of the taller towers and expanded ROW. The taller towers would also greatly increase the risk of collisions of birds along the Kittatinny Ridge Flyway and the Delaware River riparian corridor, including a bald eagle foraging area. The collision risk can be reduced to some degree through the use of bird protection measures which would increase the visibility of the lines; however, the risk remains high and the measures used to make the line more visible to birds also increases the visual impacts to visitors.

The restoration of the existing B-K Line would have beneficial impacts to the recreational sites, roads, and trails within DEWA, the MDSR, and APPA where that line crosses these areas by the removal of the towers and rehabilitation of the vegetation in the long-term. The removal of this existing line would also decrease the risk of collision for Bald Eagles in the vicinity of the winter rousting area near the line.

2) *The degree to which the proposed action affects public health or safety.*

Construction activities, the presence of heavy equipment, and alterations to typical traffic flow create increased risks to visitor and staff safety. However, such impacts are temporary. Proper management, advanced planning, and park staff expertise dealing with these types of disruptions would minimize these risks; properly managed risks to public safety are expected to be minimal.

3) *Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetland, wild and scenic rivers, or ecologically critical areas.*

Alternative 3 crosses public lands administered by state and federal entities providing a diversified visitor experience and many recreational opportunities. DEWA, MDSR, APPA and Worthington State Forest are refuges from the densely populated East Coast as the centerpieces for some of the largest continuous protected lands on the East Coast within a day's drive for millions of people. The unique topography and geology of Kittatinny Ridge, Delaware River Riparian Corridor, and the mature undisturbed Eastern Hemlock forests are the cornerstones of the geography in this region, providing a unique scenic setting through which alternative 3 crosses. The cultural landscape and national register eligible APPA was designated to provide a wilderness-like experience and an opportunity for escape and solitude. Likewise the MDSR, designated under the Wild and Scenic Rivers Act, and the Delaware River Water Trail offers a parallel experience of solitude along the Delaware River. The Kittatinny Ridge is a major flyway for bird migration and the combination of the ridge and Delaware River valley provides crucial resting and foraging habitat for a wide variety of migratory birds. The talus slopes of the Kittatinny Ridge provide prime habitat for state-listed timber rattlesnakes and many other wildlife species. The largely intact Delaware River riparian corridor within DEWA, rare in the highly developed east, contributes to a functioning floodplain that helps protect the qualities of the river that contribute to its designation as the MDSR. This large, undisturbed area of high quality riparian habitat provides crucial habitat for migratory birds, as noted above, as well as important breeding and foraging habitat for a wide variety of wildlife. The eastern hemlock forests are a unique ecosystem, found in specific locations along the slopes adjacent to the Delaware River, that support plant and animal communities not found anywhere else because of the specific combination of shading, temperature and soil characteristics created by the dense hemlock growth.

4) *The degree to which the effects on the quality of the human environment are likely to be highly controversial.*

Public attention surrounding the project is high. There is likely to be high degree of controversy over any effects on park resources that are particularly popular with the public, such as scenery, visitor use and experience, rare and unique communities, and historic structures, for any of the alternatives. The inherently uncertain nature of predicting the true degree of some of these impacts would likely heighten this controversy.

5) *The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.*

There are several unique or unknown risks associated with alternative 3. The analysis of impacts to geology and paleontological features is based on the best available data. However the extent of paleontological resources is unknown and therefore the impacts are unknown. Exposure of these unknown paleontological resources and exposure of these resources could lead to increased collection and vandalism. The wetlands along alternative 3 may support Threatened and Endangered Species, however sufficient research has not yet been conducted along this alternative to determine whether or not these wetlands support the species of concern. In addition the blasting impacts noted under geology may not affect the wetlands immediately, but changes could occur overtime decreasing the groundwater availability and quality, which could both directly and indirectly impact the function of the wetlands. Monitoring would be required to determine the impacts to wetlands following construction and blasting.

The additional clearing of ROW would likely lead to the spread of invasive species furthering impacting the vegetation communities within and surrounding the cleared areas. The additional fragmentation of the landscape could have future impacts on efforts to protect landscape connectivity in the region impacting the mobility of wildlife species. It is also unknown whether or not bird protection measures would be effective in protecting migrating raptors and other bird species along the Kittatinny Ridge Flyaway and the Delaware River Riparian Corridor. The transmission line would be oriented perpendicular to a major flyway for migratory birds, increasing the risk of bird collisions. It is not possible to predict what percentage of migrating birds might be killed or injured from colliding with the wires and/or towers but the height of the towers and number of wires are believed to greatly increase the potential for bird collisions and resulting mortality or injury. Bird diverters would be used to make the wires more visible but their effectiveness is not known.

Archeological survey was not authorized by the State of New Jersey and therefore was not conducted within Worthington State Forest and no determination of eligibility under the National Historic Preservation Act was conducted on the site located on surveys on DEWA property so the extent to which archeological resources would be impacted by alternative 3 is not known.

It is unknown how the addition of another transmission line would impact visitor use patterns in DEWA, APPA, and MDSR. Visitors would likely continue to use these parks however they may choose to recreate in other areas away from the transmission lines. This could negatively impact the visitation to the parks as a whole or put increased pressure and resource impacts on other areas of the parks.

6) *The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.*

Permitting the project would adversely affect multiple protected resources inside the parks, in some instances irreversibly. Allowing such adverse effects in order to facilitate private infrastructure expansion would be contrary to NPS practice and principle of protecting and improving these resources, and of removing incompatible infrastructure to do so. This could establish a precedent that may invite similar proposals by other applicants in the future, and create an expectation of like treatment for those proposals; it may make it difficult to deny such proposals. DEWA and APPA both contain numerous other utility crossings, which makes the risk of such precedent particularly concerning for these parks. Furthermore, as units of the national park system, wherein all parks are entitled to co-equal protection, creating such a precedent could have ramifications for parks nationwide. The location of this particular crossing within DEWA – the center of the park– could make such a precedent even more potent. Installing the S-R Line on this alignment may invite future utilities proposing to follow the same route.

7) *Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.*

The transmission line at large would require related actions taken by the applicant to complete construction elsewhere along its expanse. These related actions would further fragment wildlife habitat and reduce landscape connectivity within the broader expanse of these resources in which the parks are located.

The applicant's project would impact the portions of several resources inside the park that are also under pressure in the surrounding region. Multiple types of development outside of DEWA and APPA are quickly diminishing several of the resources analyzed on a broader scale, such as the Kittatinny migratory bird flyway, contiguous wildlife habitats, scenic viewsheds, rare and unique ecosystems, and archeological sites. The reduction of these resources in the region surrounding the parks increases the scarcity and sensitivity of them inside the parks where they are afforded special protection. Alternative 3 contributes to the cumulative adverse impact on these resources, particularly with regard to fragmentation, loss of landscape connectivity, intrusions into scenic viewsheds, and hazard to migratory birds.

The applicant's project is one component of a larger regional plan by the RTO to enhance system reliability. Other component projects of this plan have already and would continue to affect APPA, especially in the areas of scenic resources and visitor use and experience, as well as other National Parks in their paths.

8) *The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.*

After applying the Advisory Council criteria for adverse effects, the NPS has determined that implementation of alternative 3 would have an adverse effect on 6 historic structures, on cultural landscapes, and on archeological resources. The adverse effects on historic structures would result from the visual intrusion of the larger transmission line that cannot be mitigated. The adverse effect on cultural landscapes would result from alteration of character-defining features, such as disassociation of road and trail corridors from their vernacular surroundings, that would diminish the overall integrity of the cultural landscape. The adverse effect to archeological resources is a preliminary finding based on the potential for discovering significant archeological sites; however, that would not be known until pre-construction surveys are completed and may change, depending on the nature of the archeological sites found.

9) *The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.*

Alternative 3 would have adverse impacts on federally-endangered bog turtles including increased potential for illegal collection of individuals as a result of the establishment and maintenance of access roads; potential alterations of hydrology as a result of blasting that in turn could affect wetland habitat used by bog turtles; and potential for direct mortality from contact with construction vehicles and equipment. Adverse impacts to bog turtles would be minimized through implementation of appropriate mitigation and conservation measures in consultation with the USFWS; however, there would still be potential for direct mortality of bog turtles which would be a "take" under the Endangered Species Act, requiring a permit from the USFWS. Because it is not currently known whether bog turtles are present or how large of a population may exist along alternative 3, the potential for mortality of individual turtles in a local population is considered to be a significant impact; however, it is unlikely that any mortality of bog turtles as a result of alternative 3 would rise to the level of jeopardizing the continued existence of the species.

There is potential for adverse impacts on federally-endangered Indiana bats from tree clearing and construction activities that could interfere with bat foraging and could result in the removal of trees that may contain roost sites or maternity colonies. There is also some potential for adverse impacts on federally-listed freshwater mussels from vegetation clearing and construction activities. These impacts would be minimized by implementing appropriate mitigation and conservation measures in consultation with the USFWS and are not likely to adversely affect Indiana bats or freshwater mussels.

10) *Whether the action threatens a violation of federal, state, or local law or requirements imposed for the protection of the environment.*

    The high risk of bird collisions as a result of creating an aerial hazard on a major migratory flyway coupled with the unknown extent of the potential mortality of and injury to migrating birds and the uncertainty as to the effectiveness of mitigation measures could potentially violate the Migratory Bird Treaty Act. Widening the crossing at alternative 3 could have adverse impacts under Section 10 of the Wild and Scenic Rivers Act which would degrade the qualities for which the river was designated. Additional blasting on the talus slopes of the Kittatinny Ridge could threaten state listed and protected timber rattlesnake habitat. The impacts on MDSR from alternative 3 would result in significant long term degradation of the scenic values for which the river was designated which may violate the directives in Section 10(a) of the WSRA to "protect and enhance" the values that caused the river to be included in the system.

Assessment of the Significance of the Impacts of Alternative 3

Implementation of alternative 3 would have significant adverse impacts on geologic and paleontological resources, wetlands, visitor use and experience, visual resources, vegetation, rare and unique communities, species of special concern, wild and scenic rivers, historic structures, cultural landscapes, park operations, and infrastructure, access and circulation.

The route that alternative 3 follows bisects and parallels both the MDSR and APPA with a significant change in visibility as a result of the ROW expansion, taller towers, and additional lines compared to the existing condition. The visual change would affect a relatively large area, a large number of users, and would exist for the period of analysis. Impacts related to construction activities would be of short duration when compared to the period of analysis but one time visitors who were impacted by river closures or construction noise may have their experience of the MDSR forever diminished. When considered in the context of the purposes for which DEWA and APPA were established and the scenic qualities of the MDSR for which it was designated as part of the Wild and Scenic River system along with the high expectations of visitors as to the type of experience they should have in these places, the adverse impacts of increased visibility and intrusion of the transmission line are significant. The additional taller towers would also significantly impact the bird migration corridors of the Kittatinny Ridge and the Delaware River riparian corridor because it creates an aerial hazard in a major migratory flyway that may not be possible to mitigate. This is counter to the Migratory Bird Treaty Act, NPS conservation and protection mandates and policies, and the purposes for which the three units were established. The unique community of the steep talus slope and limestone formations that make up the Kittatinny Ridge require additional manipulation of the geology in order to safely construct the towers; in the context of the rare nature of the formations, the tendency of limestone to fracture and affect hydrology, and the inability to predict if fracturing would occur and to what extent, the impacts resulting from the leveling activities are considered significant. Further, the uncertainty associated with the potential for changes in hydrology as a result of fracturing limestone increases the potential for significant impacts to wetlands and wetland-dependent communities.

The uncertainty regarding the degree of impacts on geological and paleontological resources, special status species, migrating birds, archeological resources, and wildlife habitat adds to the significance of the impact and would require additional monitoring and research to determine the extent of impacts in the long-term. The operations of the park would need to be augmented in order to adequately manage additional access and ensure the protection of resources from illegal access, off-road vehicle use, and spread of invasive species. Monitoring would also be required to ensure the use of mitigation during construction and operation and maintenance phases of the line.

Beneficial impacts from the removal of the B-K Line to Landscape Connectivity, Wildlife Habitat, and Wildlife, Visual Resources, Wild and Scenic Rivers, and Visitor Use and Experience by restoring the natural habitat to the heart of DEWA and MDSR and reducing the number of crossing of APPA. Overall the beneficial impacts of the removal of the existing line do not outweigh the significant negative impacts of visual intrusion of the expanded line paralleling the MDSR and APPA.

Alternative 4

The impact analysis for alternative 4 analyzes the potential effects from the construction, operation and maintenance of an alternative to the applicant's proposal and the removal of the Bushkill-Kittatinny line (an integral component of project mitigation) on NPS resources. This alternative ROW crosses 1.5 miles of NPS land, affecting two units of the national park system, DEWA and APPA.

The environmental consequences of implementing alternative 4 would be significant. As the following explains, this determination is made through application of the ten CEQ factors to various elements of the action that are relevant in light of the context in which they occur.

A discussion of impact intensity (for applicable topics) specific to alternative 4 follows.

1) *Impacts that may be both beneficial and adverse. A significant effect may exist even if the federal agency believes that on balance the effect will be beneficial.*

   Excavation, blasting and construction of access roads would have adverse impacts on geological formations and associated paleontological resources which would be permanently altered from leveling areas for towers and crane pad placement. However, a majority of the towers (14) required for the construction of alternative 4 would be built in areas where the stability of the underlying geology is rated good and the slopes are relatively flat (0-10%). Blasting/drilling could impact habitat for Timber rattlesnake.

   Alternative 4 would have adverse effects on wetlands, floodplains, vegetation, landscape connectivity, wildlife, wildlife habitat, special status species and rare and unique communities. A loss of wetlands would occur from conversion and the construction of permanent access roads. As with any disturbance to vegetation, there is the potential for spread of exotic and invasive species, which would affect the quality of the habitat. The replacement of two towers in the section west of US 209 would result in the disturbance of floodplain. Alternative 4 would remove 113 acres of vegetation in the initial ROW expansion to 350 foot for alternative including mature forest. Additional forest would be cleared for pulling and splicing sites and temporary roads outside the 350 foot corridor. The increased ROW would also increase the fragmentation of habitat through this area, increasing the edge habitat and breaking up habitats of mature forests which in turn could adversely affect some wildlife species and create barriers for sensitive herpetological species. Rare and unique communities affected by clearing, habitat fragmentation, loss of wetlands and floodplains, and potential spread of invasive exotics include the Kittatinny Ridge (including Totts Gap) and the Minsi Lake Corridor. These unique ecosystems support migrating raptors, special status plants and wildlife, including wildlife dependent upon mature forest and vernal pool habitats. The restoration of the existing B-K Line, however would in the long-term would have a beneficial impact on the region by restoring a large forested block through a natural and wild area of the Middle Delaware River Valley.

Taller towers and additional conductors greatly increase the potential for bird collisions and for disrupting or obstructing the migratory corridor. This risk is especially high because of the location of the structures in a major flyway. Wildlife and Special Status Species would be impacted by clearing and construction activities and could result in direct mortality through crushing, destruction of nests and dens, and habitat alteration and destruction. Death could also occur from electrocution.

Permanent adverse impacts would occur to the parks' scenic resources from the visual intrusion of new, nearly 200 foot towers and substantial vegetation clearing of the ROW. Under alternative 4 there would be permanent adverse effects to the Cultural Landscapes and Historic Structures because within the study area the transmission line is maintained as an existing non-conforming feature. These impacts would last for the life of the line. The presence of the large towers and lines would diminish the integrity of setting, feeling, and associations within the cultural landscapes and historic structures.

Adverse impacts to infrastructure would occur during construction. The movement of heavy construction equipment through the park would have adverse impacts on park roads because these roads are not constructed to handle heavy equipment. Construction activities would result in temporary closures of trails and roads to ensure visitor safety. These temporary closures would have an adverse impact on visitor experience making traversing the park difficult. Park operations would also be adversely impacted because of the increased need for staffing to monitor and patrol areas during construction for visitor safety and to mitigate impacts on resources. In addition the expansion of the ROW and creation of access roads would make access for illegal uses such as off-road vehicles increasing the need for law enforcement patrols and resource protection in these areas. There may be additional adverse impacts to Totts Gap Road and Mountain Road, two local secondary roads, from construction vehicles accessing the ROW. Alternative 4 crosses the Delaware River outside of the designated MDSR. The Appalachian Trail would be crossed and would need to be re-routed during construction activities.

NPS staff resources would be required for both the construction of alternative 4 and the removal of the Bushkill-Kittatinny line. Park staff would be required to manage park closures, monitor construction and mitigation activities, prevent and monitor illegal access activities. Staff would also be required to assess and respond to cultural and natural resource issues. When the permit is issued, the NPS would receive funding from the applicant to offset some of these costs of managing the permit. However, none of these funds could be used to pay permanent NPS staff salaries; therefore, the costs of time spent by permanent park staff on permit activities would be absorbed by the parks' budgets. Time spent monitoring construction would be for the duration of construction. Monitoring mitigation and illegal access activities would likely begin during construction but would continue for some time afterward, possibly a period of several years, depending on the nature of the resource being monitored.

Construction activities would adversely affect visitor use and experience due to closures of roads, trails and sites. There would be adverse effects due to noise generated from the construction of alternative 4; however, no measurable change to the Soundscapes of the parks is expected as a result of operation of the line. The presence of nearly 200 foot towers and a widened ROW would adversely affect the natural and wildland experience of hiking this section of the Appalachian Trail for the life of the line. Topography and vegetation cover do not screen the visual intrusion on the scenic landscape from almost 200 foot tall towers. These impacts are permanent for the life of the line and cannot be mitigated. The overall experience of the APPA visitor would be degraded because this project would contribute cumulatively to the adverse impacts caused by infrastructure projects along the entirety of the trail.

The economies of both Middle Smithfield and Stroud Townships could have both adverse and beneficial effects. Additional construction jobs may be created and local businesses may benefit by providing services associated with construction. However, park and road closures could affect local businesses and park tourism. Fernwood, Shawnee on the Delaware and Stroudsmoor resorts may be affected along with the communities of Bushkill, Middle Smithfield, Shawnee, Delaware Water Gap and East Stroudsburg. Beneficial and adverse effects would occur primarily during the construction phase of the project, although some effects, such as those to real estate, may persist for the life of the line.

Several important benefits would occur from removing the Bushkill-Kittatinny line as a part of mitigation for construction of alternative 4. Alternative 4 would move large infrastructure to the margins of DEWA, would remove an existing transmission line ROW and associated infrastructure from the center of DEWA, and would completely remove the river crossing of the MDSR, enhancing the scenic and recreational qualities. Wetlands, floodplains, and forest would be restored (53 acres total), creating larger patches of contiguous habitat and reducing fragmentation in the core of the park. Additionally incompatible feature crossing the landscape would be moved to the southern extent of the DEWA boundary, reducing the total number of cultural and historic structures adversely affected by a double circuit 500-kV the transmission line.

2) *The degree to which the proposed action affects public health and safety.*

The NPS must provide a safe environment for visitors to the parks, residents and commuters that travel through them, and the employees that work there. Not all of the property crossed by alternative 4 within the study area is owned or managed by the NPS; meaning not all access to the parks is under NPS control. This alternative crosses federal lands, trails, private properties and local roads. Construction activities, the presence of heavy equipment, and alterations to typical traffic flow create greatly increased risks to visitor and staff safety. The removal of the Bushkill-Kittatinny line would also have similar safety concerns during construction. However, such impacts are temporary. Proper management, advanced planning, and park staff expertise dealing with these types of disruptions would minimize these risks. The Appalachian Trail would have to be re-routed for both construction of alternative 4 and the removal of the B-K Line. The MDSR would not be closed from construction of this alternative, only during the removal of the B-K Line Overall, properly managed risks to public safety are expected to be minimal.

3) *Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetland, wild and scenic rivers, or ecologically critical areas.*

People visit parks to experience the unique natural, cultural, and scenic. Park lands were created to protect these resources in perpetuity. DEWA and APPA were created for their unique scenic characteristics and offerings which are specifically identified in the legislation that created the parks. The parks offer solitary experiences, isolated from human encroachment. Impacts are more acute here because the parks provide uninterrupted naturalness in a developed region. These resources are high quality, scarce commodities in the region that would be appreciably diminished.

Key resources contributing to the uniqueness of these ecosystems would be impacted. Actions associated with alternative 4 would adversely affect the Kittatinny Ridge and the Minsi Lake Corridor – two unique ecosystems intersected by the study area. The Kittatinny Ridge is an important bird migratory corridor and provides breeding habitat for forest-dependent wildlife.

The Minsi Lake Corridor provides over a thousand acres of high quality habitat for vernal pool dependent wildlife and a special-status plant. The study area intersects this ecosystem.

The study area is a destination for archeological research. The area is a combination of rich deposits and protected land within an area of unique geology. Many resources were identified during the planning for the Tocks Island Dam. Totts Gap Farm and the Appalachian Trail are two unique cultural landscapes within the alternative 4 area of potential effects.

4) *The degree to which the effects on the quality of the human environment are likely to be highly controversial.*

The effects from the construction, operation and maintenance of alternative 4 are likely to be highly controversial. First, the natural, cultural, scenic and recreational resources of DEWA and APPA are held in public trust. The Organic Act and the parks' enabling legislations mandate that these resources are protected in perpetuity. Visitors come to the parks to experience these resources. Public attention surrounding the project is high. There is likely to be high degree of controversy over any effects on park resources that are particularly popular with the public, such as scenery, visitor use and experience, rare and unique communities, and historic structures, for any of the alternatives. The inherently uncertain nature of predicting the true degree of some of these impacts would likely heighten this controversy.

5) *The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.*

It is not possible to predict what percentage of migrating birds might be killed or injured from colliding with the wires and/or towers but the height of the towers and number of wires are believed to greatly increase the potential for bird collisions and resulting mortality or injury. Bird diverters would be used to make the wires more visible but their effectiveness is not known. There are also uncertain, unique or unknown risks to Landscape Connectivity, Wildlife Habitat and Wildlife associated with alternative 4. The length of time required for restoration of fragmented habitats in unknown. Once a contiguous block of habitat is broken, it is likely lost forever or at least the life of line plus 50 years for restoration. While some species found on park lands require large, contiguous blocks of habitat, no specific studies have been conducted to determine the extent of impacts from habitat fragmentation and whether or not these impacts reduce the health and viability of local populations.

Regarding socioeconomic impacts, there is uncertainty as to whether property values would be impacted as result of constructing alternative 4. Adjacent homeowners have voiced concerns that real estate values would drop with the construction of the SR Line across their properties. There is additional uncertainty as to whether the construction project would result in the creation of new local jobs or if these jobs would go to other skilled laborers from outside the region. Some local businesses used to support construction (materials, lodging, etc.) may benefit. Others businesses, dependent upon the tourism industry, may lose business due to road and park closures. There is uncertainty as to how visitors would respond to the introduction of a double circuit 500-kV line with towers twice the height of what currently existing in the area. The methods used to calculate impacts to scenic resources are limited. They can only approximate the actual impacts which scope and magnitude are unknown until construction is complete.

6) *The degree to which the action may establish precedent for future actions with significant effects or represents a decision in principle about future conditions.*

   Permitting the project would adversely affect multiple protected resources inside the parks, in some instances irreversibly. Allowing such adverse effects in order to facilitate private infrastructure expansion would be contrary to NPS practice and principle of protecting and improving these resources, and of removing incompatible infrastructure to do so. This could establish a precedent that may invite similar proposals by other applicants in the future, and create an expectation of like treatment for those proposals; it may make it difficult to deny such proposals. DEWA and APPA both contain numerous other utility crossings, which makes the risk of such precedent particularly concerning for these parks. Furthermore, as units of the national park system, wherein all parks are entitled to co-equal protection, creating such a precedent could have ramifications for parks nationwide. However, it would also set a precedent for routing utilities around MDSR and to the edges of DEWA. Blasting and drilling from construction would permanently alter or destroy geologic resources. These impacts would result in an irreversible/irretrievable commitment of geologic resources, which is contrary to typical NPS practice.

7) *Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.*

   Cumulatively significant impacts on the environment would occur as the result of permitting alternative 4. The transmission line at large would require related actions taken by the applicant to complete construction elsewhere along its expanse. These related actions would further fragment wildlife habitat and reduce landscape connectivity within the broader expanse of these resources in which the parks are located. Alternative 4 would persist as a non-conforming feature in the parks landscape and would remain for the life of the line. Although the B-K Line would be removed and restored, the opportunity is lost to remove another incompatible use that intrudes upon the scenic quality and natural character of the parks.

   The applicant's project would impact the portions of several resources inside the park that are also under pressure in the surrounding region. Multiple types of development outside of DEWA and APPA are quickly diminishing several of the resources analyzed on a broader scale, such as the Kittatinny migratory bird flyway, contiguous wildlife habitats, scenic viewsheds, rare and unique ecosystems, and archeological sites. The reduction of these resources in the region surrounding the parks increases the scarcity and sensitivity of them inside the parks where they are afforded special protection. Alternative 4 contributes to the cumulative adverse impact on these resources, particularly with regard to fragmentation, loss of landscape connectivity, intrusions into scenic viewsheds, and hazard to migratory birds.

   The applicant's project is one component of a larger regional plan by the RTO to enhance system reliability. Other component projects of this plan have already and would continue to affect APPA, especially in the areas of scenic resources and visitor use and experience, as well as other National Parks in their paths. The overall experience of the APPA visitor would be degraded because this project would contribute cumulatively to the adverse impacts caused by infrastructure projects along the entirety of the trail.

8) *The degree to which the action may adversely affect districts, sites, highways, structures or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.*

After applying the Advisory Council criteria for adverse effects, the NPS has determined that implementation of alternative 4 would have an adverse effect on one historic structure, on cultural landscapes, and on archeological resources. The adverse effects on historic structures would result from the visual intrusion of the larger transmission line that cannot be mitigated. The adverse effect on cultural landscapes would result from alteration of character-defining features, such as disassociation of road and trail corridors from their vernacular surroundings, that would diminish the overall integrity of the cultural landscape. The adverse effect to archeological resources is a preliminary finding based on the potential for discovering significant archeological sites; however, that would not be known until pre-construction surveys are completed and may change, depending on the nature of the archeological sites found.

9) *The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.*

Wetlands along the alternative 4 alignment may have suitable habitat for federally-endangered bog turtles, although the presence of the turtles has not been confirmed. Surveys would be conducted in spring 2012. If bog turtles are present, alternative 4 would have adverse impacts on bog turtles as a result of increased potential for illegal collection of individuals as a result of the establishment and maintenance of access roads and potential for direct mortality from contact with construction vehicles and equipment; there is also potential for adverse impacts to bog turtle habitat from alterations of hydrology as a result of blasting that in turn could affect wetland habitat used by bog turtles. Adverse impacts to bog turtles would be minimized through implementation of appropriate mitigation and conservation measures in consultation with the USFWS; however, there would still be potential for direct mortality of bog turtles which would be a “take” under the Endangered Species Act, requiring a permit from the USFWS. Because it is not currently known whether bog turtles are present or how large of a population may exist along alternative 4, the potential for mortality of individual turtles in a local population is considered to be a significant impact; however, it is unlikely that any mortality of bog turtles as a result of alternative 4 would rise to the level of jeopardizing the continued existence of the species.

There is potential for adverse impacts on federally-endangered Indiana bats from tree clearing and construction activities that could interfere with bat foraging and could result in the removal of trees that may contain roost sites or maternity colonies. There is also some potential for adverse impacts on federally-listed freshwater mussels from vegetation clearing and construction activities. These impacts would be minimized by implementing appropriate mitigation and conservation measures in consultation with the USFWS and are not likely to adversely affect Indiana bats or freshwater mussels.

10) *Whether the action threatens a violation of federal, state, or local law requirements imposed for the protection of the environment.*

The high risk of bird collisions as a result of creating an aerial hazard on a major migratory flyway coupled with the unknown extent of the potential mortality of and injury to migrating birds and the uncertainty as to the effectiveness of mitigation measures could potentially violate the Migratory Bird Treaty Act.

Assessment of Significance of the Impacts of Alternative 4

Implementation of alternative 4 would have significant adverse impacts on many resources, including Special Status Species, Wetlands, Rare and Unique Communities, Landscape Connectivity, Visitor Use and Experience, Visual Resources, Archaeological Resources, Cultural Landscapes, and Historic Structures.

The abrupt opening of the cleared ROW and the intrusion of transmission line towers would likely be intense and would diminish the sense of naturalness to visitors of the parks. Topography and vegetation cover would not screen the visual intrusion on the scenic landscape from almost 200 foot tall towers. These impacts are adverse, significant and permanent for the life of the line and cannot be mitigated. When taken within the context of the Appalachian Trail in its entirety, the proposed transmission line collectively detracts from the overall visitor experience.

Alternative 4 would be a non-conforming feature within DEWA and APPA cultural landscapes. Effects under section 106 would occur on cultural landscapes that are included in the National Register or have been determined by the NPS or SHPO to meet National Register eligibility requirements. After applying the Advisory Council criteria for adverse effects, the NPS has concluded that implementation of alternative 4 would have an adverse effect on historic structures, cultural landscapes and potentially on archeological resources. Long term, significant adverse affects are attributed to visual impacts from the towers and ROW clearing and physical impacts from access roads.

Permitting the construction, operation and maintenance of alternative 4 would result in short and long term adverse impacts to Floodplains, Wetlands, Vegetation, Landscape Connectivity, Wildlife Habitat, Wildlife, Special Status Species and Rare and Unique Communities. These adverse impacts include: crushing of individuals by heavy equipment; destruction of foraging habitat, roosts, nests, and hibernacula; electrocution and collision with conductors; habitat degradation from fragmentation and introduction of exotic and invasive species; soil compaction; disturbance from noise or to habitat resulting in reduced nesting success and viability of young. However a majority of these impacts would avoided, minimized, reduced over time or compensated for by providing substitute resources or environments. The permitting process would require best management practices and plans such as seasonal restrictions on clearing invasive species plan, habitat restoration, species sweeps, an Avian Protection Plan, best available technologies, and wetland mitigation. Additional habitat suitability studies would be conducted for Special Status Species in spring 2012. The USFWS is a cooperating agency in the preparation of this DEIS and consultation under Section 7 of the Endangered Species Act is ongoing and would continue when the EIS is implemented.

There is some uncertainty and unique or unknown risks to natural resources associated with the effects of permitting alternative 4. Impacts to geology and paleontological features are unknown and are based on the best available data. There is a potential for migratory birds to collide with powerlines; this is dependent on the visibility of the lines. The effectiveness of mitigation measures to reduce long-term impacts from collisions to raptors and other migratory birds using the Kittatinny flyway is uncertain and the measures used to make the lines more visible to birds also increases the impacts of the transmission line on visual resources. There are also uncertain, unique or unknown risks to Landscape Connectivity, Wildlife Habitat and Wildlife associated with alternative 4. The length of time required for restoration of fragmented habitats in unknown. Once a contiguous block of habitat is broken, it is likely lost forever or at least the life of line plus 50 years for restoration.

Regarding socioeconomic impacts, there is uncertainty as to whether property values would be impacted as result of constructing alternative 4. Adjacent homeowners have voiced concerns that real estate values would drop with the construction of the SR Line across their properties. There is additional uncertainty as to whether the construction project would result in the creation of new local jobs or if these jobs would go to other skilled laborers from outside the region. Some local businesses used to support construction (materials, lodging, etc.) may benefit. Others businesses, dependent upon the tourism industry, may lose business due to road and park closures. There is uncertainty as to how visitors would respond to the introduction of a double circuit 500-kV line with towers twice the height of what currently existing in the area. The methods used to calculate impacts to scenic resources are limited. They can only approximate the actual impacts which scope and magnitude are unknown until construction is complete.

The effects from the construction, operation and maintenance of alternative 4 are likely to be highly controversial. First, the natural, cultural, scenic and recreational resources of DEWA and APPA are held in public trust. The Organic Act and the parks' enabling legislations mandate that these resources are protected in perpetuity. Visitors come to the parks to experience these resources. Through public comment and from numerous news articles the NPS knows of public awareness, concern, and opposition over impacts to the scenic resources, in particular. Controversy already exists amongst public and stakeholders. The selection of alternative 4 would establish precedent for future actions because it reverses the trend of improving visitor experience and scenic values by removing non-conforming features. Allows a major incompatible use of federal lands reserved for conservation and enjoyment which is uncommon and noteworthy. This action could establish a high threshold upon which future proposals are evaluated and promote upgrades of DEWA's many other utility crossings.

Several significant benefits would occur from removing the Bushkill-Kittatinny line as a part of mitigation for construction of alternative 4. These benefits may balance the adverse effects of construction, operation and maintenance of alternative 4. For example, alternative 4 would move large infrastructure to the margins of DEWA, would remove an existing transmission line ROW and associated infrastructure from the center of DEWA, and would completely remove the river crossing of the MDSR, improving it scenic and recreational qualities. Wetlands, floodplains, and forest would be restored (53 acres total), creating larger patches of contiguous habitat and reducing fragmentation in the core of the park. Additionally incompatible feature crossing the landscape would be moved to the southern extent of the DEWA boundary, reducing the total number of cultural and historic structures adversely affected by a double circuit 500-kV the transmission line.

Alternative 5

The impact analysis for alternative 5 analyzes the potential effects from the construction, operation and maintenance of the proposal and the removal of the Bushkill-Kittatinny line (an integral component of project mitigation) on NPS resources. This alternative ROW crosses 0.9 miles of NPS land, affecting two units of the national park system, DEWA and APPA.

The environmental consequences of implementing alternative 5 would be significant. As the following explains, this determination is made through application of the ten CEQ factors to various elements of the action that are relevant in light of the context in which they occur.

A discussion of impact intensity (for applicable topics) specific to alternative 5 follows.

1) *Impacts that may be both beneficial and adverse. A significant effect may exist even if the federal agency believes that on balance the effect will be beneficial.*

   Excavation, blasting and construction of access roads would have adverse impacts on the geological formations and associated paleontological resources which would be permanently altered from leveling areas for towers and crane pad placement. However, a majority of the towers (10) required for the construction of alternative 5 would be built in areas where the stability of the underlying geology is rated good. Blasting/drilling could impact habitat for timber rattlesnake (this is covered in the special status species analysis).

Alternative 5 would have adverse effects on wetlands, vegetation, landscape connectivity, wildlife, wildlife habitat, special status species and rare and unique communities. A loss of wetlands would occur from conversion and the construction of permanent access roads. As with any disturbance to vegetation, there is the potential for spread of exotic and invasive species, which would affect the quality of the habitat. Alternative 5 would remove 55 acres of vegetation in the initial ROW expansion to 350 foot including mature forest. An additional 55 acres of forest would be cleared for pulling and splicing sites and temporary roads outside the 350 foot corridor. The increased ROW would also increase the fragmentation of habitat through this area, increasing the edge habitat and breaking up habitats of mature forests which in turn could adversely affect some wildlife species and create barriers for sensitive herpetological species. Rare and unique communities affected by clearing, habitat fragmentation, loss of wetlands and floodplains and potential spread of invasive exotics include the Kittatinny Ridge (including Totts Gap) and the Minsi Lake Corridor. These unique ecosystems support migrating raptors, special status plants and wildlife, including wildlife dependent upon mature forest and vernal pool habitats. The restoration of the existing B-K Line, however would in the long-term would have a beneficial impact on the region by restoring a large forested block through a natural and wild area of the Middle Delaware River Valley.

Taller towers and additional conductors greatly increase the potential for bird collisions and for disrupting or obstructing the migratory corridor. This risk is especially high because of the location of the structures in a major flyway. Wildlife and Special Status Species would be impacted by clearing and construction activities and could result in direct mortality through crushing, destruction of nests and dens, and habitat alteration and destruction. Death could also occur from electrocution.

Permanent adverse impacts would occur to the parks' scenic resources from the visual intrusion of new, nearly 200 foot towers and substantial vegetation clearing of the ROW. Under alternative 5 there would be permanent adverse effects to the Cultural Landscapes and Historic Structures because within the study area the transmission line is maintained as an existing non-conforming feature. These impacts would last for the life of the line. The presence of the large towers and lines would diminish the integrity of setting, feeling, and associations within the cultural landscapes and historic structures.

Adverse impacts to Infrastructure would occur during construction. The movement of heavy construction equipment through the park would have adverse impacts on park roads because these roads are not constructed to handle heavy equipment. Construction activities would result in temporary closures of trails and roads to ensure visitor safety. These temporary closures would have an adverse impact on visitor experience making traversing the park difficult and denying access to popular visitor use sites. Park operations would also be adversely impacted because of the increased need for staffing to monitor and patrol areas during construction for visitor safety and to mitigate impacts on resources. In addition the expansion of the ROW and creation of access roads would make access for illegal uses such as off-road vehicles increasing the need for law enforcement patrols and resource protection in these areas. There may be additional adverse impacts to Totts Gap Road and Mountain Road, two local secondary roads from construction vehicles accessing the ROW. Alternative 5 crosses the Delaware River outside of the designated MDSR. The Appalachian Trail would still be crossed and would need to be re-routed during construction activities.

NPS staff resources would be required for both the construction of alternative 5 and the removal of the Bushkill-Kittatinny line. Park staff would be required to manage park closures, monitor construction and mitigation activities, prevent and monitor illegal access activities. Staff would also be required to assess and respond to cultural and natural resource issues. When the permit is issued, the NPS would receive funding from the applicant to offset some of these costs of managing the permit. However, none of these funds could be used to pay permanent NPS staff salaries; therefore, costs associated with permanent staff time spent on permit activities would be absorbed by the parks' budgets. Time spent monitoring construction would be for the duration of construction. Monitoring mitigation and illegal access activities would be likely begin during construction but would continue for some time afterward, possibly a period of several years, depending on the nature of the resource being monitored.

In the short term, construction activities would adversely affect visitor use and experience due to closures of roads, trails and sites. There would be adverse effects due to noise generated from the construction of alternative 5; however, no measurable change to the Soundscapes of the parks is expected as a result of operation of the line. The presence of nearly 200 foot towers and a widened ROW would adversely affect the natural and wildland experience of hiking this section of the Appalachian Trail for the life of the line. Topography and vegetation cover do not screen the visual intrusion on the scenic landscape from almost 200 foot tall towers. These impacts are permanent for the life of the line and cannot be mitigated. The overall experience of the APPA visitor would be degraded because this project would contribute cumulatively to the adverse impacts caused by infrastructure projects along the entirety of the trail.

The economies of Stroud, Hamilton, Stroudsburg and East Stroudsburg Townships could both have adverse and beneficial effects. Local businesses could benefit from additional jobs created for construction and for commodities purchased. However, park and road closures could affect local businesses and park tourism. Shawnee on the Delaware and Stroudsmoor resorts may be affected along with the communities of Shawnee, Delaware Water Gap and East Stroudsburg. Beneficial and adverse effects would occur primarily during the construction phase of the project, although some effects, such as those to real estate, may persist for the life of the line.

Several important benefits would occur from removing the Bushkill-Kittatinny line as a part of mitigation for construction of alternative 5. Alternative 5 would move large infrastructure to the margins of DEWA, would remove an existing transmission line ROW and associated infrastructure from the center of DEWA, and would completely remove the river crossing of the MDSR, improving it scenic and recreational qualities. Wetlands, floodplains, and forest would be restored (53 acres total), creating larger patches of contiguous habitat and reducing fragmentation in the core of the park. Additionally incompatible feature crossing the landscape would be moved to the southern extent of the DEWA boundary (DEWA lands west of the Bushkill substation would not be crossed by new nearly 200 foot towers and additional conductors), reducing the total number of cultural and historic structures adversely affected by a double circuit 500-kV the transmission line.

2) *The degree to which the proposed action affects public health and safety.*

The NPS must provide a safe environment for visitors to the parks, residents and commuters that travel through them, and the employees that work there. Not all of the property crossed by alternative 5 within the study area is owned or managed by the NPS; meaning not all access to the parks is under NPS control. This alternative crosses federal lands, trails, private properties and local roads.

Construction activities, the presence of heavy equipment, and alterations to typical traffic flow create greatly increased risks to visitor and staff safety. The removal of the Bushkill-Kittatinny line would also have similar safety concerns during construction. However, such impacts are temporary. Proper management, advanced planning, and park staff expertise dealing with these types of disruptions would minimize these risks. The Appalachian Trail would have to be re-routed for both construction of alternative 5 and the removal of the B-K Line. The MDSR would not be closed from construction of this alternative, only during the removal of the B-K Line. Overall, properly managed risks to public safety are expected to be minimal.

3) *Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetland, wild and scenic rivers, or ecologically critical areas.*

People visit parks to experience the unique natural, cultural, and scenic features. Park lands were created to protect these resources in perpetuity. DEWA and APPA were created for their unique scenic characteristics and offerings which are specifically identified in the legislation that created the parks. The parks offer solitary experiences, isolated from human encroachment. Impacts are more acute here because the parks provide uninterrupted naturalness in a developed region. These resources are high quality, scarce commodities in the region that would be appreciably diminished.

Key resources contributing to the uniqueness of these ecosystems would be impacted. Actions associated with alternative 5 would adversely affect the Kittatinny Ridge and the Minsi Lake Corridor – two unique ecosystems intersected by the study area. The Kittatinny Ridge is an important bird migratory corridor and provides breeding habitat for forest-dependent wildlife. The Minsi Lake Corridor provides over a thousand acres of high quality habitat for vernal pool dependent wildlife and a special-status plant. The study area intersects this ecosystem.

The study area is a destination for archeological research. The area is a combination of rich deposits and protected land within an area of unique geology. Many resources were identified during the planning for the Tocks Island Dam. Totts Gap Farm and the Appalachian Trail are two unique cultural landscapes within the alternative 5 area of potential effects.

4) *The degree to which the effects on the quality of the human environment are likely to be highly controversial.*

The effects from the construction, operation and maintenance of alternative 5 are likely to be highly controversial. First, the natural, cultural, scenic and recreational resources of DEWA and APPA are held in public trust. The Organic Act and the parks' enabling legislations mandate that these resources are protected in perpetuity. Visitors come to the parks to experience these resources. Public attention surrounding the project is high. There is likely to be high degree of controversy over any effects on park resources that are particularly popular with the public, such as scenery, visitor use and experience, rare and unique communities, and historic structures, for any of the alternatives. The inherently uncertain nature of predicting the true degree of some of these impacts would likely heighten this controversy.

5) *The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.*

It is not possible to predict what percentage of migrating birds might be killed or injured from colliding with the wires and/or towers but the height of the towers and number of conductors are believed to greatly increase the potential for bird collisions and resulting mortality or injury. Bird diverters would be used to make the wires more visible but their effectiveness is not known.

There are also uncertain, unique or unknown risks to Landscape Connectivity, Wildlife Habitat and Wildlife associated with alternative 5. The length of time required for restoration of fragmented habitats in unknown. Once a contiguous block of habitat is broken, it is likely lost forever or at least the life of line plus 50 years for restoration. While some species found on park lands require large, contiguous blocks of habitat, no specific studies have been conducted to determine the extent of impacts from habitat fragmentation and whether or not these impacts reduce the health and viability of local populations.

Regarding socioeconomic impacts, there is uncertainty as to whether property values would be impacted as result of constructing alternative 5. Adjacent homeowners have voiced concerns that real estate values would drop with the construction of the SR Line across their properties. There is additional uncertainty as to whether the construction project would result in the creation of new local jobs or if these jobs would go to other skilled laborers from outside the region. Some local businesses used to support construction (materials, lodging, etc.) may benefit. Others businesses, dependent upon the tourism industry, may lose business due to road and park closures. There is uncertainty as to how visitors would respond to the introduction of a double circuit 500-kV line with towers twice the height of what currently existing in the area. The methods used to calculate impacts to scenic resources are limited. They can only approximate the actual impacts which scope and magnitude are unknown until construction is complete.

6) *The degree to which the action may establish precedent for future actions with significant effects or represents a decision in principle about future conditions.*

Permitting the project would adversely affect multiple protected resources inside the parks, in some instances irreversibly. Allowing such adverse effects in order to facilitate private infrastructure expansion would be contrary to NPS practice and principle of protecting and improving these resources, and of removing incompatible infrastructure to do so. This could establish a precedent that may invite similar proposals by other applicants in the future, and create an expectation of like treatment for those proposals; it may make it difficult to deny such proposals. DEWA and APPA both contain numerous other utility crossings, which makes the risk of such precedent particularly concerning for these parks. Furthermore, as units of the national park system, wherein all parks are entitled to co-equal protection, creating such a precedent could have ramifications for parks nationwide. However, it would also set a precedent for routing utilities around MDSR and to the edges of DEWA. Blasting and drilling from construction would permanently alter or destroy geologic resources. These impacts would result in an irreversible/irretrievable commitment of geologic resources, which is contrary to typical NPS practice.

7) *Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.*

Cumulatively significant impacts on the environment would occur as the result of permitting alternative 5. The transmission line at large would require related actions taken by the applicant to complete construction elsewhere along its expanse. These related actions would further fragment wildlife habitat and reduce landscape connectivity within the broader expanse of these resources in which the parks are located. Alternative 5 would persist as a non-conforming feature in the parks landscape and would remain for the life of the line. Although the B-K Line would be removed and restored, the opportunity is lost to remove another incompatible use that intrudes upon the scenic quality and natural character of the parks.

The applicant's project would impact the portions of several resources inside the park that are also under pressure in the surrounding region. Multiple types of development outside of DEWA and APPA are quickly diminishing several of the resources analyzed on a broader scale, such as the Kittatinny migratory bird flyway, contiguous wildlife habitats, scenic viewsheds, rare and unique ecosystems, and archeological sites. The reduction of these resources in the region surrounding the parks increases the scarcity and sensitivity of them inside the parks where they are afforded special protection. Alternative 5 contributes to the cumulative adverse impact on these resources, particularly with regard to fragmentation, loss of landscape connectivity, intrusions into scenic viewsheds, and hazard to migratory birds.

The applicant's project is one component of a larger regional plan by the RTO to enhance system reliability. Other component projects of this plan have already and would continue to affect APPA, especially in the areas of scenic resources and visitor use and experience, as well as other National Parks in their paths. The overall experience of the APPA visitor would be degraded because this project would contribute cumulatively to the adverse impacts caused by infrastructure projects along the entirety of the trail

8) *The degree to which the action may adversely affect districts, sites, highways, structures or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.*

After applying the Advisory Council criteria for adverse effects, the NPS has determined that implementation of alternative 5 would have an adverse effect on one historic structure, on cultural landscapes, and on archeological resources. The adverse effects on historic structures would result from the visual intrusion of the larger transmission line that cannot be mitigated. The adverse effect on cultural landscapes would result from alteration of character-defining features, such as disassociation of road and trail corridors from their vernacular surroundings, that would diminish the overall integrity of the cultural landscape. The adverse effect to archeological resources is a preliminary finding based on the potential for discovering significant archeological sites; however, that would not be known until pre-construction surveys are completed and may change, depending on the nature of the archeological sites found.

9) *The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.*

Wetlands along the alternative 5 alignment may have suitable habitat for federally-endangered bog turtles, although the presence of the turtles has not been confirmed. Surveys will be conducted in spring 2012. If bog turtles are present, alternative 5 would have adverse impacts on bog turtles as a result of increased potential for illegal collection of individuals as a result of the establishment and maintenance of access roads and potential for direct mortality from contact with construction vehicles and equipment; there is also potential for adverse impacts to bog turtle habitat from alterations of hydrology as a result of blasting that in turn could affect wetland habitat used by bog turtles. Adverse impacts to bog turtles would be minimized through implementation of appropriate mitigation and conservation measures in consultation with the USFWS; however, there would still be potential for direct mortality of bog turtles which would be a "take" under the Endangered Species Act, requiring a permit from the USFWS. Because it is not currently known whether bog turtles are present or how large of a population may exist along alternative 5, the potential for mortality of individual turtles in a local population is considered to be a significant impact; however, it is unlikely that any mortality of bog turtles as a result of alternative 5 would rise to the level of jeopardizing the continued existence of the species.

There is potential for adverse impacts on federally-endangered Indiana bats from tree clearing and construction activities that could interfere with bat foraging and could result in the removal of trees that may contain roost sites or maternity colonies. There is also some potential for adverse impacts on federally-listed freshwater mussels from vegetation clearing and construction activities. These impacts would be minimized by implementing appropriate mitigation and conservation measures in consultation with the USFWS and are not likely to adversely affect Indiana bats or freshwater mussels.

10) *Whether the action threatens a violation of federal, state, or local law requirements imposed for the protection of the environment.*

The high risk of bird collisions as a result of creating an aerial hazard on a major migratory flyway coupled with the unknown extent of the potential mortality of and injury to migrating birds and the uncertainty as to the effectiveness of mitigation measures could potentially violate the Migratory Bird Treaty Act.

Assessment of the Significance of the Impacts of Alternative 5

Implementation of alternative 5 would have significant adverse impacts on many resources including Special Status Species, Wetlands, Rare and Unique Communities, Landscape Connectivity, Visitor Use and Experience, Visual Resources, Archaeological Resources, Cultural Landscapes, and Historic Structures.

The abrupt opening of the cleared ROW and the intrusion of transmission line towers would likely be intense and would diminish the sense of naturalness to visitors of the parks. Topography and vegetation cover would not screen the visual intrusion on the scenic landscape from almost 200 foot tall towers. These impacts are adverse, significant and permanent for the life of the line and cannot be mitigated. When taken within the context of the Appalachian Trail in its entirety, the proposed transmission line collectively detracts from the overall visitor experience.

Alternative 5 would be a non-conforming feature within DEWA and APPA cultural landscapes. Effects under section 106 would occur on cultural landscapes that are included in the National Register or have been determined by the NPS or SHPO to meet National Register eligibility requirements. After applying the Advisory Council criteria for adverse effects, the NPS has concluded that implementation of alternative 5 would have an adverse effect on historic structures, cultural landscapes and potentially on archeological resources. Long term, significant adverse affects are attributed to visual impacts from the towers and ROW clearing and physical impacts from access roads.

Permitting the construction, operation and maintenance of alternative 5 would result in short and long term adverse impacts to Wetlands, Vegetation, Landscape Connectivity, Wildlife Habitat, Wildlife, Special Status Species and Rare and Unique Communities. These adverse impacts include: crushing of individuals by heavy equipment; destruction of foraging habitat, roosts, nests, and hibernacula; electrocution and collision with conductors; habitat degradation from fragmentation and introduction of exotic and invasive species; soil compaction; disturbance from noise or to habitat resulting in reduced nesting success and viability of young. However a majority of these impacts would avoided, minimized, reduced over time or compensated for by providing substitute resources or environments. The permitting process would require best management practices and plans such as seasonal restrictions on clearing invasive species plan, habitat restoration, species sweeps, an Avian Protection Plan, best available technologies, and wetland mitigation. Additional habitat suitability studies will be conducted for special-status species in spring 2012. The USFWS is a cooperating agency in the preparation of this DEIS and consultation under Section 7 of the Endangered Species Act is ongoing and will continue when the EIS is implemented.

There is some uncertainty and unique or unknown risks to natural resources associated with the effects of permitting alternative 5. Impacts to geology and paleontological features are unknown and are based on the best available data. There is a potential for migratory birds to collide with powerlines; this is dependent on the visibility of the lines. The effectiveness of mitigation measures to reduce long-term impacts from collisions to raptors and other migratory birds using the Kittatinny flyway is uncertain and the measures used to make the lines more visible to birds also increases the impacts of the transmission line on visual resources. There are also uncertain, unique or unknown risks to Landscape Connectivity, Wildlife Habitat and Wildlife associated with alternative 5. The length of time required for restoration of fragmented habitats in unknown. Once a contiguous block of habitat is broken, it is likely lost forever or at least the life of line plus 50 years for restoration.

Regarding socioeconomic impacts, there is uncertainty as to whether property values would be impacted as result of constructing alternative 5. Adjacent homeowners have voiced concerns that real estate values would drop with the construction of the SR Line across their properties. There is additional uncertainty as to whether the construction project would result in the creation of new local jobs or if these jobs would go to other skilled laborers from outside the region. Some local businesses used to support construction (materials, lodging, etc.) may benefit. Others businesses, dependent upon the tourism industry, may lose business due to road and park closures. There is uncertainty as to how visitors would respond to the introduction of a double circuit 500-kV line with towers twice the height of what currently existing in the area. The methods used to calculate impacts to scenic resources are limited. They can only approximate the actual impacts which scope and magnitude are unknown until construction is complete.

The effects from the construction, operation and maintenance of alternative 5 are likely to be highly controversial. First, the natural, cultural, scenic and recreational resources of DEWA and APPA are held in public trust. The Organic Act and the parks' enabling legislations mandate that these resources are protected in perpetuity. Visitors come to the parks to experience these resources. Through public comment and from numerous news articles the NPS knows of public awareness, concern, and opposition over impacts to the scenic resources, in particular. Controversy already exists amongst public and stakeholders. The selection of alternative 5 would establish precedent for future actions because it reverses the trend of improving visitor experience and scenic values by removing non-conforming features. Allows a major incompatible use of federal lands reserved for conservation and enjoyment which is uncommon and noteworthy. This action could establish a high threshold upon which future proposals are evaluated and promote upgrades of DEWA's many other utility crossings.

Several significant benefits would occur from removing the Bushkill-Kittatinny line as a part of mitigation for construction of alternative 5. These benefits may balance the adverse effects of construction, operation and maintenance of alternative 5. For example, alternative 5 would move large infrastructure to the margins of DEWA, would remove an existing transmission line ROW and associated infrastructure from the center of DEWA, and would completely remove the river crossing of the MDSR, improving it scenic and recreational qualities. This alternative would also remove the DEWA crossing west of the Bushkill substation, meaning visual impacts from nearly 200 towers would not be seen from the center of DEWA – and the contiguous forest and scenic landscape in this area would not be impacted. Wetlands, floodplains, and forest would be restored (53 acres total), creating larger patches of contiguous habitat and reducing fragmentation in the core of the park. Additionally incompatible feature crossing the landscape would be moved to the southern extent of the DEWA boundary, crossing no NPS lands west of the Bushkill substation, reducing the total number of cultural and historic structures adversely affected by a double circuit 500-kV the transmission line.