

RARE AND UNIQUE COMMUNITIES

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 or unique communities include sites identified by the DEWA GMP (NPS 1987), county natural areas inventories, and state natural heritage programs. Often, the physical characteristics of an area create a specific set of unusual conditions that foster rare or unique communities. The geology, hydrology, and soil conditions of a site can determine the vegetation that grows there, which in turn influences the wildlife that use the habitat. Because these conditions create microclimates with unusual conditions, these communities are often globally or state ranked for rarity. Rare and unique communities often contain a high number of rare, threatened, or endangered species, because these species are adapted to thrive in the specific conditions found in the communities. Because of the rarity of such areas and the higher number of species of special status they often harbor, rare and unique communities should be considered in a holistic manner, rather than by looking at the importance of the geology, vegetation, or wildlife alone. Nearly half of the 69 vegetation associations within DEWA can be considered state or globally rare or unique. The state and global importance of some of these areas has led to them being classified as natural heritage areas. Additionally, several rare and unique communities within DEWA have been identified as outstanding natural features due to their unique ecological values. Communities given this designation receive the highest level of protection and preservation efforts. These sites are open for visitor use, but this use may be limited to protect these areas from degradation. Development, such as trails, interpretive waysides, exhibits, and parking areas, is kept to a minimum in areas of outstanding natural features (NPS 1987, 18).

The rare and unique communities that are present or have the potential to be found within the study area for the S-R Line are presented in table 21 and are described in the following sections.

CALCAREOUS WETLANDS

DEWA contains a number of calcareous wetland communities, including seeps and fens. These wetlands typically have a very limited geographic range and a unique combination of plant species, thereby gaining recognition for their global rarity. A fen is a nutrient-rich marshy area associated with limestone and calcareous siltstone where calcareous groundwater discharges to the surface. The soils of a calcareous fen vary from silt loams to shallow mucky peat. Generally, such wetlands have little cover, contain mainly grasses or shrubby vegetation, and include plant species such as silky dogwood, poison sumac (*Toxicodendron vernix*), shrubby cinquefoil, and steeplebush. Several calciphytic (calcium-loving) plant species, including Ontario lobelia (*Lobelia kalmii*) and rigid sedge, grow in the herbaceous layer (NPS 2007b, 313–315). Six rare plant species have been identified within the calcareous wetlands of DEWA. Additionally, 29 taxa of lichens have been found in this habitat type in the park (TNC 2000, 9).

Arnott Fen: Arnott Fen is a calcareous wetland close to Bushkill, Pennsylvania. A calcareous fen arises out of the unique geological conditions that foster a unique biological community. Calcareous fens form in areas with limestone bedrock. The geologic formation underlying Arnott Fen is Buttermilk Falls Limestone through Esopus formation, undivided. This includes four formations; Buttermilk Falls Limestone, Palmerton Sandstone, Schoharie, and Esopus formations. The Schoharie Formation is calcareous, with a significant portion of the interstitial material containing calcium carbonate (PADCNR 2009, 15, 17–18).

TABLE 21: RARE AND UNIQUE COMMUNITIES PRESENT WITHIN THE STUDY AREA

Community	Global Rank	NJ Rank	PA Rank	Alternatives					
				1	2	2b	3	4	5
Arnott Fen ^a	Imperiled to critically imperiled	—	Critically imperiled	X	X	X			
Hogback Ridge ^a	—	—	—	X	X	X			
Hemlock Forests									
Eastern hemlock forest	Secure	Not ranked	Apparently secure	X	X	X		X	
Eastern white pine forest	Secure	Not ranked	Apparently secure	X	X	X			
Eastern hemlock/northern hardwood forest	Apparently secure (?)	Vulnerable	Apparently secure	X	X	X	X		
Dry eastern hemlock/oak forest	Apparently secure to vulnerable (?)	Not ranked	Apparently secure	X	X	X	X		
Lichens	—	—	—	X	X	X	X	X	X
Riparian Corridors									
Delaware River riparian corridor ^a	—	—	—	X	X	X	X		
Van Campens Brook riparian area	—	—	—	X	X	X			
Kittatinny Ridge ^a	—	—	—	X	X	X	X	X	X
Talus Slopes									
Sandstone talus	Apparently secure	Vulnerable	Vulnerable	X	X	X	X		
Oak/birch talus	Apparently secure to vulnerable	Vulnerable (?)	Vulnerable	X	X	X	X	X	X
Natural Heritage Sites									
Totts Gap and Totts Gap Swamp	—	—	—					X	X
Bear Swamp	Unknown	—	Imperiled to vulnerable					X	X
Minsi Lake vernal pools	Unknown	—	Vulnerable						

a. Indicates an outstanding natural feature.

— = Community not ranked, or not found in state.

Ranking Definitions: **Critically imperiled:** At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.

Imperiled: At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.

Vulnerable: At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.

Apparently secure: Uncommon but not rare; some cause for long-term concern due to declines or other factors.

Secure: Common; widespread and abundant.

Not ranked: Conservation status not yet assessed.

Unknown: Possibly in peril range-wide but status uncertain; need more information.

Calcareous groundwater is discharged at Arnott Fen as a result of the calcareous geologic formations, which support calciphytic vegetation. A calcareous fen like Arnott Fen can only be found on areas of highly calcareous rock, which is necessary to provide the calcium needed to support calciphytic vegetation (Mellon 2010a, 11). Generally, calcareous wetlands are grassy or shrubby, with little cover. Sedges are often a prominent vegetation type. Arnott Fen is classified as a poison sumac/red-cedar/bayberry fen. This community type exists in areas with base-rich water, often with a pH ranging from 7.0 to 8.1, and usually contains a rich organic layer (Fike 1999, 42). This plant community is considered globally imperiled, ranked as G1G2, and is the only community of its kind in Pennsylvania (NPS 2009g, 4). The unusual conditions present support six known Pennsylvania special-status plant species and one plant that is a proposed threatened species for Pennsylvania but is not yet listed (NPS 1983a, 43). Within DEWA, 29 taxa of lichens have also been found in this habitat type (TNC 2000, 9). These rare plant communities support rare wildlife species that depend on the hydrologic conditions found at Arnott Fen and the surrounding wetland complex. The fen with surrounding wetlands and forest compose a unique ecosystem that supports diverse breeding bird, reptile, and amphibian populations, including species of conservation concern.

The larger wetland that encompasses Arnott Fen has been altered by beaver and human activity. Since the initial discovery of special-status species in the fen, beaver activity has altered water levels, flooding much of the area for several years. Remnant dams are still present and functioning in some parts of the wetland complex. In other areas, woody species are encroaching and succession has become a concern. Historical impacts on the wetland from beaver and humans have not been documented, nor have the changes been compared over time. The threat of encroachment of shrubby species and saplings may also affect the wetland and fen (TNC 2000, 1).

OUTSTANDING NATURAL FEATURES

An outstanding natural feature is defined in the DEWA GMP as one that has a high intrinsic or unique value. The NPS-identified outstanding natural features are open for visitor use; however, these areas are also managed to prevent degradation (NPS 1987, 18).

Hogback Ridge: A hogback ridge is a bedrock ridge with steep sides. The geology of Hogback Ridge is Devonian Buttermilk Falls Limestone (NPS 1983a, 4). The ridge runs roughly northeast to southwest in DEWA and drops off steeply on the southeastern side. The northern slope of the ridge contains eastern hemlock/northern hardwood forests, as well as extensive wetland areas.

Hogback Ridge is important to the conservation of biodiversity in Pennsylvania (PATNC 1991a, 14–25). The Hogback Ridge is an outstanding natural feature in the park, and its hemlock forest, which is a rare community type in DEWA, contributes significantly to the biological diversity of the state and county. (NPS 1987, 18; PATNC 1991A, 14–25). A unique community type in DEWA, the hemlock forest is dominated by eastern hemlock in the canopy, with sweet birch (*Betula lenta*) and sugar maple as codominant canopy species (NPS 2009g, 4). Canopy cover is thick—generally more than 70%. The dense cover of the canopy creates a densely shaded understory. This lowers air and water temperatures in these forests, as well as providing specific habitat and soil nutrients for a host of species. Many species rely on the conditions found in these forests. The eastern hemlock/northern hardwood forest along Hogback Ridge also supports several species of native wildflowers and rare plants (NPS 2009g, 4). It is also holds an abundance of lichen species and is an area where new species are currently being discovered (Harris and Lendemer 2005, 4–6; 2006, 69–71).

A few bird species are hemlock specialists, meaning that they require a limited set of conditions found within hemlock forests for survival, and can be found exclusively in hemlock stands such as the stand on Hogback Ridge. Hemlock-specialist bird species include the black-throated green warbler, blue-headed

vireo (*Vireo solitarius*), and northern goshawk. The red shouldered hawk, barred owl, Acadian flycatcher, winter wren (*Troglodytes troglodytes*), and hermit thrush (*Catharus guttatus*) are also highly associated with hemlock ecosystems (Ross et al. 2004, 4). Pennsylvania state-threatened bald eagles are known to roost in trees on the ridge with easy access to foraging points along the Delaware River. Several bird species of concern also nest in the area (NPS 2009f, 4). These species are not common breeders in DEWA.

The cooler and darker conditions found in hemlock forests such as those found along the northern side of Hogback Ridge support a higher abundance of aquatic species as well. Brook trout and benthic invertebrates are often found in greater numbers in streams under hemlock stands (USGS 2003, 2.17, 3.3). The large forest block provided by Hogback Ridge has benefits for forest-interior species. The conditions found in the eastern hemlock/northern hardwood forest also support many of the reptile and amphibian species found in DEWA (NPS 2009f, 4).

Hogback Ridge contains several wetland areas along higher elevations (500–600 feet AMSL) that run between limestone ridges. Although many of these wetlands have been affected by beaver activity, a small population of a proposed Pennsylvania state-threatened reptile species was observed at the edge of one of the linear wetlands on Hogback Ridge. The wetlands on Hogback Ridge also support special status plants, and the beavers have created habitat for the great blue heron and red-headed woodpeckers, two uncommon breeders in DEWA.

HEMLOCK FORESTS

Eastern hemlocks are found within four forest types within the study area: eastern hemlock forest, eastern hemlock/northern hardwood forest, dry eastern hemlock/oak forest, and eastern white pine forest. Hemlock forests provide densely shaded areas that aid in lowering surrounding air and water temperatures, provide habitat structure, and affect soil nutrients, providing important habitat for several plant, animal, and insect species. Several bird species are found exclusively in hemlock stands (black-throated green warbler, blue-headed vireo, and northern goshawk) or are highly associated with them (red-shouldered hawk, barred owl, Acadian flycatcher, winter wren, and hermit thrush) (Ross et al. 2004, 4). In riparian areas, the streams associated with hemlock stands generally contain more taxa than those with hardwood forest associations. Fish, such as brook trout, and many benthic invertebrates are found in greater abundance in streams underneath hemlock stands (USGS 2003, 2.17, 3.3). Aquatic diversity is predicted to decline with the loss of hemlock forests based on a study in DEWA (Snyder et al. n.d., i–ii). Hemlock forests are threatened by the spread of the hemlock woolly adelgid, which is discussed in the “Invasive Wildlife Species” section of this chapter.

Eastern Hemlock Forest: Eastern hemlock forests are found in dry–mesic conditions on steep slopes throughout the DEWA. These forests are dominated by eastern hemlocks or eastern white pine and grow in rocky soils. The understory is sparse and could include American witch-hazel, mountain laurel, and lowbush blueberry; the herbaceous layer is also sparse and species could include Indian cucumber and New York fern.

Eastern White Pine Forest: Eastern white pine forests are similar to eastern hemlock forests, with the exception of the abundance of eastern hemlocks in the canopy. In eastern hemlock forests, hemlocks constitute approximately 50% to 90% of the canopy, whereas only 50% or less of the canopy of eastern white pine forests consists of eastern hemlocks (NPS 2007b, 9–12, 15–18).

Eastern Hemlock/Northern Hardwood Forest: Eastern hemlock/northern hardwood forests are found in acidic soils on steep ravines and along north-facing lower slopes throughout DEWA. Eastern hemlocks make up 25% to 50% of the canopy of these forests, with sweet birch and sugar maple as codominant

species. The bedrock that underlies eastern hemlock/northern hardwood forests varies from shale to calcareous shale and limestone. The shrub layer in these forests ranges from open to dense, while the herbaceous layer is usually sparse (NPS 2007b, 173–175).

Dry Eastern Hemlock/Oak Forest: The canopy of dry eastern hemlock/oak forests is codominated by eastern hemlock and oaks, predominantly chestnut oak. Eastern hemlocks compose more than 25% of the canopy. This forest type is found on shale, sandstone, siltstone, and limestone bedrock in extremely stony soils. Both the shrub and herbaceous layers are sparse. Dry eastern hemlock/oak forests are found on steep northeastern to northwestern exposures in DEWA.

LICHENS

Lichens are often used for natural resource assessment because they are responsive to environmental stressors in forests, such as habitat alteration and pollution (Lichen.com 2001). The Forest Inventory and Analysis Program of the U.S. Forest Service monitors lichen communities throughout the United States to evaluate biodiversity, air quality, and climate (USFS 2008, 4–7). Lichens provide food for animals such as deer and provide nesting materials for small mammals and birds. DEWA is considered one of the most diverse areas in the United States for lichen flora (Harris and Lendemer 2006, 75) and supports over 320 species of lichens (NPLichen 2010).

RIPARIAN CORRIDORS

Riparian corridors are vegetated areas that grow along streams, lakes, rivers, wetlands, and bays. Riparian corridors naturally consist of trees and grasses, and are predominately forested in the study area. These corridors protect water resources by removing contaminants from runoff water and providing habitat for riparian and aquatic organisms (Gilliam, Osmond, and Evans 1997).

Delaware River Riparian Corridor: The north-to-south orientation of the Delaware River riparian corridor provides crucial habitat for migratory bird species, particularly migratory songbirds, waterfowl, and wading bird species. The bottomlands associated with this riparian corridor provide important habitat for breeding and foraging for many bird species, including songbirds, raptors, and waterfowl (NPS 2009g, 5).

Van Campens Brook Riparian Area: Van Campens Brook and wetland complex is a high-value aquatic area on the New Jersey side of DEWA, off County Road 606. The brook itself is categorized as a category one stream, which is afforded the highest level of state water protection (NPS 2009c, 4). These waters support several aquatic species and are considered trout-producing for the native brook trout. The aquatic areas of the Van Campens Brook and associated wetlands are also important suitable habitat for many listed amphibian and trout species.

Within the Van Campens Brook area, Van Campens Glen is a steep hemlock ravine with a popular hiking trail. The ravine runs along Van Campens Brook, on the western side of Kittatinny Mountain, and the glen is an outstanding natural feature of DEWA that contributes to the uniqueness of the Van Campens Brook riparian corridor. A species of filmy fern found within the glen represents the only known population of this species in New Jersey. This species is found in deep recesses of crevices of the rocky sides of the ravine (NPS 1986, 125). The location of this species is such that it would not be affected by activities in the B-K Line ROW.

In the ROW near the Watergate Recreation Site, the floodplain of Van Campens Brook is generally dominated by hairyfruit sedge. This species is often associated with high pH soils. Other species found in this area include blue vervain (*Verbena hastata*), arrow-leaved tearthumb, woolgrass, giant goldenrod

(*Solidago gigantea*), soft rush (*Juncus effusus*), rough-leaved goldenrod (*Solidago rugosa*), monkeyflower (*Mimulus rigens*), and mild water pepper (*Polygonum hydropiperoides*) (Mellon 2010a, 11).

Wetland areas along the B-K Line ROW near the Van Campens Brook wetland complex and Watergate Recreation Site include seepage wetlands and old ponds. These wetland areas were found to have a high diversity and abundance of plant species. Plants found included marsh fern (*Thelypteris palustris*), sensitive fern, yellow birch, Morrow's honeysuckle, autumn olive, and multiflora rose, among many others.

MIGRATORY BIRD FLYWAYS

Birds migrate between breeding and wintering locations in order to benefit from the ability to inhabit two different areas during seasons when each region provides favorable conditions (Lincoln, Peterson, and Zimmerman 1998, 13). Flyways generally contain several primary migration routes, many important tributaries, and suitable resting and feeding habitats where birds can stop during migration (Boere and Stroud 2006, 40). There are four major migratory flyways in North America: the Atlantic, Mississippi, Central, and Pacific flyways. The Atlantic Flyway spans more than 3,000 miles and stretches from the Arctic Tundra to the Caribbean (Kramer 2006, 1). The states that lie within the Atlantic Flyway in the United States are home to over 500 species of birds and contain a variety of habitats, including forests, coastal habitats, and wetlands. Kittatinny Ridge, DEWA, and APPA are within the Atlantic Flyway. The Delaware River is also a part of the Atlantic flyway, and provides important migratory habitat for waterfowl.

Kittatinny Ridge: Kittatinny Ridge (Blue Mountain in Pennsylvania and Kittatinny Mountain in New Jersey) runs through DEWA in both Pennsylvania and New Jersey. Within Kittatinny Ridge, Kittatinny Mountain is a priority site for the protection of New Jersey biodiversity (NPS 2009c, 3). Kittatinny Ridge supports a vast diversity of plant communities and wildlife, including endangered species, along its length. Kittatinny Ridge is identified as a priority site by the New Jersey Natural Heritage Program (NJNHP). It is also identified as an IBA by the Audubon Society in both Pennsylvania and New Jersey and a petition has been submitted to designate the ridge as a national raptor migration corridor (Audubon PA 1999b; NJ Audubon 2010d; Heintzelman 2009).

With its north-south orientation, Kittatinny Ridge is a globally significant fall migration corridor used by many thousands of raptors every year. Audubon Pennsylvania has named Kittatinny Ridge as the largest of the state's IBAs (Audubon PA 2006, 7). The unique geology of the ridge results in the creation of wind currents that raptors and other species use to migrate. It is estimated that between 14,000 and 20,000 hawks and other raptors migrate through Kittatinny Ridge yearly (Heintzelman 2009, i). Aside from the benefits of the wind currents, the forested habitats along Kittatinny Ridge provide breeding, resting, and foraging areas for bird species. Information on the use of the ridge by bird species and the IBAs along Kittatinny Ridge is outlined in the "Migratory Birds" section of this chapter.

Other wildlife species can be found in the diversity of habitats along the ridge. The woodlands along Kittatinny Ridge provide critical, high quality interior-forest habitat for 143 breeding bird species, 55 fish species, 49 species of amphibians/reptiles, 83 butterfly species, 78 dragonfly/damselfly species, 292 woody plant species, 19 plant communities, and 33 mammal species (TNC 2009). The Kittatinny Ridge talus slopes, hemlock ravines, and conifer and hardwood swamps support a rare ecosystem within the parks. The varied habitats along Kittatinny Ridge provide habitat for many endangered or rare wildlife, including raptors, mammals, amphibians, and reptiles (NPS 2009c, 3). In addition, high-elevation ponds within Kittatinny Ridge provide important breeding habitat for dragonflies and damselflies (Shreiner 2008, 11).

TALUS SLOPES

Talus describes an area with large, boulder-like rocks found at the bottom of steep slopes, usually resulting from slides or rockfalls from unstable cliffs. The soils in this type of community are thin and dry. The vegetation grows on the face of the rock rubble or in the weakly developed soils between the rock fragments on steep slopes. With little soil in the field of boulders, talus areas are generally sparsely vegetated and moderately unstable. Within DEWA, talus slope communities are found along Kittatinny Ridge. Kittatinny Ridge maintains two unusual vegetation associations in Kittatinny talus.

Sandstone Talus: Sandstone talus is found on the steep southern and southeastern slopes of the Kittatinny Ridge in coarse, sandstone-based talus. Lichen cover is common on the boulders. Vegetation cover in sandstone talus ranges from 0% to 50% cover and is dominated by drought-resistant species such as sweet birch and chestnut oak. Other plant species common to this type of habitat include oak and hickory species, mountain laurel, poison ivy, and summer grape. The height of the canopy species ranges from 16.4 to 65.6 feet (5 to 20 meters). The shrub layer is usually sparse and the herbaceous layer is usually sparse to absent (NPS 2007b, 343–345).

Oak/Birch Talus Forest: In areas where vegetation cover is greater than 50% on talus slopes, the vegetation is considered oak/birch talus forest. Oak/birch talus forests can be found on the southeastern-facing parts of the Kittatinny Ridge, where the sandstone boulders are large and coarse with only small amounts of soil rock crevices. Oak/birch talus forests differ from sandstone talus in that the canopy cover ranges from 50% to 80% and the height of the canopy could reach 49.2 to 98.4 feet (15 to 30 meters). The dominant canopy cover is black birch, particularly in the less stable areas of the talus, although chestnut oak is also characteristic in the canopy. Other oaks, hickory, and two pine species, white pine and pitch pine, are also occasionally found in the canopy. Shrub species include American witch-hazel and mountain laurel, with early lowbush blueberry and other berry species in the shorter shrub layer. Poison ivy, Virginia creeper, and other vines grow on the boulders; however, the herbaceous layer tends to be barren (NPS 2007b, 197–199).

NATURAL HERITAGE SITES

Natural heritage sites are areas identified by Pennsylvania and New Jersey natural heritage programs as being significant natural areas that support species of special concern, exemplary natural communities, or larger areas supportive of the biodiversity of native species within the state. Inventories of these sites have helped to provide information on special-status species and natural communities threatened by extinction on a local or global level, and have helped to develop management and protection guidelines for these sites.

Acidic Broadleaf Swamps

Acidic broadleaf swamps are characterized by a tall shrub layer of highbush blueberry, with associate species of swamp azalea, red maple, and maleberry. The canopy is sparse, with a cover of less than 10%. Canopy species could include pitch pine, red maple, and black spruce. These communities are bog-like and the vegetation grows on organic soils, often on a floating mat (NPS 2007b, 251–254).

Totts Gap Swamp: The Totts Gap Natural Heritage Site is composed of Totts Gap and Totts Gap Swamp, both ranked as 5 in Northampton County, indicating that the two sites are the lowest priority for protection (PATNC 2005a, 43). Totts Gap Swamp is an acidic broadleaf swamp. The canopy is dominated by black gum, red maple, and yellow birch, with a fairly open canopy. The understory is dense, and dominated by great laurel, spicebush, winterberry, and highbush blueberry. The swamp is

known to contain a Pennsylvania proposed threatened plant species, which is found along the edge of the swamp (PATNC 2005a, 131).

Rocky Summit Outcrops

Rocky summit outcrop communities are dominated by low shrubs with grasses, sedges, and a few herbaceous species forming a secondary component. These communities are open areas found on rocky summits of hills and mountains where bedrock is exposed, where vegetation is confined to cracks in the rocks or to areas of shallow soil between the rock outcrops. Vegetation in these communities can include scrub oak, blueberry varieties, pitch pine, and oaks (Commonwealth of Massachusetts [Commonwealth of MA] 2007, 1–2).

Totts Gap: The Totts Gap Natural Heritage Site is composed of Totts Gap and Totts Gap Swamp, both ranked as 5 in Northampton County, indicating that the two sites are the lowest priority for protection (PATNC 2005a, 43). The vegetation along the ridge of Totts Gap is generally shrubby in rocky summit outcrop areas, which are xeric in nature. These outcroppings are dominated by scrub oak, blueberry, black huckleberry, and black chokeberry. Interspersed within the shrubby vegetation, a few pitch pines can be found. The herbaceous layer includes hairgrass, little bluestem, and dewberry. Populations of a Pennsylvania state-threatened plant species and a proposed Pennsylvania state-threatened plant species can be found within Totts Gap (PATNC 2005a, 131).

Circumneutral Broadleaf Swamps

Circumneutral broadleaf swamps are also known as buttonbush wetlands. These wetlands experience prolonged or semipermanent flooding throughout most of the growing season. The wet areas are dominated by buttonbush (*Cephalanthus occidentalis*). Other shrub species could include highbush blueberry, silky dogwood, and red maple seedlings. The tree canopy may reach 25% coverage and canopy species could include sugar maple and pin oak (NPS 2007b, 247–250).

Bear Swamp: Bear Swamp is part of the Minsi Lake Corridor, which also contains Minsi Lake vernal pools. This corridor represents a collection of forestlands and other natural areas that link and protect valuable wildlife habitat spanning several thousand acres. Bear Swamp is a circumneutral broadleaf swamp natural community that lies in two separate lobes along two separate tributaries of Martins Creek and occupies approximately 200 acres (PATNC 2005a, 31).

Ephemeral/Fluctuating Natural Pools

Vernal pools or ephemeral/fluctuating wetlands are natural wet areas that contain water during fall, winter, and spring months, but dry out during the summer due to evaporation. Because of the absence of water in the summer, these pools do not support fish species, but they do provide important breeding grounds for a number of amphibian species. Several special-status salamanders rely on ephemeral wetlands for metamorphosis from larva to adult (Indiana University–Purdue University Fort Wayne 2011, 1–2).

Minsi Lake Vernal Pools: The Minsi Lake vernal pools, together with Bear Swamp (described above), compose the Minsi Lake Corridor. The vernal pools contain a collection of more than 100 ponds of varying sizes scattered throughout several hundred acres of dry–mesic forest, as well as several streams and springs (PATNC 2005a, 128). The varied habitats of the Minsi Lake Corridor support a wide range of both plant and animal species, including those that are adapted to a dry phase, as the vernal pools dry up each fall (TNC 2011a). These varying wet areas support diverse plant species and create excellent breeding habitat for amphibians, including marbled and spotted salamanders. The Minsi Lake Corridor

contains one of the largest collections of vernal pools in Pennsylvania (TNC 2011b). Additionally, the Minsi Lake vernal pools combined with Bear Swamp include some of the most extensive forests remaining within Northampton County, Pennsylvania, and could be used by forest-interior breeding species such as the cerulean warbler (PATNC 2005a, 128).

Alternative 1 (No Action), Alternative 2, and Alternative 2b

The alignment for alternatives 1, 2, and 2b would intersect three park-managed outstanding natural features (Arnott Fen, Hogback Ridge, and Kittatinny Ridge), and five rare and unique vegetation communities (Delaware River riparian corridor, hemlock forests, lichens, talus slopes, and Van Campens Brook riparian area) (table 21; figures 43 and 44).

The alignment for alternatives 1, 2, and 2b would pass directly through Arnott Fen and would bisect Hogback Ridge; these two communities are only present within the alignment for alternatives 1, 2, and 2b.

Four hemlock forest types are found along alternatives 1, 2, and 2b: eastern hemlock forests, eastern hemlock/northern hardwood forests, dry eastern hemlock/oak forests, and eastern white pine forests. Hogback Ridge is composed mostly of eastern hemlock/northern hardwood forests and also contains dry oak/eastern hemlock forests. Eastern hemlock/northern hardwood forests are found within the Van Campens Brook riparian area in New Jersey. Eastern hemlock/northern hardwood forests and eastern white pine forests are found in an undisturbed area between the Upper and Lower Hamilton Trails. The eastern hemlock forest type is found north of the Bushkill Substation along the banks of Big Bushkill Creek.

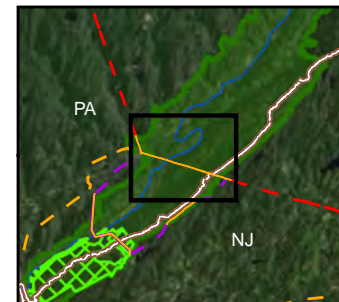
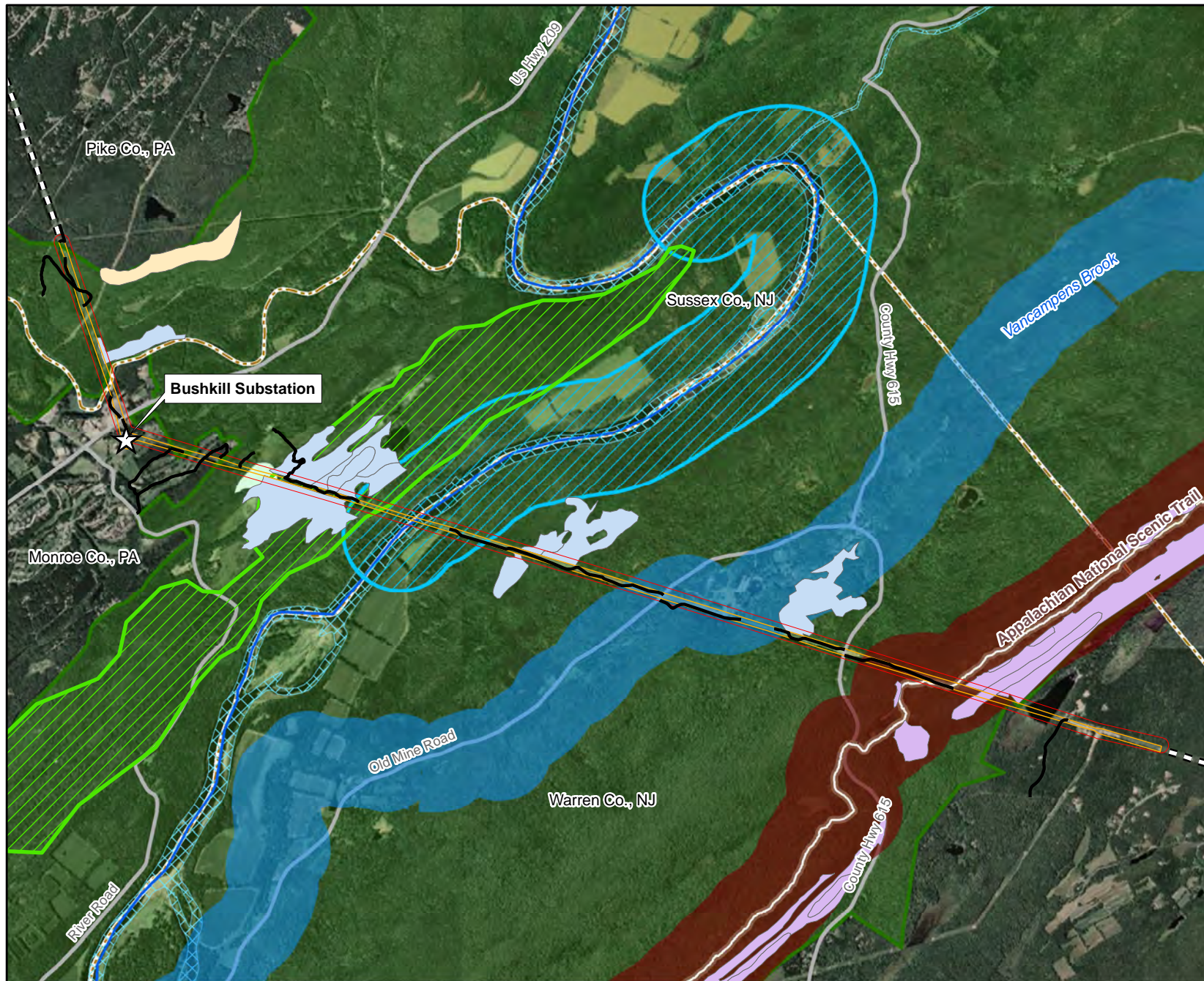
Lichens are found throughout the alignment for alternatives 1, 2, and 2b. In a 2005 survey of the lichens in the Pennsylvania side of DEWA, 209 species were collected (Harris and Lendemer 2005, 1). Of these, 133 species were collected from two locations on Hogback Ridge. On a follow-up survey a year later, the survey sites were revisited and 35 new species were collected at one site and 89 new species were collected at the second (Harris and Lendemer 2006, 69–75). Several of the species collected during these surveys were new to science and new to North America (Harris and Lendemer 2005, 1).

The alignment for alternatives 1, 2, and 2b would cross Van Campens Brook and Delaware River riparian corridors. This alignment is the only one that would run along Van Campens Brook and cross it. The Delaware River riparian corridor supports bald eagles, providing foraging, nesting, and roosting habitat. The alignment runs between a communal bald eagle roost and foraging habitat. During the winter, the riparian corridor is used by bald eagles for foraging, because the river provides open water that is free from ice (NPS 2009g, 5).

The alignment for alternatives 1, 2, and 2b would cross Kittatinny Ridge, which contains both sandstone talus and oak/birch talus. The sandstone talus plant community is found on the steep southern and southeastern slopes of the Kittatinny Ridge in coarse, sandstone-based talus. Oak/birch talus can be found on the southeastern-facing parts of the Kittatinny talus, where the sandstone boulders are large and coarse with only small amounts of soil rock crevices (NPS 2007b, 197).

Alternative 3

The alternative 3 alignment would intersect one park-managed outstanding natural feature (Kittatinny Ridge), four rare and unique vegetation communities (Delaware River riparian corridor, hemlock forests, lichens, and talus slopes), and one natural heritage site (Shoemakers Barren) inside the study area (table 21; figure 45).



- Legend**
- ☆ Substation
 - = 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
 - Middle Delaware National Scenic and Recreational River
 - County Line
 - Rare and Unique Communities**
 - Amott Fen
 - Delaware River Riparian Corridor
 - Eastern Hemlock Forests
 - Hogback Ridge Woodlands
 - Kittatinny Ridge
 - Shoemakers Barren Natural Heritage Site
 - Talus Slopes
 - Vancampens Brook

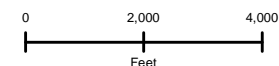


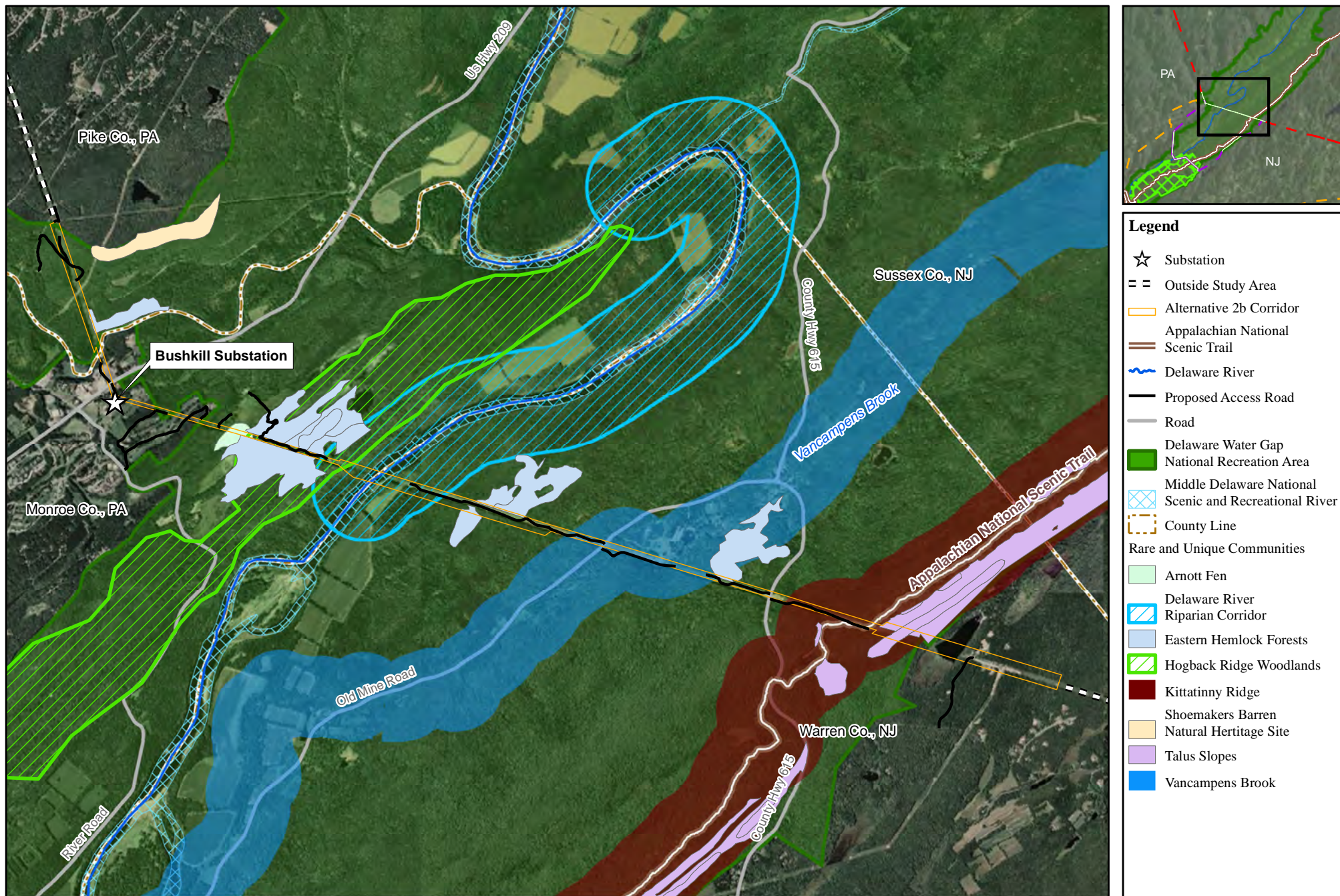
Susquehanna to Roseland
Transmission Line Proposal
and
Right-of-Way Request EIS

Figure 43
Alternative 2 Rare and Unique Communities

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





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

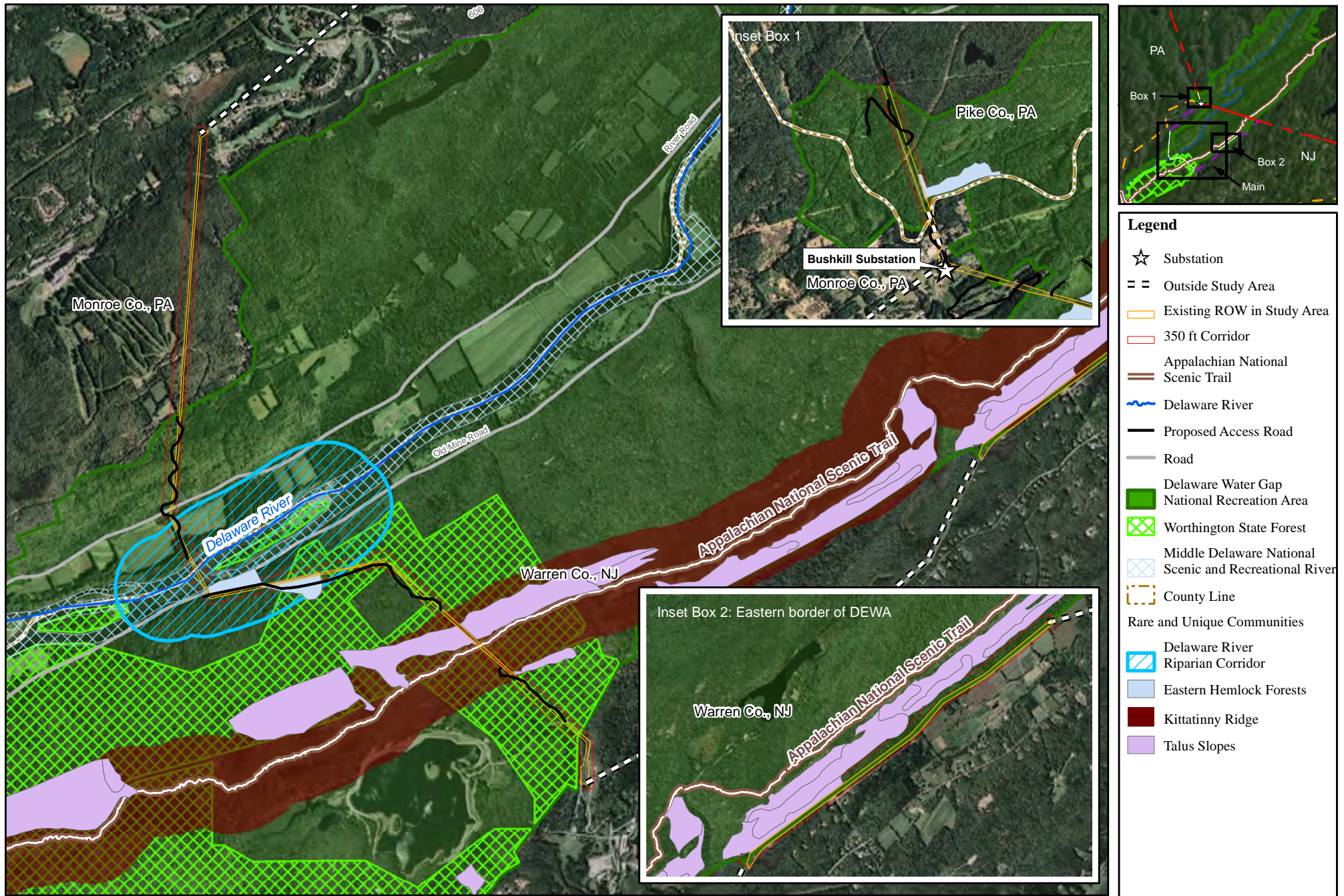
Figure 44
Alternative 2b Rare and Unique Communities

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



0 2,000 4,000
Feet



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

Figure 45
Alternative 3 Rare and Unique Communities

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



0 1,800 3,600
Feet
Scale applies to main frame and inset maps

Three types of forests containing eastern hemlocks are found along the alternative 3 corridor: eastern hemlock/northern hardwood, dry eastern hemlock/oak, and eastern hemlock forests. The first two forest types are just west of the Delaware River in New Jersey adjacent to the ROW. Eastern hemlock forests grow along Big Bushkill Creek in this area, as described under alternatives 1, 2, and 2b.

The alternative 3 alignment would cross the Delaware River riparian corridor approximately 5 miles south of alternatives 1, 2, and 2b. The riparian area supports migratory and resident birds by providing foraging and nesting habitat; however, this portion of the Delaware River riparian corridor does not contain a bald eagle winter roost.

Lichens are expected to be found throughout the habitats along the alternative 3 alignment; however, the quantity and number of unique species would likely be less than that found within Hogback Ridge.

The alternative 3 alignment would cross Kittatinny Ridge within DEWA. This portion of the alignment would traverse oak/birch talus forest near APPA. Both oak/birch talus forest and sandstone talus are found in the portion of the alternative 3 alignment that travels parallel to APPA along the DEWA boundary.

Alternative 4

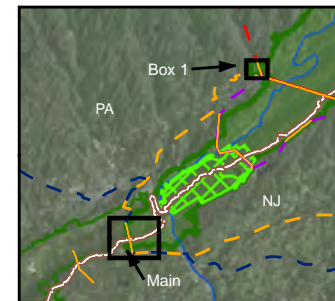
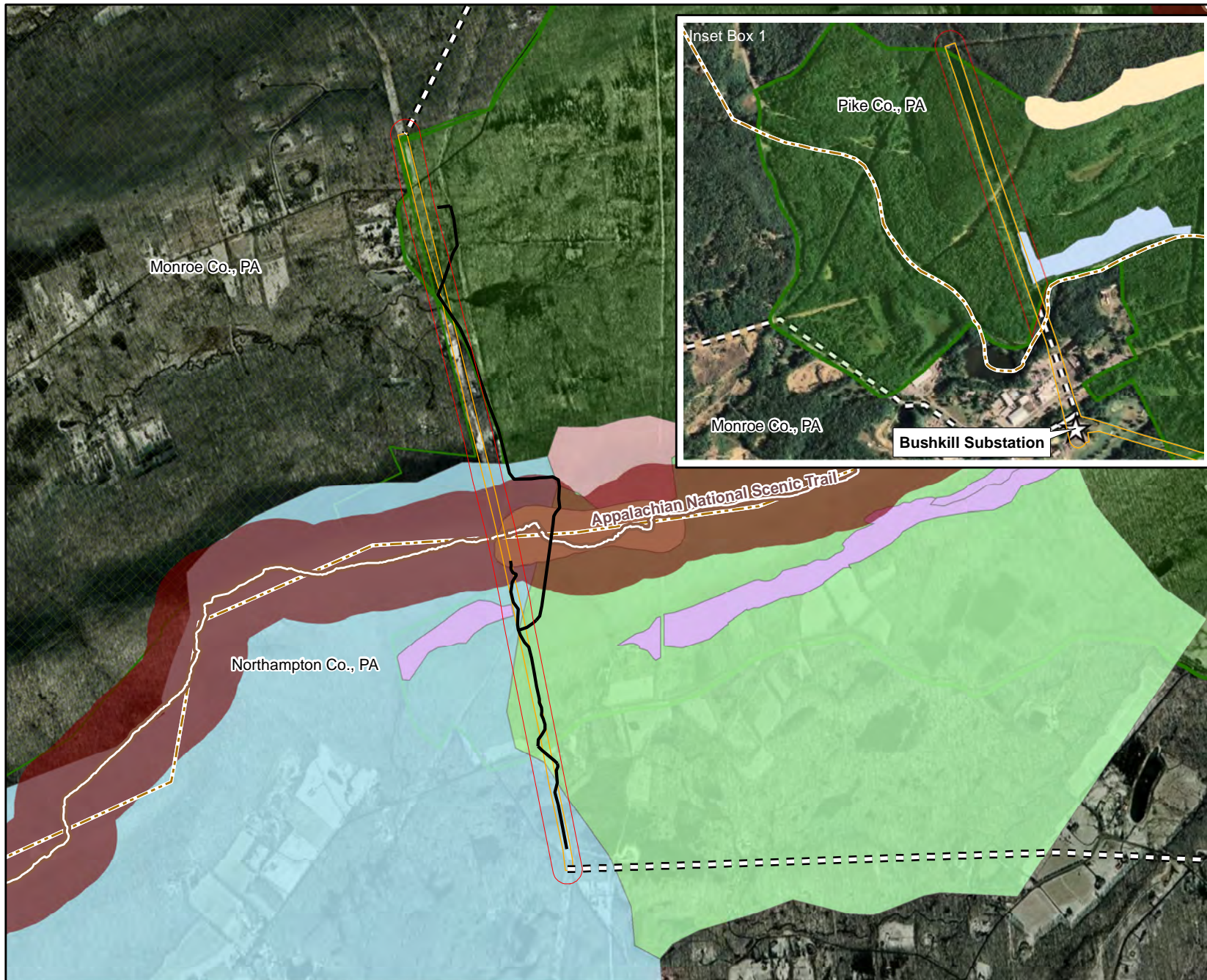
Inside the study area, the alternative 4 alignment would intersect one park-managed outstanding natural feature (Kittatinny Ridge), three rare and unique vegetation communities (hemlock forests, lichens, and talus slopes), and three natural heritage sites (Totts Gap, Minsi Lake vernal pools, and Bear Swamp) (table 21; figure 46).

The alternative 4 alignment would encounter hemlock forests where the alignment follows the B-K Line, as described for alternatives 1, 2, and 2b. Lichens are expected to be present along the alternative 4 alignment. Because the alignment is situated along the edge of DEWA and is more disturbed by development, the lichen flora is expected to be less diverse and plentiful than that found along Hogback Ridge as described for alternatives 1, 2, and 2b. The alternative 4 alignment would cross Kittatinny Ridge and a small portion of oak/birch talus forest habitat. This talus habitat is east of APPA; sandstone talus is not found along the alternative 4 route.

The southern half of alternative 4 within the study area crosses Totts Gap Natural Heritage Site and the Minsi Lake Corridor, which contains Minsi Lake vernal pools and Bear Swamp. These communities abut one another in the southernmost portion of DEWA and the alignment crosses the outermost edges of both (figure 46). These communities support state-listed plant species, as well as sensitive wildlife species.

Alternative 5

Inside the study area, alternative 5 would follow the same route through DEWA and APPA as alternative 4 except it would not include any portion of the B-K Line. Therefore, alternative 5 would intersect one park-managed outstanding natural feature (Kittatinny Ridge), two rare and unique vegetation communities (lichens and talus slopes), and three natural heritage sites (Totts Gap, Minsi Lake vernal pools, and Bear Swamp) (table 21; figure 46). The conditions of these communities are the same as those described for alternative 4.



Legend

- ☆ Substation
- = = Outside Study Area
- Existing ROW in Study Area
- 350 ft Corridor
- Appalachian National Scenic Trail
- Proposed Access Road
- Delaware Water Gap National Recreation Area
- CVNWR Boundary
- County Line
- Rare and Unique Communities
- Kittatinny Ridge
- Shoemakers Barren Natural Heritage Ste
- Talus Slopes
- Totts Gap
- TNC Designations
- Minsi Lake/Bear Swamp
- Totts Gap
- Totts Gap Swamp

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 46
Alternative 4/5 Rare and Unique Communities

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



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

Outside the Study Area

From the study area to the Susquehanna Substation, the S-R Line could pass through Carbon, Lackawanna, Luzerne, Monroe, Northampton, Pike, and Wayne counties in Pennsylvania. These counties contain 58 different types of rare and unique habitats, including a variety of wetlands, barrens, and rocky summits (PNHP 2010e). The rare and unique communities of these seven Pennsylvania counties and their state ranks are presented in appendix G. Rare and unique communities identified by the PNHP range from demonstrably stable to critically imperiled. Pike County contains 26 rare and unique communities, the largest number of any of the counties within the project vicinity in Pennsylvania; Lackawanna County contains the least, with 12 rare and unique community types. Two communities in Pennsylvania are also ranked globally: shrub fen is ranked as globally vulnerable to globally imperiled, and the northern Appalachian calcareous rocky summit community is listed as potentially globally imperiled (PNHP 2010e). The Pennsylvania Science Office of TNC has identified the outstanding or critical natural features in a series of natural area inventory reports. For the counties that may be affected by the S-R Line, the number of outstanding natural features range from 54 in Lackawanna County to 122 in Luzerne County (PATNC 1990, 1991a, 1991b, 1998, 1999, 2005a, 2005b, 2006). The outstanding natural features are presented in appendix G. Additionally, 11 preserves protected by TNC are within the counties that could be involved with the S-R Line outside the study area and are presented in appendix G-8 (TNC 2011c).

Outside the study area to Roseland Substation, the S-R Line would traverse Sussex, Warren, and Morris counties on its route from the study area to the Roseland Substation in New Jersey; these counties contain 20, 10, and 4 rare and unique communities, respectively. The NJNHP has identified these communities as ranging from rare or vulnerable to critically imperiled for the state of New Jersey, and many are ranked as very rare globally (NJDEP 2008b, 2008c, 2008d). NJDEP has identified critically important habitat or natural heritage priority sites in Sussex, Warren, and Morris counties. There are 80 natural heritage priority sites in Sussex County, 39 in Warren County, and 22 in Morris County (NJDEP 2007). The outstanding natural features are presented in appendix G. In addition, there are eight preserves owned by TNC that could be encountered in Sussex, Warren, and Morris counties in New Jersey, which are presented in appendix G-8 (TNC 2010).

Depending on the route chosen, the transmission line could encounter one or more of these rare or unique communities, TNC preserves, or natural heritage site communities outside the study area in Pennsylvania and New Jersey.

ARCHEOLOGICAL RESOURCES

This section identifies potential archeological resources that could be affected by the S-R Line. Archeological sites are defined as follows:

A site is the location of a significant event, a prehistoric or historic occupation or activity, or a building or structure, whether standing, ruined, or vanished, where the location itself maintains historical or archeological value regardless of the value of any existing structure. (36 CFR 60.3[l])

Further, an archeological resource is a site that has been recognized by the NPS or, pending agency review, could be recognized by the Pennsylvania SHPO or the New Jersey Historic Preservation Office (NJ HPO) as historically and archeologically important and worthy of preservation. Sites include those that meet the eligibility requirements of the National Register of Historic Places (36 CFR 60.4) but can include other properties as well.

The affected environment for archeological resources is defined with reference to the implementing regulations of section 106 of the NHPA. Under section 106, the affected environment is referred to as the area of potential effects (APE), which is defined as follows:

Area of potential effects means the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking (36 CFR 800.16[d]).

For the S-R Line, the APE for direct effects on archeological sites is the area of ground disturbance, including, but not limited to the tower locations, temporary construction pads and clearings, the ROW cleared area, and the access roads to and from the ROW. Direct effects could also be on the viewsheds from National Register-eligible archeological sites. However, neither the visual effects of the alternatives on archeological sites nor the long-term, indirect effects of erosion are considered in this analysis because those effects are uncertain.

The entire range of prehistory, from the Paleo-Indian period to the Late Woodland period (approximately 10,500 BC–AD 1600) is represented in the archeological record of DEWA, as well as many proto-historic and historic period sites. Archeological sites in and near the APE were identified in two stages. First, archeologists conducted a Phase IA-level investigation, including existing background publications, documents, and digital information. Sources included NPS GIS information, Pennsylvania SHPO files and NJ HPO files. These data helped to determine the presence and location of previously identified sites and resources, as well as where archeologists might most likely find sites. This research revealed that while numerous historic and prehistoric sites have been recorded on both the Pennsylvania and New Jersey sides of the Delaware, none have been found to be directly within the bounds of the transmission line alternatives. This is because systematic field survey of the transmission line corridors had not been conducted, and the other ways sites are discovered (plowing, erosion, illegal digging, etc.) had not occurred, either.

Subsequently, archeologists conducted a Phase IB archeological survey along all the alignments for alternatives 2 and 2b (Berger 2010b), 3, 4, and 5 (JMA 2011). Archeologists did not survey a short segment of the alternative 3 alignment within the Worthington State Forest due to lack of clearance from the New Jersey DEP. The Phase IB survey involved the hand excavation of shovel test units within the alternative ROWs on areas of high probability (low slope) and surface observation of areas of low probability (slope greater than 15 degrees).

There was a significant difference between the amount of testing on alternative 2/2b and the other alternatives. Because the applicants had substantially determined tower locations, crane pad locations, and the access routes to and from the ROW, they were able to direct Berger archeologists to survey those locations, as well as substantial portions of the APE within the alternative 2/2b ROW. Because only general construction information is available for the other alternatives, archeologists only conducted centerline testing for alternatives 3, 4, and 5. In both cases, if additional, more specific construction documents are developed that better define the APE, additional Phase I testing may be required to comply with ARPA and NHPA, along with Phase II and Phase III eligibility determinations and mitigation. Archeologists discovered sites on all alternatives, as shown in Table 22.

TABLE 22: SUMMARY OF IDENTIFIED ARCHEOLOGICAL SITES WITHIN THE STUDY AREA

Classification	Alternatives					
	1	2	2b	3	4	5
National Register listed	0	0	0	0	0	0
National Register eligible	3	3	3	0	0	0
Unevaluated	3	3	3	1	1	1

ALTERNATIVE 1 (NO ACTION), ALTERNATIVE 2, AND ALTERNATIVE 2B

The intensive Phase I survey identified 25 archeological sites along the alignment for alternatives 1, 2, and 2b. Three of these sites (2 prehistoric, 1 historic) were within the APE. The applicants have asserted that the remainder would not be affected by construction activities (Berger 2010b) by using strategies of avoidance and/or non-ground-disturbing construction techniques. Additional fieldwork conducted in 2011 (Berger 2011) has not been incorporated into this document.

ALTERNATIVE 3

One historic period site was identified along the alternative 3 alignment, on the Pennsylvania side of the river. The site consisted of a cellar hole and an associated surface feature. Artifacts recovered totaled 273. Artifact typology indicates a date range of approximately 1829–1895. The site deposits appear reasonably intact and display good integrity.

ALTERNATIVE 4

One prehistoric site was identified on the Pennsylvania side of the river. The site assemblage consists of 46 black chert flakes and shatter. The site is adjacent to a wetland area and appears to be intact, displaying good archeological integrity. Archeologists uncovered no temporally or culturally diagnostic artifacts. Phase II excavations have not been conducted to determine the site's eligibility for the National Register of Historic Places.

ALTERNATIVE 5

The archeological resources along the alternative 5 alignment are the same as those described for alternative 4, because none were identified along the B-K Line portion of the alternative 4 alignment.

HISTORIC STRUCTURES

This section identifies specific historic structures that could be affected by the S-R Line. Historic structures are defined to include buildings, districts, and structures that have been recognized by NPS or, pending agency review, could be recognized by the Pennsylvania SHPO or NJ HPO as historically and culturally important and worthy of preservation. They include properties that are known to meet the eligibility requirements of the National Register (36 CFR 60.4) but include other properties as well. Historic structures do not include sites of demolished buildings, districts, or structures.

The affected environment for historic structures is defined with reference to the implementing regulations of section 106 of the NHPA. Under section 106, the affected environment is referred to as the APE (see "Archeological Resources" for a definition of the APE). NPS policy states that eligible structures are to be treated in the same manner as listed structures.

The S-R Line would involve the regular placement of new towers and intervening electrical transmission lines within identified alternative alignments. Because these features are large in scale and readily visible from great distances, they would have visual impacts on historic structures within the Delaware River valley. Therefore, within the park boundary, the NPS defined an APE that extends 8 miles laterally from each proposed alternative alignment. Outside the park boundary, the NPS defined an APE that extends 0.5 mile laterally from each proposed alternative alignment. The width of the APE is governed by VSLs, points where established alignment segments within the valley meet one or more speculative segments that extend to the Susquehanna Substation to the west or Roseland Substation to the east.

Researchers identified historic structures in several ways, depending on their locations. For portions of the APE associated with alternatives 1, 2, and 2b, information was drawn from the results of the cultural landscape investigation (Jacobs et al. 2011). For portions of the APE associated with alternatives 3, 4, and 5 within the park boundary, where considerable previous surveys had occurred, researchers consulted the DEWA inventory of historic structures. This inventory included a GIS layer and database. The GIS layer contained points identifying the location of each identified resource, and the database contained standardized information about the identity, location, status, type, and age of each resource. For portions of the APE associated with alternatives 3, 4, and 5 outside the park boundary, where little or no previous investigation had occurred, field staff conducted a reconnaissance survey to determine the presence of buildings, districts, and structures that appeared to meet the project definition of historic structures. Researchers also reviewed the Pennsylvania SHPO and NJ HPO survey files to determine the presence and location of previously-identified historic structures (Clark et al. 2011).

The number and distribution of identified historic structures are summarized by National Register status and project alternative in table 23. The identified historic structures are listed by name in chapter 4, along with the determination of effects. Because the APEs for various alternatives intersect, some historic structures are represented more than once in table 23. Regarding National Register status, “listed” indicates that a historic structure is listed on the National Register, “eligible” indicates that either the historic structure has been formally determined to meet National Register requirements or the SHPO has issued an opinion that the historic structure meets at least one of the National Register eligibility criteria, and “undetermined” indicates that the historic structure has not been evaluated for listing on the National Register.

TABLE 23: SUMMARY OF IDENTIFIED HISTORIC STRUCTURES

National Register Status	Alternatives					
	1	2	2b	3	4	5
Listed/eligible	23	23	23	17	7	7
Undetermined	10	10	33	57	15	15
Total	33	33	72	74	22	22

CULTURAL LANDSCAPES

“In the analysis of cultural landscapes there is an application of the present state of the art understanding and definitions of the small and easily recognizably individual cultural landscapes that are found within the three park areas. However, DEWA, including the portion of APPA found within it and the MDSR together constitute a cultural landscape themselves.

The legislation creating DEWA allows the secretary great flexibility with the boundary recognizing that the effort is only begun and not finalized with the drawing of the legislated boundary. The parks are really 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 is built. You cannot separate the built environment from the natural environment in such a place. You can only encompass the whole within a larger cultural landscape as DEWA represents. All of the individual farms, villages, tribal sites retain their individual intrinsic importance, but as a whole they synergistically surpass the value of any one separately.

In fact, all national park units are to one extent or another are cultural landscapes. The most famous parks were designed by and represent a historical park planning style that is derived directly from the Olmstead Landscape firm and school of landscape architecture. The circular traffic patterns found in most parks with the defined areas of visitor attractions is a particular model that has been emulated in most every park in the United States. Parks like DEWA, APPA, Shenandoah, and the Blue Ridge Parkway follow a different but equally recognizable pattern. Encompassing a river valley and the surrounding mountains and gazed down upon by millions of visitors from APPA and hundreds of other trails, the Delaware River Valley is a living ecosystem and an iconic representation of the human environment.

It was the valley and its history and culture that the local citizens fought to preserve when they stopped the flooding of the valley by the Tocks Island Dam. 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 it be retained for those higher purposes and never allowed to be denigrated for inappropriate uses.

This single large cultural landscape made up of many individual cultural landscapes is the context that the analysis of impacts must be made against. Is it possible to retain that use and enjoyment for future generations with the proposed changes being requested? How many historic structures can be affected visually, how many individual cultural landscapes can be altered before the larger cultural landscape is significantly impacted or impaired. At what point does the cultural landscape lose the connection to the inhabitants from ten thousand years ago or simply a century ago. The context of cultural landscape is larger than simply the individual cultural landscapes analyzed.”

The proposed project includes the regular placement of new towers and intervening electrical transmission lines within identified alternative alignments. Because these features are large in scale and readily visible from great distances, they would have physical as well as visual effects on the larger cultural landscape of the Delaware Valley, the Delaware River, APPA, historic roads, and the property corridors that surround the roads and historic districts. Action alternatives will also affect the smaller component cultural landscapes that reflect the larger settlement patterns of the valley and are the setting for farmsteads, mining sites, campsites, and resorts and their associated historical features.

NPS staff determined an APE for cultural landscapes that is the same as that for historic structures.

DELAWARE WATER GAP NATIONAL RECREATION AREA

The Upper Delaware Valley, between the Delaware Water Gap and Port Jervis, New York, is located in a geomorphic zone known as the Appalachian Ridge and Valley Province. This zone runs in a northeast-to-southwest direction. The valley geology and geography determined communication networks, affected settlement patterns, and created scenic beauty. The Upper Delaware Valley contains cultural landscapes that reflect the American past. The valley still reflects the setting, feeling, and association of the earliest periods of habitation into the twenty-first century. The earliest known settlement of the area was in 8000 BCE by American Indians. European settlement in the seventeenth century to the twentieth century created impacts that changed the River Valley landscape; these established patterns remain substantially intact and are part of the ongoing process of landscape continuity and change. The overall cultural

landscape of DEWA is a combination of significant natural and cultural resources (NPS 1993b, 1996; JMA 2011).

Cultural landscapes can range from thousands of acres of rural tracts of land to small homesteads on less-than-one-acre lots. Cultural landscapes also include historic roads, trails, and river corridors and the associated properties on either side. Like historic buildings and districts, these special places reveal aspects of our country's origins and development through their forms and features and the ways they were used. Cultural landscapes are significant historic resources that reveal information about places that have been part of the everyday lives of successive generations of people (NPS 1996; JMA 2011).

For the purposes of planning and management of cultural resources, *Preservation Brief 36: Protecting Cultural Landscapes, Planning, Treatment and Management of Historic Landscapes* defines a cultural landscape as follows:

A geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values. (NPS 1994)

Overall, APPA has been determined eligible for listing on the National Register in its entirety and is listed in New Jersey both as a structure and as a cultural landscape. Recent discussions with the Pennsylvania SHPO have suggested that DEWA and MDSR should be evaluated as a singular cultural landscape based on their historical importance in defining the environmental movement in the United States and role in mobilizing people to oppose the damming of the Delaware River, as well as the push by the US Government in the 1960s to increase the availability and improve the quality of outdoor recreation for citizens and visitors (Safley pers. comm. 2011).

In addition to the parks as unified cultural landscapes, DEWA, MDSR, and APPA are complex in nature, possessing a number of interrelated historic landscape components and features that could be affected by the proposed transmission lines and corridors. The park units are the large cultural landscapes that form the context for the associated smaller component landscapes, which are best described as historic vernacular landscapes. *Preservation Brief 36* defines a vernacular landscape as follows:

A landscape that evolved through use by the people whose activities or occupancy shaped that landscape. Through social or cultural attitudes of an individual, family or a community, the landscape reflects the physical, biological and cultural character of those everyday lives. Function plays a significant role in vernacular landscapes. They can be a single property such as a farm or a collection of properties such as a district of historic farms along a road or a river valley. (NPS 1994)

The larger landscapes as well as the component historic properties and road corridors have been documented and evaluated as cultural landscapes and many are either currently in the National Register or found to be eligible for listing in the National Register for contributions to the broad patterns of American history. Numerous landscape resources and features that survive include waterways, landforms and topography, historic roads and road traces, vegetation and agricultural use patterns, outbuildings, farm support structures, houses, recreational features, camp structures, cemeteries, fence rows, and even some nonhistoric (not eligible for the National Register) buildings, structures, and landscape features.

In the 1987 GMP for DEWA, goals were identified for the preservation of cultural landscapes, including the Old Mine Road, APPA, and other historic component landscapes and sites. The GMP states:

Cultural landscapes will be retained by keeping vegetation and agricultural use patterns near historic structures. Outbuildings, farm support structures, and fence rows will be kept wherever possible to maintain farmsteads and existing landscape configurations. Proposed treatment levels for related structures will depend on their physical condition and the potential need of a structure for agricultural purposes or adaptive uses. Based on the contribution of all features, individual structures could either be kept, or recorded and removed, with their component pieces being used for salvage materials to restore other historic properties.

Many old but nonhistoric structures and features contribute to the cultural landscape of the Delaware Valley. The landscape as a whole, as well as the individual features, will be evaluated as part of the area's landscape management plan to determine whether it is eligible for nomination to the National Register as a rural historic district.

The Old Mine Road, Appalachian National Scenic Trail, and other historic component landscapes and sites will be used for interpretation of historic development and growth of the area, as well as for recreational purposes such as hiking and scenic driving. Any actions that will affect the road or trail and their respective corridors will have to meet requirements for preserving their historical and cultural integrity. (NPS 1987)

Subsequent to the GMP, other studies of historic resources including cultural landscapes were developed by NPS and include the *Preliminary Historic Resource Study* (NPS 1996) and the *Draft Rural Landscape Management Plan* (NPS 1993b). Both studies identified and described the cultural landscape resources under primary areas of historic significance and considered surviving landscape patterns as dominant features. From 1995 to 2005, the park completed comprehensive cultural landscape inventories to evaluate the historic significance and integrity of its 70,000-acre rural landscape (NPS 1995–2005). Preliminary integrity determinations were made, and the park's cultural landscape inventory team recognized that consistent and repeating land use patterns were intact throughout the entire valley and were undoubtedly highly significant cultural landscape characteristics.

Cultural landscapes identified in the APEs for this topic include sites identified in the 1987 GMP, the subsequent resource studies, and the cultural landscape inventory database for DEWA. Other sites were also identified by the parks and studied in the field because they may have become significant since the previous studies were written.

APPALACHIAN NATIONAL SCENIC TRAIL

All the action alternatives have the potential to affect APPA, which is eligible for the National Register. The entire corridor of the trail is considered for this topic as a cultural landscape, which is consistent with the NPS description of APPA in the DEWA GMP. The trail is listed as a culturally significant property within DEWA and is described in the GMP as follows:

Appalachian Trail, N.J. – Local: In addition to its scenic qualities, a 400-foot-wide corridor of the Appalachian National Scenic Trail in New Jersey has been determined historic because of its significance in conservation and outdoor recreation and its longstanding history as a natural area. Established between 1922 and 1937, the trail is usually a simple footpath extending nearly 2,100 miles from Maine to Georgia. (NPS 1987)

All the alternatives cross APPA, either within or outside DEWA boundaries.

Table 24 summarizes the identified resources within the APE for alternatives 1 through 5. The table also indicates whether the resource falls within multiple alternative APEs.

TABLE 24: IDENTIFIED CULTURAL LANDSCAPES WITHIN THE APE FOR ALL ALTERNATIVES

Tract ID	Cultural Landscape Resource	Date	Documentation	Alternatives					
				1	2	2b	3	4	5
615-1 615-2	Abraham Van Campen Farm	c. 1750	National Register as part of Old Mine Road Historic District and Conservation Landscape Initiative (CLI)	x	x	x	x		
	Appalachian Trail	1926, 1933	Eligible for the national register	x	x	x	x	x	x
	Arnott Fen and Hogback Ridge			x	x	x			
617-1	Benjamin B. Van Campen Farm	c. 1830	Part of Old Mine Road Historic District and CLI	x	x	x	x		
803	Blasi House			x	x	x	x		
8500 and 8552	Brodhead-Heller Farmstead	c. 1890	National register and CLI	x	x	x			
7456	Bushkill Dutch Reformed Church	1873	Eligible for national register and CLI	x	x	x	x		
7531	Bushkill School	1932	CLI	x	x	x	x		
	Gonzales Mill site	c. 1750	Eligible for national register	x	x	x	x		
7455	Peter's House and Garage	1746 altered in 1943	National register and CLI	x	x	x	x		
2729	St John's Catholic Church	c. 1955		x	x	x	x		
7502	Ralph G. Turn, Jr., Farmstead	1914		x	x	x	x		
2731	Raymond Steele Gulf Gas Station	1960	CLI	x	x	x	x		
613	Calno Schoolhouse	c. 1910	CLI	x	x	x	x		
3001	Camp Ken-Etiwa-Pec	1938	Some buildings eligible for national register and CLI	x	x	x			

Tract ID	Cultural Landscape Resource	Date	Documentation	Alternatives					
				1	2	2b	3	4	5
607	Camp Mohican	1926		x	x	x	x		
Paha-quarry Copper Mines Tract	Camp Pahaquarra	1925		x	x	x	x		x
205	Camp Weygadt	1921					x	x	x
6909-2	Chado Farmstead	c. 1932 c. 1910s–1920s	Eligible for national register and CLI	x	X	x			
2123	Cold Spring Farm Spring House	Late 1800s	National register and CLI	x	x	x	x		
603-1	Copper Mine Inn	c. 1792	National register as part of Old Mine Road Historic District	x	x	x	x		
7108	Cornelius Gunn Farmstead	c. 1814	National register and CLI	x	x	x			
121 (on Slateford Farm tract)	Emory Pipher Quarry	1820s–1843	Eligible for national register					x	x
7624-1	Decker Ferry House	c. 1800 1856–1882	National register as part of Old Mine Road Historic District and CLI	x	x	x	x		
	Dimmick's Ferry	1826–1937	Eligible for national register	x	x	x	x		
6528 and 6554	Flatbrookville Bridge	1884–1886		x	x	x	x		
2735	Fort Hynshaw	c. 1756–1757	Potentially eligible for National register	x	x	x	x		
8300 or 8315	George Nyce/J. Russell Eshback Farm	1780 house 1910–1920s dairy	National register	x	x	x			
2707-C	Grube Cemetery			x	x	x	x		

Tract ID	Cultural Landscape Resource	Date	Documentation	Alternatives					
				1	2	2b	3	4	5
	Haney's Mill site	c. 1860	Eligible for national register	x	x	x			
1900	Hidden Lake Lodge	1940 altered in c. 1965		x	x	x	x		
2148	Horace Van Auken House and Guest Cottages and Barn	1882 or 1868	Eligible for national register and CLI	x	x	x	x		
7111-1 7111-2 7150	Isacc Van Campen Inn	c. 1750	National register as part of Old Mine Road Historic District and CLI	x	x	x			
7144	Jacob Roe House	c. 1812	Eligible for national register and CLI	x	x	x			
2919	Jacob Shoemaker House	c. 1790s	National register and CLI	x	x	x	x		
1001-1	James Van Campen Farm	c. 1880	Property eligible for national register	x	x	x	x		
6907-1 6907-2	John P. House Farmstead	c. 1900	Eligible for national register	x	x	x			
1359	John Stark Michael Farm	c. 1875	National register	x	x	x	x	x	x
2122 2164	John Turn Farm	c. 1830s 1950s camp	National register and CLI	x	x	x	x		
105	Laurel Falls Schoolhouse	1850, 1866 Altered c. 1945	CLI				x	x	x
919	McManus House	1915	Eligible for national register	x	x	x	x	x	x
1506-C	Michael Cemetery	c. 1792–1860		x	x	x	x		
Millbrook Village									
	Abraham Van Campen III	c. 1800		x	x	x	x		
6500	E.L. Garriss House and Barn	c. 1852	National register as part of Old Mine Road Historic District	x	x	x	x		

Tract ID	Cultural Landscape Resource	Date	Documentation	Alternatives					
				1	2	2b	3	4	5
	Garris Mill site	1832–1922 Reconstructed 1994		x	x	x	x		
6504-1	G. Trauger House and Barn	c. 1860	National register as part of Old Mine Road Historic District	x	x	x	x		
821	Millbrook Schoolhouse	1840	National register as part of Old Mine Road Historic District	x	x	x	x		
6502-1	Sylvester Hill House	c. 1850–1960	National register as part of Old Mine Road Historic District	x	x	x	x		
614-1	Miller Farm	c. 1768	National register as part of Old Mine Road Historic District	x	x	x	x		
807	Minard-Hamilton Farmstead	c. 1870		x	x	x	x		
121 (on Slateford Farm tract)	Munch-Cyr Farm		Some buildings eligible for national register and CLI				x	x	x
6709-3	Myers Farmstead	Early 1900s Moved to site		x	x	x	x		
901 or 905	Newcomb House	1768 Altered 1840	Eligible for national register	x	x	x	x	x	x
121	New York and Delaware River Slate Company Quarry	1870–1873	Eligible for national register				x	x	x
7106	Oakley Stoll Farmstead	c. 1835, 1850		x	x	x			
1017-1 1017-2	Otto Nehland House	1950s	Potentially eligible for national register	x	x	x	x		
2130-C	Overfield Cemetery	c. 1798		x	x	x	x		

Tract ID	Cultural Landscape Resource	Date	Documentation	Alternatives					
				1	2	2b	3	4	5
	Owens Property (see Stone Springs Farm)			x	x	x	x		
605-1 605-2	Pahaquarry Copper Mines	c. 1756	National register as part of the Old Mine Road Historic District	x	x	x	x		
2155	Pennsylvania Subdistrict Office	1932–1935		x	x	x	x		
7101	Richard Layton Farmstead	1812	National register and CLI	x	x	x			
	River Road System (NJ)		National register (Old Mine Road) and CLI	x	x	x	x		
	River Road (PA) Shawnee to Decker's Ferry	1744 Altered 1838, 1912, 1934	Potentially eligible for national register	x	x	x	x	x	x
	Route 209 (Community Drive to Spackman's Creek)	1750s Altered 1920s and 1930s	Eligible for national register and CLI	x	x	x	x		
602-1	Sadie Van Campen Farm	1870 Altered 1930s		x	x	x	x		
6521-4	Salamovka	c. 1840–1880 Altered 1904 and c. 1930s	National register as part of Old Mine Road Historic District and CLI	x	x	x	x		
2700	Schoonover Farm (also called Schoonover Mountain House)	c. 1850–1860	National register as part of Old Mine Road Historic District and CLI	x	x	x	x		
	Slate House	1800						x	x
121	Slateford Farm	1800, 1833	National register as part of Old Mine Road Historic District and CLI				x	x	x

Tract ID	Cultural Landscape Resource	Date	Documentation	Alternatives					
				1	2	2b	3	4	5
	Smith-Rosenkrans House	1807, 1808	National register as part of Old Mine Road Historic District	x	x	x	x		
1353	Smithfield Beach	1955, 1957	Potentially eligible for national register	x	x	x	x	x	x
2130	Stone Spring Farm	c. 1840	Eligible for national register and CLI	x	x	x	x		
324	Totts Gap Farm	1820, 1835 Altered c. 1935, c. 1945	Eligible for national register and CLI				x	x	x
	Totts Gap Road	1737 or earlier	Eligible for national register				x	x	x
1357	Trieble-Rouch House site	1832 house demolished	Potentially eligible for national register	x	x	x	x	x	x
2704-C	Van Auken Cemetery			x	x	x	x		
	Van Buskirk Barn	1800						x	x
	Van Campen Sawmill site	c. 1793–1870s	Eligible for national register	x	x	x	x		
6750	Van Scouder-Knight	Early 1800s	National register as part of Old Mine Road Historic District	x	x	x	x		
1016-1	Watergate Complex	1955–1971	Potentially eligible for national register	x	x	x	x		
1502	Zion Lutheran Church	1851	National register and CLI	x	x	x	x		
204 205	Delaware Water Gap Slate Company Quarry and Building Sites Historic District	1870–1904	Eligible for national register				x	x	x
	Old Mine Road Historic District		National register	x	x	x	x		

Tract ID	Cultural Landscape Resource	Date	Documentation	Alternatives					
				1	2	2b	3	4	5
8203 8209 8223 8227	Walpack Center Historic District	1850	National register and CLI	x	x	x			

Notes:

CLI = Conservation Landscape Initiative

National register = National Register of Historic Places

ALTERNATIVE 1 (NO ACTION), ALTERNATIVE 2, AND ALTERNATIVE 2b

Alternative 1 is the no-action alternative and represents the existing transmission line corridor that alternatives 2 and 2b would follow. The corridor crosses APPA, River Road System New Jersey, River Road (Pennsylvania) Shawnee to Decker's Ferry, Route 209 (Community Drive to Spackman's Creek), the Delaware River, and Route 602. As early as 1966, NPS planners recognized that the existing line---as electrical transmission infrastructure within the park---was incompatible with development of the park for recreation and visitor experience and proposed removing it in the first DEWA Master Plan (NPS 1966).

Cultural landscapes located in the APE for the alignment of alternatives 2 and 2b could be affected by physical impacts and/or visual impacts. Physical impacts would be due to the location of the proposed alignment directly through or across cultural landscape corridors or parcels. Such cultural landscapes include APPA; the Old Mine Road Historic District; the River Road System, New Jersey; the River Road (Pennsylvania) Shawnee to Decker's Ferry; Route 209 (Community Drive to Spackman's Creek); the Watergate Complex; the Horace Van Auken parcel; the Schoonover Farm parcel; and the Otto Nehland House parcel. These sites would also be affected by the visual impact of the alternatives 2 and 2b transmission lines crossing the landscape corridor or the adjacent component landscape (JMA 2011). Although the alignment for alternative 2b would be the same as that for alternatives 1 and 2 and would therefore have the same APE and affect the same potential cultural resources, the additional towers needed for alternative 2b would be more intrusive to the cultural landscapes than the number proposed for alternative 2.

Alternatives 1, 2 and 2b Crossing the Old Mine Road (Documented in the River Road System, New Jersey Conservation Landscape Initiative)

The existing transmission line (alternative 1) and proposed alternatives 2 and 2b transmission line cross Old Mine Road at mile marker 11. This location of the road is included in the 26-mile section that is part of the Old Mine Road Historic District.



Alternatives 2 and 2b: Existing Transmission Line Crossing the Old Mine Road, Looking East and Looking West.

The transmission line clearing creates an abrupt opening where it crosses Old Mine Road. The corridor can be seen extending to the east and west, and towers are very visible.

Alternatives 1, 2 and 2b Crossing Community Drive and the Horace Van Auken Landscape

The existing transmission line (alternative 1) and proposed alternatives 2 and 2b transmission line also cross Route 209 (Community Drive) and passes through the Horace Van Auken component landscape. This alternative location constitutes both a physical and visual impact to the historic Community Drive corridor and the adjacent cultural landscape site.



Van Auken House on Community Drive.



Van Auken Barn on Community Drive.

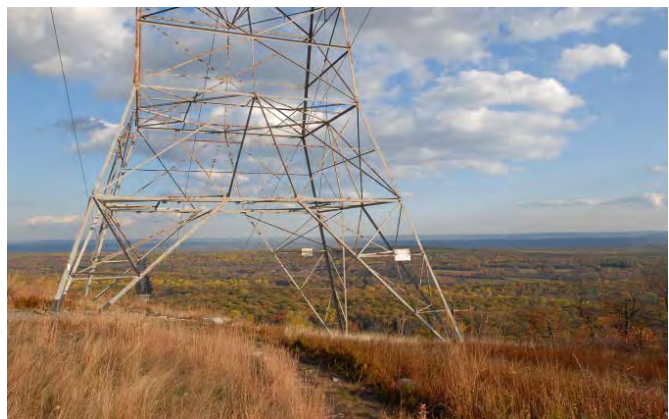


Arnott Fen at Community Drive.

Alternatives 1, 2, and 2b Crossing APPA

The existing transmission line (alternative 1) and proposed alignment for alternatives 2 and 2b cross APPA, creating both physical and visual effects for the trail and trail corridor.

The cultural landscapes located in the APE for the alignment with the potential for effects from visual impacts include: Abraham Van Campen Farm; Benjamin B. Van Campen Farm; Blasi House; Brodhead-Heller Farmstead; Bushkill Dutch Reformed Church; Bushkill School; Gonzales Mill site; Peter's House and Garage; St. John's Catholic Church; Ralph G. Turn, Jr., Farmstead; Raymond Steele Gulf Gas Station; Calno Schoolhouse; Camp Ken-Etiwa-Pec; Camp Mohican; Camp Pahaquarra; Chado Farmstead; Cold Spring Farm; Cornelius Gunn Farmstead; Decker Ferry House; Flatbrookville Bridge; Fort Hynshaw; George Nyce/J. Russell Eshback Farm; Grube Cemetery; Haney's Mill site; Hidden Lake Lodge; Horace Van Auken House and



Alternative 2 Transmission Lines and Corridor Crossing APPA.

Guest Cottages and Barn; Isacc Van Campen Inn; Jacob Roe House; Jacob Shoemaker House; James Van Campen Farm; John P. House Farmstead; John Turn Farm; Garriss Mill site; George Trauger House and Barn; Millbrook Schoolhouse; Sylvester Hill House; Miller Farm; Minard-Hamilton Farmstead; Myers Farmstead; Oakley Stoll Farmstead; Overfield Cemetery; Pennsylvania Subdistrict Office; Richard Layton Farmstead; Salamovka; Smith-Rosenkrans House; Stone Spring Farm; Van Auken Cemetery; Van Campen Saw Mill site; Van Scouder-Knight Farm; and the Walpack Center Historic District (JMA 2011).

Alternatives 2 and 2b Outside the Study Area to Susquehanna Substation

The alternative 2 alignment, which would also provide connection to alternatives 3 and 4, would traverse a substantially large section of Delaware State Forest lands in Pike County. The majority of the line's path through the county would go through state forest. Continuing west, the line would cross state game lands in Pike, Lackawanna, and Luzerne counties. The line would also cross a small section of a small state forest in Lackawanna County and would cross a state forest in Luzerne County. There are no documented cultural landscapes or landscapes determined to be potentially eligible for National Register recognition in these areas.

Alternatives 2 and 2b Outside the Study Area to Roseland Substation

The alternative 2 alignment, which would also provide connection to alternatives 3 and 4, would traverse the north end of a state park in Sussex County and some small game lands in Morris County, bypassing another state park and a natural area to the south. There are no documented cultural landscapes or landscapes determined to be potentially eligible for National Register recognition in these areas.

ALTERNATIVE 3

The alternative 3 alignment would follow an existing transmission line corridor that travels southwest from the Bushkill Substation and crosses the River Road System (New Jersey), River Road (Pennsylvania), the Delaware River, and Route 602 as it trends northeast to reconnect with the proposed alternative 2 route outside NPS boundaries.

Cultural landscapes that fall within the APE for the alternative 3 alignment can potentially be affected by physical impacts and/or visual impacts. Physical impacts would be due to the location of the proposed alignment directly through or across cultural landscape corridors or parcels. These cultural landscapes include APPA, the Old Mine Road Historic District, the River Road System (New Jersey), and the River Road (Pennsylvania) (JMA 2011).

Alternative 3 Crossing APPA

Cultural landscapes located within the APE for the alternative 3 alignment that have the potential for effects from visual impacts include Camp Mohican; Camp Pahaquarra; Cold Spring Farm; Copper Mine Inn; Dimmick's Ferry; Emory Pipher Quarry; Hidden Lake Lodge; John Stark Michael Farm; John Turn Farm; McManus House; Michael Cemetery; Pahaquarry Copper Mines; Sadie Van Campen Farm; Smithfield Beach; Trieble-Rouch House; and Zion Lutheran Church (JMA 2011).



Alternative 3 Alignment Crosses APPA, Creating both Physical and Visual Effects for the Trail and Trail Corridor.

Alternative 3 Outside the Study Area to Susquehanna Substation

The alternative 3 alignment would traverse a substantially large section of Delaware State Forest lands in Pike County. Continuing west, the line would cross state game lands in Pike, Lackawanna, and Luzerne counties. The line would also cross a small section of a small state forest in Lackawanna County and would cross a state forest in Luzerne County. There are no documented cultural landscapes or landscapes determined to be potentially eligible for National Register recognition in these areas.

Alternative 3 Outside the Study Area to Roseland Substation

The alternative 3 alignment would traverse the north end of a state park in Sussex County and some small game lands in Morris County, bypassing another state park and a natural area to the south. There are no documented cultural landscapes or landscapes determined to be potentially eligible for National Register recognition in these areas.

ALTERNATIVES 4 AND 5

The alignment for alternatives 4 and 5 would follow I-80 from the west to near the town of Delaware Water Gap. From here, it would head south and roughly follow the southern boundary of DEWA, returning to I-80 slightly east of the park's eastern boundary.

Cultural landscapes that fall within the APE for alternative 4 and 5 alignments could be affected by physical impacts and/or visual impacts. Physical impacts would be due to the location of the proposed alignment directly through or across cultural landscape corridors or parcels. These cultural landscapes include APPA and Totts Gap Road (JMA 2011).



Totts Gap Road.



Totts Gap Farm Adjacent to Totts Gap Road.

Alternatives 4 and 5 Crossing Totts Gap Road near Totts Gap Farm

The proposed transmission line for alternatives 4 and 5 would cross Totts Gap Road, creating both physical and visual effects on the historic road and adjacent landscapes.

The cultural landscapes located within the APE for the alternative 4 and 5 alignment that have the potential for effects from visual impacts include Camp Weygadt, John Stark Michael Farm, Laurel Falls Schoolhouse, Munch-Cyr Farm, Newcomb House, New York and Delaware River Slate Company Quarry, Slateford Farm, Totts Gap Farm, and Delaware Water Gap Slate Company Quarry and Building Sites Historic District (JMA 2011).

Alternatives 4 and 5 Outside the Study Area to Susquehanna Substation

The alternative 4 alignment in this area would be the same as alternative 2. The alternative 5 alignment would follow the I-80 ROW, which bypasses a state game area in Monroe County and passes through some game lands in Carbon and Luzerne counties. There are no documented cultural landscapes or landscapes determined to be potentially eligible for National Register recognition in these areas.

Alternatives 4 and 5 Outside the Study Area to Roseland Substation

The alternative 4 alignment outside the study area would be the same as alternative 2. The alternative 5 alignment would follow the I-80 ROW. There are no documented cultural landscapes or landscapes determined to be potentially eligible for National Register recognition in these areas.

Outside the Study Area

From the study area to the Susquehanna Substation, the S-R Line could pass through Carbon, Lackawanna, Luzerne, Monroe, Northampton, Pike, and Wayne counties in Pennsylvania. Outside the study area to Roseland Substation, the S-R Line would traverse Sussex, Warren, and Morris counties on its route from the study area to the Roseland Substation in New Jersey; these counties contain 20, 10, and 4 rare and unique communities, respectively. The NJNHP has identified these communities as ranging from rare or vulnerable to critically imperiled for the state of New Jersey, and many are ranked as very rare globally (NJDEP 2008b, 2008c, 2008d). NJDEP has identified critically important habitat or natural heritage priority sites in Sussex, Warren, and Morris counties. There are 80 natural heritage priority sites in Sussex County, 39 in Warren County, and 22 in Morris County (NJDEP 2007). The outstanding natural features are presented in appendix G. In addition, there are eight preserves owned by TNC that could be

encountered in Sussex, Warren, and Morris counties in New Jersey, which are presented in appendix G-8 (TNC 2010).

Depending on the route chosen, the transmission line could encounter one or more of these rare or unique communities, TNC preserves, or natural heritage site communities outside the study area in Pennsylvania and New Jersey.

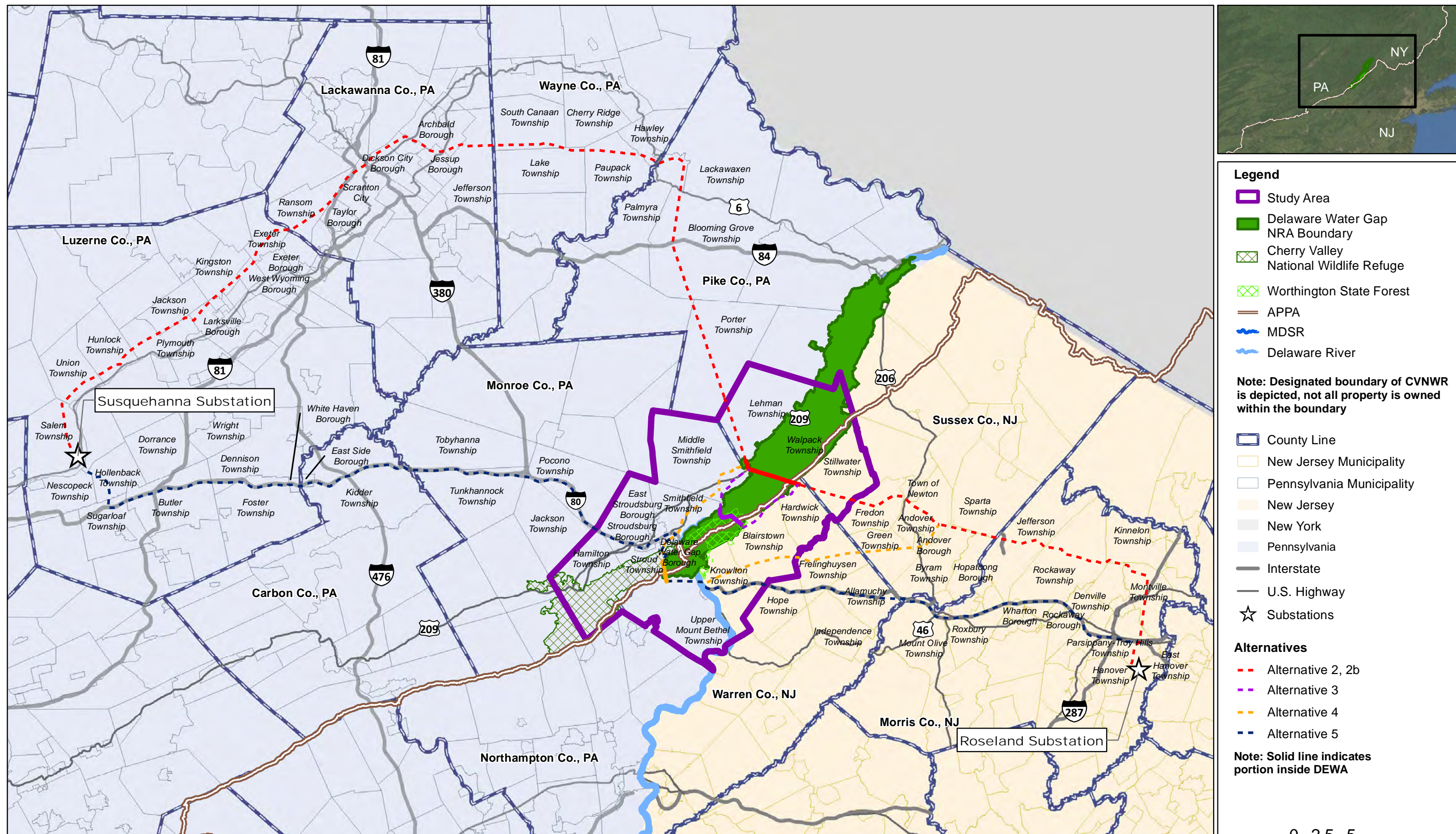
Outside the study area, the proposed S-R Line could pass through Carbon, Lackawanna, Luzerne, Monroe, Pike, Northampton, and Wayne counties in Pennsylvania and Warren, Sussex, and Morris counties in New Jersey. The special-status plant species that have been listed by consulting agencies as having the potential to be present within the proposed alternative alignments could be present in these counties if the appropriate habitat exists. In addition, any of the species listed in table 20 could be found in these counties, provided the proper habitat exists.

SOCIOECONOMICS

The proposed alternatives could affect local economies through changes in visitation and associated visitor spending. The alternatives could also affect where people live, which could have socioeconomic impacts. Because socioeconomics primarily pertains to effects outside NPS boundaries, the study area for socioeconomics includes landowners with inholdings within DEWA, and the counties and townships immediately adjacent to the proposed alternatives that intersect DEWA and the Cherry Valley NWR. Pennsylvania counties in the study area include Pike, Monroe, and Northampton. New Jersey counties include Sussex and Warren. Figure 47 shows counties and townships intersected by each alternative alignment inside and outside the study area. Because the NPS cannot dictate the route the transmission line would follow outside the study area, the socioeconomic conditions of those counties and townships are only briefly discussed in this chapter. The most recent and comprehensive statistical data were used to describe the affected environment, including data from the 2000 and 2010 decennial census, census population estimates between 2005 and 2009, and local agency planning documents.

Figure 48 provides an overview of visitor trends and expenditures at DEWA from 2005-2009, which affects local socioeconomics. Although visitation did not substantially change during that time period, visitor spending decreased, as did NPS jobs (including contractors) and local jobs supported by non-local spending. The latter decreased by more than half. These trends likely reflect national economic trends that occurred toward the end of the time period, so other economic factors may have contributed to the declines.

Based on a river users survey completed in summer 2010, 97% of DEWA visitors are from the United States, with the largest groups coming from New Jersey (40%), Pennsylvania (31%), and New York (19%). The average visitor group spent a total of \$287. Inside DEWA, the average expenditure was \$29 per person per trip. The total trip expenditures inside DEWA were primarily spent on water recreation equipment rental (48%) and camping fees (13%). Outside DEWA, the average expenditure was \$94 per person per trip. The expenditures outside DEWA were primarily spent on water recreation equipment rental (28%), lodging (22%), and groceries and take-out food (15%) (Blotkamp et al. 2010, 5, 73, 75, 79).



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

Figure 47
Socioeconomics Area of Effect

Sources: NPS 2010, EA Engineering 2010,
DEWA 2008, ESRI 2002, ESRI 2010,
NJOIT - OGIS 2008, PASDA 2010,

Projection: NAD83 UTM Zone 18N
Date: October 2011





Source: Headwaters Economics 2011.

FIGURE 48: DEWA VISITATION TRENDS AND EXPENDITURES 2005–2009

Hunting is allowed in most parts of DEWA. Average daily expenditures (in 1989 dollars) were \$31 by New Jersey hunters and \$28 by Pennsylvania hunters. Total hunting expenditures for 1987/1988 were \$1.4 million (Penn State 1989, 40). Nearly 75% of these expenditures were from the big game seasons, and 25% from various small game seasons. Approximately 20% of expenditures occurred in transit to the park or near the park (Penn State 1989, 44). Less than 20% of hunters were from the five-county region immediately adjacent to the park (Penn State 1989, 42). Urban and suburban counties surrounding Newark, Philadelphia, Allentown, and Bethlehem contributed nearly 70% of hunting use. Hunters averaged 10 years of hunting experience in the park and held a very positive attitude toward park resources (Penn State 1989, 58). Hunting is described in more detail in the “Visitor Use and Experience” section.

Several commercial outfitters provide recreational services to the public, making use of DEWA and/or APPA. DEWA also hosts summer camps and several well-known special events that are supported by local businesses. There are currently 23 businesses with commercial use authorizations to provide recreational services within DEWA. Those businesses offer canoe, kayak, and raft trips on the Delaware River, rock-climbing and backpacking workshops, tours (such as the Water Gap Trolley), camping trips, retreats, bike rental, and fly-fishing. Over half of these businesses consider DEWA a primary destination for their services and are largely dependent on DEWA-related tourism to sustain their businesses (NPS 2011d). Thirteen canoe liveries (river outfitters) provide services within DEWA, as shown in table 25.

Not all lands within DEWA are owned exclusively by the NPS or used for recreational or park management purposes. The park currently permits 3,000 acres to local farmers for agriculture (NPS

2003a, 25). Some of these croplands are below the existing transmission lines described under the proposed alternatives. Land under private ownership, or “inholdings,” also exist in DEWA. A restaurant (Walpack Inn), farms, campgrounds, and seasonal and year-round single-family residences are all represented within the developed, privately owned land remaining in DEWA.

TABLE 25: CANOE LIVERIES THAT PROVIDE SERVICES WITHIN DEWA

Business Name	Offers Service Within DEWA Boundary	Offers Service Outside DEWA Boundary	Proximity to DEWA Boundary
Pennsylvania			
Adventure Sports Canoe and Raft Trips	X		South end
Chamberlain's Canoes	X	X	South end
Delaware River Country	X		South end
Dingman's Campground (Concession)	X		North end
Indian Head Canoes and Rafts	X	X	North end
Jerry's Three River Campground/Canoes	X	X	North end
Kayaks East	X	X	South end
Kittatinny Canoes and Campgrounds	X		North end
Pack Shack Adventures	X		South end
Pack 'n' Paddle Tours	X		South end
Shawnee River Trips	X		South end
Silver Canoe Rentals	X	X	North end
New Jersey			
Delaware River Rafting & Canoeing	X	X	South end

Source: Meis pers. comm. 2010.

INSIDE THE STUDY AREA

Counties crossed by each alternative are identified in table 26.

TABLE 26: ALTERNATIVES CROSSING COUNTIES WITHIN THE STUDY AREA

	Alternative			
	2, 2b	3	4	5
Pennsylvania				
Pike County	X	X	X	
Monroe County	X	X	X	X
Northampton County			X	X
New Jersey				
Sussex County	X	X		
Warren County	X	X	X	X

Many Pennsylvania counties have experienced negative growth or no growth in recent years. However, this is not the case for counties bordering the Delaware River. In the cases of Pike and Monroe counties, growth due to migration from New Jersey and New York has been extraordinary over the past 25 years (Lehigh Valley Planning Commission 2005, 6; NPS 2005c). This is demonstrated in decennial census data, which show a 15% decline in population in Newark and a 15% increase in the New York City population since 1980, as compared to substantial population growth in Pike and Monroe counties (see table 27). In the 1970s, a wave of development began moving westward into the Poconos along I-80 (NPS 2003c), resulting in an urban-to-rural migration trend that has profoundly affected the study area (NPS 2003a). Many vacation and seasonal homes in the area were converted to year-round residences, and permanent residential and commercial developments expanded rapidly (NPS 1991a). Strip malls, fast food restaurants, and other similar development to meet the shopping and social needs of both residents and visitors also resulted, concentrated along the major roads and interchanges associated with I-80 and other major routes (NPS 2003a).

TABLE 27: POPULATION GROWTH FOR COUNTIES WITHIN THE STUDY AREA

	Total Population			% Change	
	1990	2000	2010	1990–2000	2000–2010
Pennsylvania	11,881,643	12,281,071	12,702,379	3%	3%
Pike County	27,966	46,303	57,369	66%	24%
Monroe County	95,709	138,690	169,842	45%	23%
Northampton County	247,105	267,077	297,735	8%	12%
New Jersey	7,730,188	8,414,378	8,791,894	9%	5%
Sussex County	130,943	144,165	149,265	10%	4%
Warren County	91,607	102,438	108,692	12%	6%

Source: U.S. Census Bureau 1990, 2011.

Development impacts were first felt in Monroe County and later in Pike County, and resulted in growth trends that rapidly changed the region's rural character. Monroe and Pike counties in Pennsylvania and Sussex County in New Jersey are the fastest growing commuter counties in their respective states. Approximately 60% of residents in these areas travel to work in the New York metropolitan area (NPS 2003a). The resident population in communities surrounding DEWA is expected to continue to increase by as much as 50% by 2030 (NPS 2003a; 2009h, 8). Socioeconomic indicators for each county within the study area are discussed in more detail below.

Pennsylvania: Pike County

Inside the study area, Pike County is the fastest growing area in Pennsylvania, growing 66% between 1990 and 2000 and 24% between 2000 and 2010 (see table 27) (U.S. Census Bureau 2011). This positive growth trend is expected to continue until 2030 (Pike County 2006, 2-8).

Pike County's leading industry is tourism, "the basis of which directly relates to the county's scenic rural character and natural resources," and the county has identified a goal to "retain tourism as a major component of economic development" (Pike County 2006). According to Pike County's most recent comprehensive plan, the tourism, real estate, and construction industries rely heavily on the continued attractiveness of the county. "Without the continuing healthy ecotourism industry growth, the social dynamics and attractiveness of the county would likely change dramatically" (Pike County 2006, 17-7–17-8). The unemployment rate in the county fluctuates seasonally due to the substantial number of workers dependent on the recreation/tourism industry (Pike County 2006, 17-1). Between 2007 and 2011,

unemployment rates in Pike County peaked each year in February, increasing each year from 6.7% in 2007 to 12.1% in 2011 (BLS 2011). Over 20% of employment in Pike County is generated by the tourism industries (arts, entertainment, and recreation and accommodation and food services) (Pennsylvania Department of Labor & Industry 2011). Although the county's economy still relies on the tourism and service industries, more retail and service establishments are becoming year-round businesses instead of seasonal businesses serving just the tourist trade (Pike County 2006, 13-9).

Farming in Pike County contributes to the local economy and plays a significant role in the scenic rural character of local communities. However, Pike County's agricultural community has been faced with impediments to its continued operation. The rising costs of farm operation, steadily increasing real estate taxes, and the continued pressure from development create hurdles for small farmers (Pike County n.d.). However, Pike County experienced a substantial increase in farmland between 2002 and 2007 (173%), whereas adjacent counties (Wayne and Monroe) experienced losses between 10% and 20% (USDA 2007).

Income levels in Pike County increased substantially from \$44,608 in 1999 to \$59,369 in 2009 (see table 28) (U.S. Census Bureau 2011). Median income levels in Lehman Township, the only township in the study area, are on a par with county levels at \$59,295 (U.S. Census Bureau n.d.). The percentage of the population living in poverty in Pike County (8%) is lower than the statewide average (13%), while current unemployment rates are slightly higher, at 10% compared to the statewide rate of 9%.

TABLE 28: ECONOMIC DATA FOR COUNTIES WITHIN THE STUDY AREA

	Unemployment Rate (2010)	Median Household Income (2009)	People Below Poverty Level (2009)
Pennsylvania	9%	\$49,501	13%
Pike County	10%	\$59,369	8%
Monroe County	10%	\$54,703	10%
Northampton County	9%	\$57,999	9%
New Jersey	10%	\$68,444	9%
Sussex County	9%	\$80,155	5%
Warren County	9%	\$70,092	7%

Source: U.S. Census Bureau 2011; BLS 2011.

Pennsylvania: Monroe County

Monroe County is one of the fastest growing areas in Pennsylvania, growing 45% from 1990 to 2000 and 23% from 2000 to 2010 (see table 27). This growth is expected to continue, reaching 31% to 54%—the same as Pike and Warren counties. The main growth driver in Monroe County is the expansion of the New York/Newark metropolitan regions east of the Delaware River (Monroe County 1999, 11). Development typically follows major highways, and development in Monroe County has concentrated at interchanges and along parallel arterial corridors (Monroe County 1999, 11). Population density is high along I-80 from East Stroudsburg to approximately 10 miles west. The communities along I-80, including Stroudsburg and East Stroudsburg, where population density is highest in this county, would be intersected by the alternative 5 alignment.

The median household income in Monroe County is \$54,703, the lowest in the study area. Other economic data shown in table 28 indicate that county statistics are consistent with statewide statistics, with a slightly lower proportion of the population below the poverty level and a slightly higher unemployment rate (U.S. Census Bureau 2011).

A substantial portion of Monroe County's history and prosperity concerns recreation. In the twentieth century, the resort industry and recreation became Monroe County's main sources of income. Monroe County has the third largest tourist economy in Pennsylvania and supports the third largest labor force in tourist-related expenditures. Total tourist expenditures in Monroe County are three to seven times higher than the other Pocono counties of Pike, Wayne, and Carbon, making these expenditures a major component of Monroe's economic base. A substantial percentage of revenue in Monroe County is generated by tourism. The New York and Philadelphia regions are the primary sources of visitors to the county, including DEWA (Monroe County 1999, 52). The role of the tourism industry is reflected in recent employment statistics, which indicate that the largest employment sectors in the county are retail trade and accommodation and food services, representing nearly 30% of total county employment (Pennsylvania Department of Labor & Industry 2011).

In 2009, only 85 people (of 56,527 total) in Monroe County were employed in the agriculture, forestry, and fishing industry (Pennsylvania Department of Labor & Industry 2011). Monroe County has a goal to "protect and promote continued productive agricultural use on viable agricultural lands" (Monroe County 1999, 63). Much of the county's growth and development has occurred on prime agricultural soils that were once farmland. Beginning with the vacation home rush of the 1960s and 1970s and continuing to the present influx of permanent residents, productive farmland has been reduced each year. This reduction of farmland corresponds directly to the increase in residential development in the county. Rising costs of farm operation, fluctuating market prices and demand, steadily increasing property taxes, and continued pressure from development are anticipated in the next decade (Monroe County 2004, 2–3). This is reflected in recent agricultural statistics, which indicate that the amount of land dedicated to agricultural production in the county decreased by 11% between 2002 and 2007 (USDA 2007).

Pennsylvania: Northampton County

Northampton County, located in the Lehigh Valley, is the most highly and densely populated county in the study area, with close to 800 people per square mile constituting the county's nearly 300,000 residents (see table 27) (U.S. Census Bureau 2011). Northampton County experienced the lowest population growth in the study area between 1990 and 2000 (8%), with growth rates increasing to 12% between 2000 and 2010. The county is expected to grow more than 30% between 2000 and 2030 (Lehigh Valley Planning Commission 2005, 47). The alignments for alternatives 4 and 5 only intersect one rural township, Upper Mount Bethel, in the northern portion of the county near DEWA and Cherry Valley NWR.

Tourism does not currently appear to play a measurable role in the county's economy, and the presence of DEWA is not identified by the county as a contributor. Tourism revenue is 5% to 7% for Northampton County. However, the county has a goal of promoting tourism activities "that relate to the unique physical, historic, and cultural features of the Lehigh Valley" (Lehigh Valley Planning Commission 2005, 56).

The Lehigh Valley is a metropolitan region consisting of Lehigh, Northampton, and Carbon counties in eastern Pennsylvania. The area has been changing from a predominantly agricultural area to a predominantly urban area. In 1975, 67% of the area was agriculture and vacant land. This percentage is expected to drop to about 45% by 2030. Agricultural and vacant land in Lehigh Valley's rural areas is being developed for housing, business, and industry at an average rate of 3.0 square miles per year. This rate has been increasing each decade since the 1970s (Lehigh Valley Planning Commission 2005, 9). Expanses of farmland still exist in northeastern Northampton County in Upper Mount Bethel, yet farmland is disappearing rapidly. The amount of land dedicated to agricultural production in the county decreased by 12% between 2002 and 2007 (USDA 2007). Like the other counties in the study area, Northampton County has a goal to protect farmland and to promote farming as an economic activity.

There are sizable areas in Upper Mount Bethel where the county believes farming should remain the primary land use (Lehigh Valley Planning Commission 2005, 30).

Overall income levels have shown slow growth as high-paying manufacturing jobs were replaced by lower-paying jobs in services and trade. Despite the loss of 44% of the region's manufacturing jobs from 1970 to 2000, manufacturing remains the second highest employment industry in the county, representing 13% of total employment (Lehigh Valley Planning Commission 2005, 54; Pennsylvania Department of Labor & Industry 2011). The median household income for Northampton County was \$57,999 in 2009 (see table 28). Income levels in Upper Mount Bethel have stayed on a par with county levels, at \$58,972 in 2009 (U.S. Census Bureau n.d.).

New Jersey: Warren County

Warren County in New Jersey has experienced moderate population growth since 1990, increasing by 12% between 1990 and 2000 and 6% between 2000 and 2010 (see table 27). Like the Pennsylvania counties, Warren County's geographic location and proximity to key employment centers are contributing factors to growth. The most development continues to be in the southern part of the county near I-78, outside the study area. New developments in Warren County are often close to existing communities and accessible to highways, schools, and shopping. The northern part of the county, which is crossed by I-80, primarily consists of large sites with custom-built homes (Warren County Planning Board 2005, 19).

Although no tourism revenue data are available for Warren County, the county employs the smallest percentage of people in the sales and service industry in the study area. According to the Warren County Department of Economic Development and Tourism, there is little support for large-scale tourism, such as hotels and overnight tourism. The *Warren County Strategic Growth Plan* concluded that tourism has little potential of generating family wage jobs and increasing the county's tax base. A recent analysis of the New Jersey State tourism industry determined that tourism in Warren County accounts for approximately 5,000 jobs and has a total payroll of \$84.8 million, which represents an average of \$16,960 per job. The majority of tourist dollars are spent in restaurants and retail businesses (Warren County Planning Board 2005, 41).

Approximately 33% (74,975 acres) of Warren County's total land area is in farms; this area decreased by 4% between 2002 and 2007 (USDA 2007). However, less than 1% of total employment in Warren County is in the agricultural and natural resource industries (New Jersey Department of Labor and Workforce Development 2011). While agriculture was once the largest industry in the county, increased highway construction and population movement out of urban areas and into rural areas has diminished its role. Despite a recent loss in farmlands, Warren County ranks first among New Jersey counties for sales of dairy products and poultry and eggs, and ranks first for the number of many types of livestock (USDA 2007). The county has identified goals to support and preserve agricultural lands, and a substantial number of farms and acreage is preserved or identified for future acquisition (Warren County Planning Board 2005, 39–41).

Residents in Warren County are more affluent than the Pennsylvania counties discussed above, particularly along the alternative 1, 2, and 2b alignment. The county's median household income is \$70,092, the second highest income in the study area (U.S. Census Bureau 2011). Poverty levels are also below the statewide average, with 7% of the county population living below poverty as compared to 9% statewide. The median household income in Hardwick Township, the township nearest to DEWA, is estimated at \$89,000 (U.S. Census Bureau n.d.).

New Jersey: Sussex County

Sussex County's growth rate was highest from 1960 to 1970 at 57.4%, and the greatest increase in population occurred from 1970 to 1980, with 38,537 new residents. For each decade from 1980 to 2000, the population increased by about 14,000 (Sussex County n.d., 101). From 2000 to 2010, the county grew by 4%, the slowest growth rate within the study area (see table 27). Sussex County provides easy access to highways and employment opportunities outside the county; over 60% of the county workforce travels outside the county for employment (Sussex County n.d., 113). According to a national study that compared growth rates among counties, Sussex County is a "Metropolitan Growth County," one of 124 U.S. counties that experienced growth rates of at least 10% each decade since 1950. These growth counties have developed at low densities of single-family homes where commutes are long; they are a typical "bedroom community." Lands identified as "developable" generally lie in the central Sussex County municipalities, which include Stillwater Township (Sussex County n.d., 101–102). Despite continued county growth, municipalities such as Stillwater Township have not experienced this same growth pattern. Stillwater Township experienced a slight decrease in population between 1990 and 2010 (U.S. Census Bureau 2011, 1990).

Recreation and tourism are considered the backbone of Sussex County's economy. However, the county's *Strategic Growth Plan* notes that "What is often thought to be the backbone of our county's economy employs only 4,298 people in our county, including Arts, Entertainment, Recreation, Accommodation, and Food Services." Approximately 7% to 11% of the county's revenue is from tourism. Although the number of people employed in the tourism industry has grown, wages associated with these jobs have prevented the tourism sector from becoming the foundation of the county's economy (Sussex County n.d., 145). Tourism wage rates in the area for museums, parks, and historical sites range from \$268 per week in the private sector to \$1,166 per week in the public sector; wage rates in the traveler accommodation industry and RV parks and recreational camps average \$378 per week (New Jersey Department of Labor and Workforce Development 2011).

Sussex County was one of the last counties established in northern New Jersey and has large stretches of undeveloped land, giving the county its rural character. Between 1959 and 1997, 68,222 acres of Sussex County farmland ceased to be used for agriculture production, representing a loss of 1,795 acres per year. The rate between 1992 and 1997 decreased to an average of 506 acres lost per year, increasing to a loss of 1,709 acres per year between 2002 and 2007 (USDA 2007). Currently less than 1% of the county's population is employed in the agricultural and natural resources industry (New Jersey Department of Labor and Workforce Development 2011). Like Pike and Monroe counties in Pennsylvania, Sussex County has a goal to preserve its farmland. Similar to Warren County, Sussex County is developing and actively promoting agritourism to help sustain farming operations (Sussex County n.d., 231–232).

Sussex County is one of the wealthier counties in New Jersey. The county currently has the highest median household income in the study area, at \$80,155. Sussex County also has the lowest proportion of people in the study area living below poverty, at 5% (see table 28) (U.S. Census Bureau 2011). The median household income for Walpack and Stillwater townships, the townships closest to DEWA, is estimated at \$105,625 and \$81,926, respectively; however, the population of Walpack Township is less than 25 because it lies within DEWA, which may account for the higher-than-average income levels (U.S. Census Bureau n.d.).

OUTSIDE THE STUDY AREA

Outside the study area in Pennsylvania, the S-R Line could travel through Wayne, Lackawanna, Luzerne, and Carbon counties en route to the Susquehanna Substation. Pertinent socioeconomic data for these counties is provided in table 29. Wayne and Carbon counties have experienced substantial growth, each

increasing 11% from 2000 to 2010, compared to 3.4% for Pennsylvania overall. Lackawanna and Luzerne counties experienced almost no growth from 2000 to 2010, increasing by only 0.5%. Wayne and Carbon counties are more rural, with relatively small populations and low population density. Lackawanna and Luzerne counties are more densely populated, with more people per square mile than the statewide average. The median household income of all four Pennsylvania counties is lower than the statewide average of \$49,501 in 2009. The median household income for Luzerne County is the lowest of all counties along the S-R Line inside and outside the study area at \$39,984 (U.S. Census Bureau 2011).

TABLE 29: SOCIOECONOMIC DATA FOR COUNTIES OUTSIDE THE STUDY AREA

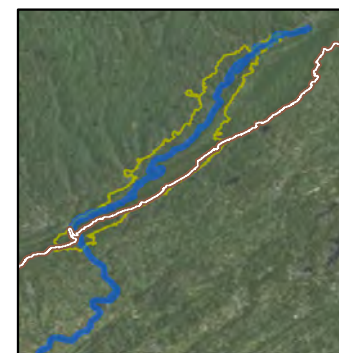
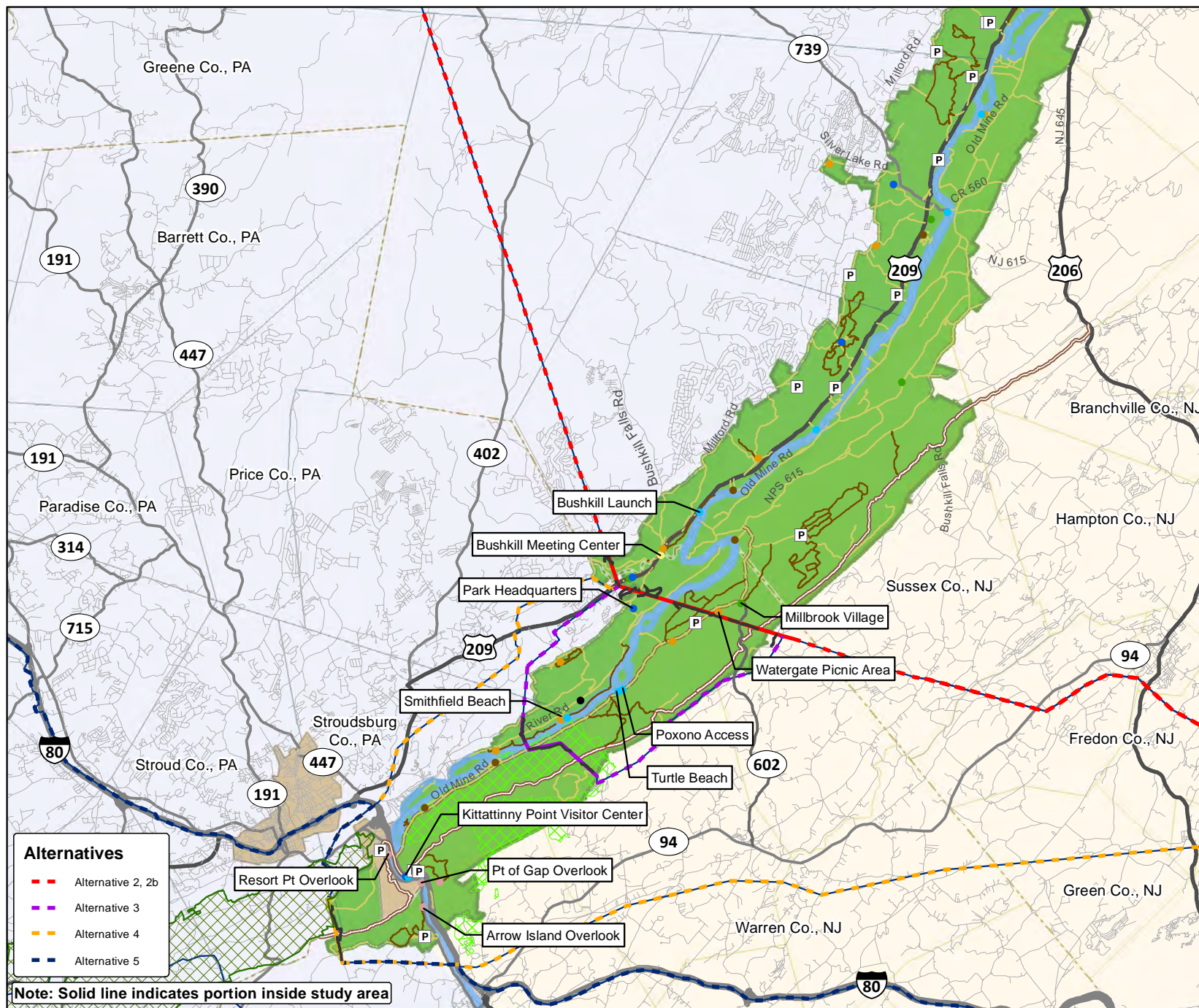
	Population (2010)	Population Density (2010)	Median Household Income (2009)
Pennsylvania	12,702,379	283	\$49,501
Wayne County	52,822	72	\$46,036
Lackawanna County	214,437	467	\$43,715
Luzerne County	320,918	360	\$39,984
Carbon County	65,249	171	\$44,945
New Jersey	8,791,894	1,185	\$68,444
Morris County	492,276	1,049	\$96,300

Outside the study area in New Jersey the proposed alternatives could cross Morris County. Morris County's population increased 4.7% from 2000 to 2010. The county is densely populated, with 1,049 people per square mile, but that number is below the statewide density of 1,185. Median household income in Morris County was the highest of all counties inside and outside the study area along the S-R Line, at \$96,300 (U.S. Census Bureau 2011). Some municipalities outside the study area, such as the Sandyston Township, have been promoting ecotourism based upon their proximity to DEWA and APPA.

INFRASTRUCTURE, ACCESS, AND CIRCULATION

This section summarizes characteristics of the existing transportation infrastructure, access, and circulation in the study area. Construction activities associated with transmission lines would require transporting large pieces of equipment, such as towers and the cranes needed to erect them, as well as construction personnel. Roads in the study area are shown in figures 49 through 52. Ongoing transmission line maintenance would require similar activities, but to a much lesser or more infrequent extent. These activities could affect existing transportation infrastructure and services, particularly roads, and how visitors, NPS personnel, and local residents and business commerce/freight providers access and interface with their desired destinations and circulate through the area.

The study area for this topic includes the areas within the parks, with focus on routes that provide direct access to the vicinity of existing and potential transmission line right-of-way and utility access roads. Outside the study area, routes that serve supplementary connections to these primary routes were identified for analysis.



Legend

- DEWA Boundary
- Cherry Valley NWR
- WSF
- APPA
- MDSR
- Delaware River

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

Visitor Attractions

- Airpark
- Campground
- Information
- Meeting Hall
- Picnic Area
- Point of Interest
- Ranger Station
- River Access

- County Boundary
 - New Jersey
 - Pennsylvania
 - New Jersey Municipality
 - Pennsylvania Municipality
 - Interstate
 - U.S. Highway
 - State Highway
 - Local Road
 - Community Road
 - Access Road
- 0 2 Miles

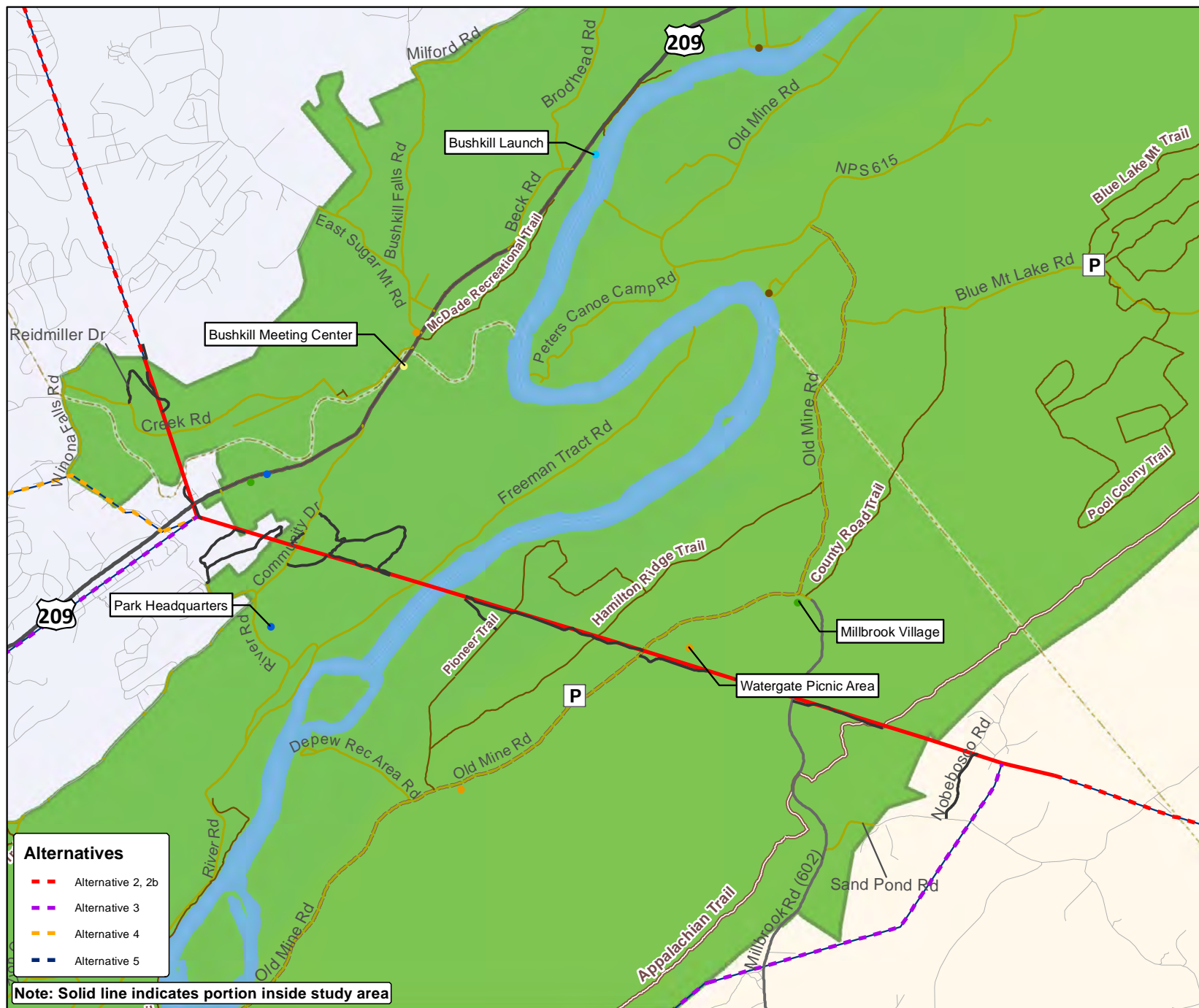


Susquehanna to Roseland
Transmission Line Proposal
and
Right-of-Way Request EIS

Figure 49
Roadways and Project Vicinity

Sources: NPS 2010, EA Engineering 2010
DEWA 2008, NJOIT - OGIS 2008, PASDA 2010,
USGS 2006, NJ DEP 2008, Penn State 2010,
ESRI ArcGISOnline Map Service 2010,
Projection: NAD83 UTM Zone 18N
Date: October 2011





- Legend**
- DEWA Boundary
 - Cherry Valley NWR
 - WSF
 - APPA
 - MDSR
 - Delaware River

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

Visitor Attractions

- Airpark
- Campground
- Information
- Meeting Hall
- Picnic Area
- Point of Interest
- Ranger Station
- River Access

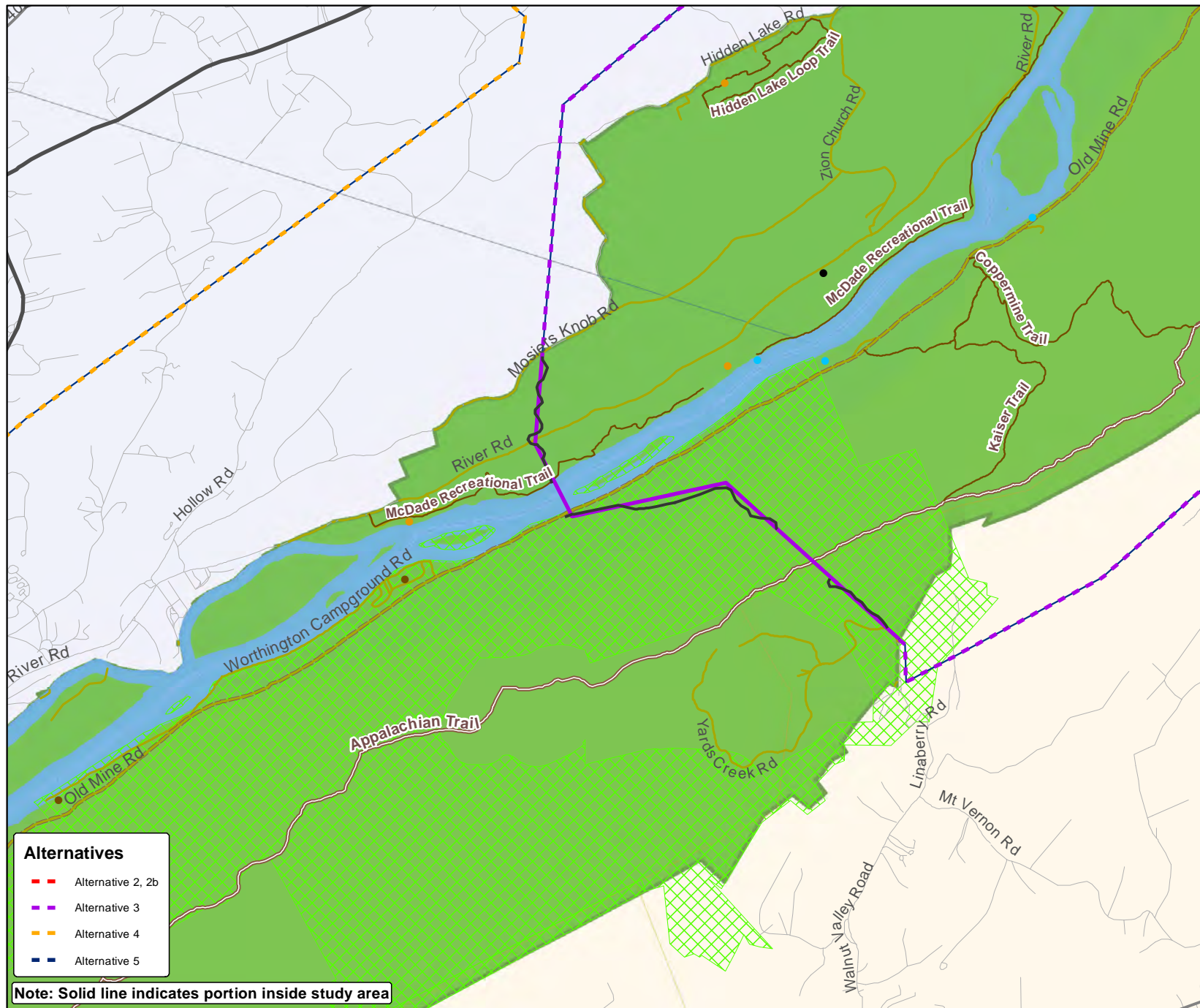
- County Boundary
- New Jersey
- Pennsylvania
- New Jersey Municipality
- Pennsylvania Municipality
- Interstate
- U.S. Highway
- State Highway
- Local Road
- Community Road
- Access Road

Figure 50
Alternative 2 Roadways

Sources: NPS 2010, EA Engineering 2010
DEWA 2008, NJOIT - OGIS 2008, PASDA 2010,
USGS 2006, NJ DEP 2008, Penn State 2010,
ESRI ArcGISOnline Map Service 2010,
Projection: NAD83 UTM Zone 18N
Date: October 2011



0 1
Miles



- Legend**
- DEWA Boundary
 - Cherry Valley NWR
 - WSF
 - APPA
 - MDSR
 - Delaware River

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

Visitor Attractions

- Airport
- Campground
- Information
- Meeting Hall
- Picnic Area
- Point of Interest
- Ranger Station
- River Access

- County Boundary
- New Jersey
- Pennsylvania
- New Jersey Municipality
- Pennsylvania Municipality
- Interstate
- U.S. Highway
- State Highway
- Local Road
- Community Road
- Access Road

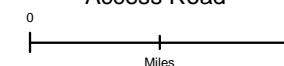
Alternatives

- Alternative 2, 2b
- Alternative 3
- Alternative 4
- Alternative 5

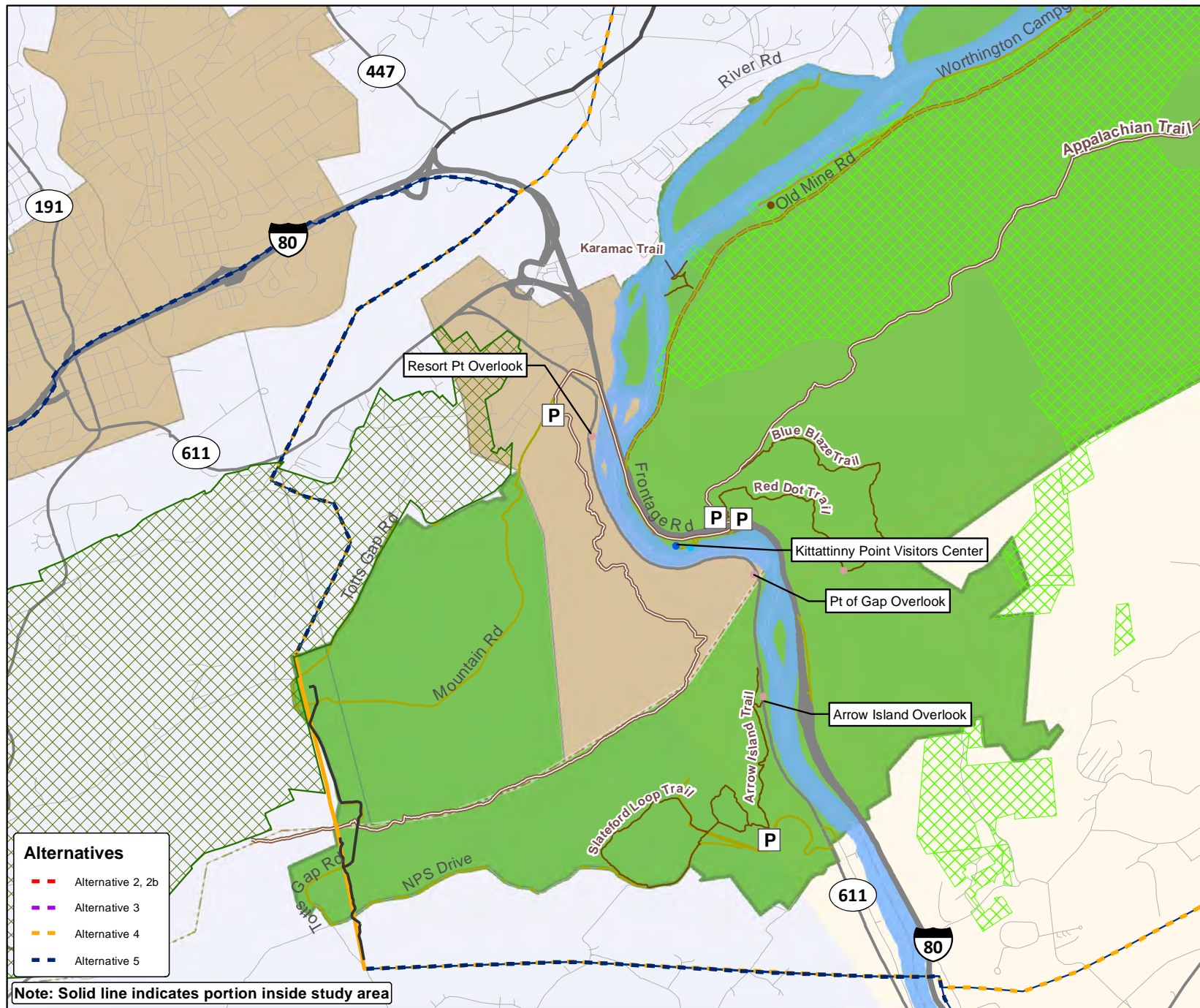
Note: Solid line indicates portion inside study area

Figure 51
Alternative 3 Roadways

Sources: NPS 2010, EA Engineering 2010
DEWA 2008, NJOT - OGIS 2008, PASDA 2010,
USGS 2006, NJ DEP 2008, Penn State 2010,
ESRI ArcGISOnline Map Service 2010,
Projection: NAD83 UTM Zone 18N
Date: October 2011



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



Legend

- DEWA Boundary
- Cherry Valley NWR
- WSF
- APPA
- MDSR
- Delaware River

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

Visitor Attractions

- Airpark
- Campground
- Information
- Meeting Hall
- Picnic Area
- Point of Interest
- Ranger Station
- River Access

- County Boundary
- New Jersey
- Pennsylvania
- New Jersey Municipality
- Pennsylvania Municipality
- Interstate
- U.S. Highway
- State Highway
- Local Road
- Community Road
- Access Road



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

Figure 52
Alternatives 4 and 5 Roadways

Sources: NPS 2010, EA Engineering 2010
DEWA 2008, NJOIT - OGIS 2008, PASDA 2010,
USGS 2006, NJ DEP 2008, Penn State 2010,
ESRI ArcGISonline Map Service 2010,
Projection: NAD83 UTM Zone 18N
Date: October 2011



0 1
Miles

Roads provide important opportunities for travel between states, local residential neighborhoods, commuter trips, and for visitors to recreation destinations. Various federal highways, state routes, local county roads, and NPS-owned roads make up the transportation network surrounding DEWA. There are approximately 86 miles of paved roads and 83 miles of unpaved roads in the 67,210 acres of DEWA, and DEWA has over 50 entry points, with a high proportion of travel through the park made by commuters and local residents (NPS 2009h, 6, 13). The majority of roads within DEWA are owned and managed by the NPS; however, there are some state, county, or local roads in the park and that provide entry to the park, as well as private/public inholdings in the states of Pennsylvania and New Jersey with their own roads for access to their properties (NPS 2009h, 11). US and state highways in both New Jersey and Pennsylvania traverse the DEWA boundary as shown in figures 49 through 52.

ALTERNATIVE 1 (NO ACTION), ALTERNATIVE 2, AND ALTERNATIVE 2b

Inside the study area on the Pennsylvania side, US 209 functions as the major backbone of the road transportation network. To the south, I-80 serves as a major entry point to DEWA. I-80 is also one of three east–west access points that cross the Delaware River within a 30-mile span, providing high-speed, high-capacity east–west access (NPS 2009h, 6). PA 191 and PA 611 provide access to the southern end of DEWA near the alignments for alternatives 4 and 5. These routes may also be used to access the construction and maintenance areas for alternatives 1 (maintenance only), 2, 2b, and 3 from the south.

Several roads traverse the study area in both states, including River Road and US 209 in Pennsylvania and Old Mine Road in New Jersey. These roads are designated NPS roads, with the exception of the southern part of Old Mine Road, which runs through Worthington State Forest and is owned by the State of New Jersey (NPS 2009h, 14).

On the New Jersey side of the study area, traffic volumes are relatively low because the Kittatinny Mountain Range acts as a natural barrier, restricting road access. However, local roads, including Millbrook/Blairstown Road (CR/NPS 602) and Flatbrookville/Stillwater Road (NPS 615) provide access to the study area (NPS 2009h, 14).

Tables 30 and 31 provide additional information on arterial, collector, and local roads within the study area, including the state in which it is located and its character/use. The tables list each road's functional class, as defined by the appropriate state transportation department. Figures 49 through 52 show the locations of the roads. Character/use of each road is defined by the following:

- road to park—road provides entry point to the park
- main north–south or east–west road—road serves as a main north–south or east–west travel route in or near the parks
- scenic route—road provides scenic viewing opportunities
- historic – road is listed or eligible for listing on the National Register of Historic Places, or part of a historic district
- regional or secondary road—road provides connection(s) to other roads that provide entry to the park
- serves existing utility ROW corridor – road directly accesses existing utility ROW.

Table 30 provides information on regional roads within the study area. The functional classifications of these roads are principal and minor arterials. Rural principal arterials exhibit corridor movements with trip length and density suitable for substantial statewide or interstate travel and movements between all

(or virtually all) urban populations over 50,000 and a larger majority of those over 25,000. Rural minor arterials provide linkage of cities, larger towns, and other traffic generators that are capable of attracting travel over similarly long distances, integrated interstate and intercounty service.

TABLE 30: REGIONAL ARTERIAL ROADS WITHIN THE STUDY AREA

Road	States	Character/Uses
I-80	Pennsylvania, New Jersey, New York	Road to park Interstate highway (principal arterial)
US 209	Pennsylvania	Road to park Two-lane highway Rural minor arterial
PA 191	Pennsylvania	Two-lane road Rural minor arterial
PA 611	Pennsylvania	Main north-south road through southern end of park Two-lane road (Rural minor arterial Scenic route

Source: Aerial Photography 2010; NJDOT 2004, PADOT 2009a.

The study area is served by various local roads that provide access to DEWA, surrounding communities, and/or workplaces for commuters. Table 31 provides information for each local road in the study area, including the state or states in which it is located, its character/uses, and the direction and location of travel through DEWA. Rural collector roads generally serve travel of intracounty importance. Rural local roads primarily provide access to land adjacent to the collector network and serve travel over relatively short distances.

River Road, located on the Pennsylvania side of DEWA, dates to 1744 and is considered an important part of the area's historical and cultural landscape. The original road was laid out by early European settlers and extended from Philadelphia to Milford, PA. The portion within the park is considered one of the last remaining sections that most closely resemble its original character. Within the park, the road extends from Shawnee-on-Delaware north to its intersection with US 209 near Bushkill. The majority of the road's alignment is a historic road trace, although the portion of River Road in front of DEWA Headquarters was constructed in 1965. River Road is considered a park resource itself with potential eligibility for the National Register as a historic district (NPS 2005d, 1, 9) (see the "Cultural Landscapes" section for more information). Based on American Association of State Highway and Transportation Officials guidelines and the NPS Park Road Standards, River Road can be classified as either a principal park road or a connector park road. The Federal Highway Administration considers River Road to be a connector park road (FHWA 2003, 1). The NPS defines a connector park road (a Class II road) as a road that provides access within a park to areas of scenic, scientific, recreational, or cultural interest, such as overlooks and campgrounds (NPS 1984b, 3). As a park road, River Road is not an essential element of the local traffic patterns. No commercial traffic is allowed on River Road other than that permitted by the superintendent (NPS 2005d, 56). River Road is characterized by narrow pavement widths; minimal, if any, shoulders, with trees at pavement edges; several sharp curves; and an uneven profile. The existing asphalt pavement is currently in fair to very poor condition, with various forms of pavement deterioration (such as cracks, differential settling, rutting, and pothole patching) occurring throughout. Several NPS maintenance patches have been performed to smooth the pavement surface, but no work to correct any subsurface problems has occurred (NPS 2005d, 61; FHWA 2003, 1–2). Substantial pavement damage occurs due to lack of ditches along many of the shoulders, which allows water to infiltrate under the pavement (FHWA 2003, 2). A 1998 Federal Highway Administration engineering study recommended

total reconstruction to rehabilitate River Road. In addition, about 30% of 66 existing culverts may need to be replaced, and safety improvements are needed. The study notes that any rehabilitation must maintain the road's rural setting and character (FHWA 2003, 2). However, no rehabilitation has occurred to date.

TABLE 31: RURAL COLLECTOR AND LOCAL ROADS WITHIN THE STUDY AREA

Road	States	Character/Uses	Direction and Location of Travel through DEWA
Bushkill Falls Road	Pennsylvania	Two-lane road Rural collector road	North-south from US 209 at Bushkill (concurrent with SR 2001 from Milford Rd to US 209)
Community Drive	Pennsylvania	Narrow road Rural local road Serves ROW corridor Locally-owned	North-south from River Road to near intersection with Hidden Lake Rd to US 209 near Bushkill Meeting Center?
Creek Road	Pennsylvania	Two-lane road Rural local road Locally-owned	East-west parallel to US 209 between park boundary and US 209 near Bushkill Meeting Hall
Freeman Tract Road	Pennsylvania	Scenic route Unpaved road Rural local road Locally-owned	Northeast-southwest from River Road near DEWA Headquarters, terminating at river
Millbrook/Blairstown Road (CR 602 from Millbrook Village to the park boundary, NPS 602 in park)	New Jersey	Main east-west road Two-lane road Rural local road	East-west from Blairstown to Millbrook Village (ending at old Mine Road)
Old Mine Road	New Jersey	Main north-south road for park visitors Low speed road; portion includes a one-lane section Rural local road Scenic route Listed historic resource Southern portion closed in winter	North-south on east (New Jersey) side of river
River Road	Pennsylvania	Primary entry road to park (at I-80 and near Shawnee-on-Delaware) Main north-south road for park visitors Two-lane road Rural local road Low speed scenic route Eligible historic resource Serves existing utility ROW corridor	North-south orientation on west (Pennsylvania) side of river

Source: Aerial Photography 2010; DEWA Citizen Advisory Commission 2007; NPS 1987, 63–64; 2009i, 13–15; 2010o; 2010p; 2010q; 2010r; NJDOT 2004, PADOT 2009a.

Old Mine Road is extremely narrow due to overhanging rock ledges and vegetation. It is listed on the national register as a historic district. The southern section of Old Mine Road is minimally maintained,

especially through Worthington State Forest. This section of Old Mine Road becomes a one-way route near I-80, where traffic is controlled by a timed, 3-minute traffic light. Old Mine Road makes a sharp turn under the interstate at the exit ramp at the Kittatinny Visitor Center. Old Mine Road is believed to be one of the oldest roads in the country (NPS 1983b). As noted in the “Cultural Landscapes” section, the DEWA 1987 GMP identified goals for the preservation of cultural landscapes, including the Old Mine Road. The GMP states, “The Old Mine Road ... will be used for interpretation of historic development and growth of the area, as well as for recreational purposes such as hiking and scenic driving. Any actions that will affect the road [and its] respective corridor will have to meet requirements for preserving [its] historical and cultural integrity” (NPS 1987, 33).

Some roads within the study area not only provide important access for motorized vehicles, but also provide road bicycle touring and trail bicycling access. Approximately 3,500 bicyclists use DEWA trails annually (NPS 2009h, 22). Bicycling can be used as an alternative transportation mode, in addition to a recreational use (bicycling as a recreational activity is discussed in the “Visitor Use and Experience” section). The McDade Trail is the only designated bicycle trail in DEWA, though bicycles are permitted on all roads open to vehicular traffic.

Various seasonal multiuse paths exist in DEWA, which can be used for recreation or transportation purposes. On the Pennsylvania side, the McDade Trail offers hiking, bicycling, and cross-country skiing opportunities for visitors. On the New Jersey side, Blue Mountain Lakes Road connects to approximately 10 miles of cross-country skiing trails (NPS 2009h, 22).

DEWA has an extensive network of trails, the majority of which are used for day-use activities. APPA also receives day users, as well as long-distance hikers walking the entire trail or multiday sections of the trail. These pursuits are primarily recreational and not necessarily for transportation. However, visitors can walk from the Delaware Water Gap borough to the scenic viewing opportunities within DEWA (NPS 2009h, 18). More details about trails are provided in the “Visitor Use and Experience” section.

Although most visitors to DEWA use private vehicles, there are several public and private transportation service options for accessing the park and surrounding communities. Transit service in the study area is primarily provided by fixed-route, fixed-schedule buses operating in mixed traffic. Additionally, commuter rail provides access to the northern end of the park at Port Jervis, New York. In addition, various private companies provide public transportation to locations near the study area (NPS 2009h, 30–32). No connecting transit services offer transfers to commuter rail. The Monroe County Transportation Authority Pocono Pony, under the auspices of the NPS and with NPS funding, provides fixed-route, shared-ride, and special-transport bus services. The Pocono Pony offers various routes, all of which can be connected to provide broader service (Monroe County Transit Authority 2010). Within the study area, a fixed route provides access to the DEWA entrance on US 209, and to the intersection of Broad Street and Main Street in the Delaware Water Gap borough (an access point for the APPA). As of spring 2011, the NPS and the Pocono Pony are working together to provide transportation to and around DEWA on a pilot program to test the use of public transportation in the park. Two routes serve the park with service beginning in East Stroudsburg and Milford. This service is seasonal, with planned service dates of April 30 through October 30 (Monroe County Transportation Authority 2011).

Because most visitors use private vehicles to access recreation sites, designated parking areas near highly visited recreation sites represent a significant facility for visitors. Within the study area, the Bushkill Launch parking area is highly used by visitors to access key recreation sites. In addition, the largest concentrations of visitor parking spaces in the study area are located at Kittatinny Point Visitors Center and Smithfield Beach (NPS 2009h, 14). Various other sites throughout the park offer additional visitor parking.

In addition to designated visitor parking areas, various undesignated parking areas exist throughout the park. Dispersed parking throughout DEWA is available on most roads and accounts for a large amount of visitor parking. Some of these areas are considered unsafe and harmful to natural resources. While efforts to eliminate these specific undesignated parking areas have been undertaken, designated parking areas do not provide adequate parking for visitors during peak times, including hunting season and some summer weekends. Thus, it is likely that these undesignated parking areas will continue to be used by visitors during busy months.

Some roads within the study area have been identified as scenic routes, including the following:

- River Road from Bushkill, Pennsylvania, to Shawnee-on-Delaware, Pennsylvania—provides scenic views of agricultural lands, Kittatinny Ridge, and the Delaware River Valley
- Old Mine Road—provides scenic views of hills, villages, Kittatinny Ridge, the Delaware River Valley, and other historic sites within the park on the east side of the river (NPS 2010o)

Table 32 shows the primary roads used to access the most often visited sites in the park (5% or more of visitors surveyed reporting visits to the site). Of the noted visitor destinations within the study area, Milford Beach, Smithfield Beach, and Dingmans Boat Launch are the most visited (30% or more visitors surveyed reported visits to those sites). Visitor destinations are described in further detail in the “Visitor Use and Experience” section under “Visitor Use of Recreational Facilities.”

TABLE 32: ROADS TO MOST VISITED LOCATIONS WITHIN DEWA

Visitor Destination	State	Roads Used to Access Destination
Smithfield Beach	Pennsylvania	River Road
Bushkill Access	Pennsylvania	US 209
Kittatinny Point Visitor Center	New Jersey	I-80
Turtle Beach	New Jersey	Old Mine Road
Bushkill Meeting Center	Pennsylvania	US 209
Park Headquarters	Pennsylvania	River Road
Poxono Access	New Jersey	Old Mine Road
Millbrook Village	New Jersey	Old Mine Road Walpack Flatbrook Road (NPS 615) Millbrook/Blairstown Road (CR/NPS602)

Source: Blotkamp et al. 2010, 43.

Roads within DEWA not only provide access to recreation sites and scenic destinations, they also provide access to surrounding towns. Stroudsburg is the closest large town to DEWA accessible from I-80. Stroudsburg is accessed from the north primarily by PA 191, from the northeast and east by US 209 and I-80, and from the south by SR 611 (table 33).

TABLE 33: PRIMARY ROADS USED TO ACCESS LOCAL COMMUNITIES

Community	State	Roads Used to Access Community
Stroudsburg	Pennsylvania	<ul style="list-style-type: none"> • I-80 • US 209 • PA 191 • PA 611
Delaware Water Gap	Pennsylvania	<ul style="list-style-type: none"> • I-80 • PA 191 • PA 611
Shawnee-on-Delaware	Pennsylvania	<ul style="list-style-type: none"> • River Road • Hollow Road
Bushkill	Pennsylvania	<ul style="list-style-type: none"> • US 209 • Bushkill Falls Road
Marshalls Creek	Pennsylvania	<ul style="list-style-type: none"> • US 209 • PA 402 • Marshalls Creek Road

Source: Aerial Photography 2010; NPS 2010p, 2010q.

A presentation from the NPS DEWA Traffic Safety Study Open House held on July 15, 2008, summarized data related to safety issues that exist in the park. The July 2008 open house presentation identified US 209 and Brodhead Road (near Bushkill Access) and US 209 and Bushkill Falls Road as two areas experiencing the highest incidences of motor vehicle accidents within the study area based on parkwide data (NPS 2008d, 5). Both locations are near Bushkill. Data from the Pennsylvania Department of Transportation indicate that the annual average daily traffic along US 209 between East Stroudsburg and US 206 near Milford is 12,317. The annual average daily traffic is the typical daily traffic on a road segment for all days in a week over a 1-year period, including traffic in both directions. Traffic volumes on these routes generally decrease from south to north, with the highest US 209 volumes near the multiple road intersections at Marshalls Creek. Volumes decrease en route to Bushkill, where they then increase slightly at the intersection of Bushkill Falls Road. Volumes resume a substantially decreasing trend farther north en route to Dingmans Ferry (PA 739) and US 206 near Milford (PADOT 2010).

Within DEWA, major sources of congestion include east–west access points and roads that provide access to surrounding, densely populated communities. According to the June 2009 *DEWA Alternative Transportation Feasibility Study*, several roads that provide access to DEWA from the west that originate in dense, planned communities are a major source of congestion. Within the study area, Bushkill Falls Road has relatively consistent congestion issues. Additionally, congestion is generally an issue at all east–west toll bridges in DEWA, including on I-80 (NPS 2009h, 13–14).

I-80 currently carries some of the highest truck volumes in Pennsylvania—approximately 10,000 trucks per day. These trucks carry an estimated 216 million tons of freight. Approximately 60% of the freight carried along I-80 originates and terminates outside Pennsylvania. Much of this traffic connects New York City metropolitan markets with Midwestern markets. According to Federal Highway Administration freight forecasts, it is expected that I-80 commercial traffic will more than double by 2035. I-80 from the Ohio state line to I-81 will continue to be one of the largest-volume truck routes in the state (PADOT 2009b, 8).

Beyond the high truck volume and freight traffic, I-80 also serves a growing commuter pattern to and from the New York metropolitan area and the Pocono region. Overall current traffic volumes range from an average of 15,000 to 20,000 average daily traffic west of I-380 to over 40,000 average daily traffic east

of I-380. This eastern section has the highest average daily traffic on I-80 and is generally the oldest section, with a high percentage of original construction (PADOT 2009b, 9).

ALTERNATIVE 3

The affected environment for alternative 3 would be the same as that for alternatives 1, 2, and 2b.

ALTERNATIVE 4

In addition to I-80, mentioned in the discussion of alternatives 1, 2, and 2b, roads in the study area near the alternative 4 alignment are PA 191 and PA 611. PA 191 and PA 611 are considered minor arterials. Totts Gap Road in Pennsylvania is a rural road in the study area that travels northwest–southeast and forms the southern boundary of DEWA.

As mentioned above, seasonal multiuse paths within DEWA can be used for recreation or transportation purposes. Although most hiking pursuits are primarily recreational and not necessarily for transportation, visitors can walk from the Delaware Water Gap borough to scenic viewing opportunities within DEWA (NPS 2009h, 18). In addition, the APPA traverses the study area.

PA 611 through the Delaware Water Gap has been identified as a scenic route through the southern part of DEWA. It provides scenic views of the Delaware Water Gap formation, as well as access to three overlooks that provide scenic viewing opportunities:

- Arrow Island Overlook
- Point of Gap Overlook
- Resort Point Overlook

In addition, the Kittatinny Point Visitor Center, located at the Delaware Water Gap, provides scenic viewing opportunities of the southern area of DEWA (NPS 2010p, 2010q, 2010r). There are many other nondesignated vistas within the park that help to accentuate all viewsheds. PA 611 provides access to several minor destinations that are near the alignments for alternative 4, including the Arrow Island, Point of Gap, and Resort Point Overlooks.

Roads within DEWA provide access to surrounding towns. The Borough of Delaware Water Gap is located near the southwestern area of DEWA. This community is accessed from the north primarily by SR 611, from the south by SR 191, and from the east by I-80 (NPS 2009h, 15).

ALTERNATIVE 5

The affected environment for alternative 5 would be the same as alternative 4, with the exception of the portion of the study area near Bushkill. Alternative 5 would not traverse this area.

OUTSIDE THE STUDY AREA

Outside the study area in Pennsylvania, I-84 and SR 6 provide access to DEWA from the north. Access from the west is provided by various roads such as Bushkill Falls Road, Silver Lake Road, PA 739 (Dingmans Turnpike), and SR 2001. Traffic volumes on these roads are relatively high because they are used by residents of the surrounding densely developed communities. US 206 is an access point that provides an east–west crossing for commuters near Milford and for the Dingmans Choice Toll Bridge,

which provides weight- and capacity-restricted east–west access, connecting Dingmans Ferry, Pennsylvania and Layton, New Jersey (NPS 2009h, 6).

The regional roads outside the study area include PA 402, NJ 94, CR 560, PA 739, US 209, and US 6. Major north–south transportation access is provided by US 402, and major east–west transportation access is provided by I-84 (NPS 2009h, 13–15). Tables 34 and 35 provide additional information on each regional and local road outside the study area, including the state or states in which it is located and its character/uses.

I-84, north of DEWA, serves travelers between Scranton, Pennsylvania, and Hartford, Connecticut. It is a well-traveled route, providing an alternate route for Boston–New York City traffic via the Massachusetts Turnpike, I-84, and I-684. I-84 traverses a generally hilly route, including the Poconos, the historic Hudson Valley, and the foothills of Connecticut. It also makes part of an outer loop of New York City and is a major thoroughfare for Connecticut-based commuters (Interstate Guide 2007).

TABLE 34: ARTERIAL ROADS OUTSIDE THE STUDY AREA

Road	States	Character/Uses
I-80	New York, New Jersey, Pennsylvania	Interstate highway (principal arterial) Crosses southern end park
I-84	New York, Pennsylvania, New Jersey	Interstate highway (principal arterial) Adjacent to northern park boundary
PA 191	Pennsylvania	Regional road (minor arterial)
PA 402/Resica Falls Road	Pennsylvania	Secondary road (minor arterial)
PA 611	Pennsylvania	Main north–south road (minor arterial) Scenic route
PA 739/Dingmans Turnpike	Pennsylvania	Main east–west road (major collector) Connects to CR 560
US 209	Pennsylvania	Road used to access park (minor arterial) (south of Bushkill and south of Milford) Main north–south road Scenic route
US 6	Pennsylvania	Primary road to Milford and northern end of park (principal arterial) Connects to US 209 in Pennsylvania and US 206 in New Jersey
US 206	New Jersey	Rural principal arterial Runs north-south from Milford and crosses I-80 east of DEWA
NJ 94	New Jersey	Rural minor arterial Roughly parallels the park east of the Kittatinny Mountain Range, Crosses I-80 near DEWA at Columbia and US 206 in Newton

Source: Aerial Photography 2010; DEWA Citizen Advisory Commission 2007; NPS 1987, 63–64; 2009i, 13–15; 2010o; 2010p; 2010q; 2010r; PPL and PSE&G 2008; NJDOT 2004, PADOT 2009a.

TABLE 35: RURAL COLLECTOR AND LOCAL ROADS OUTSIDE THE STUDY AREA

Road	State	Character/Uses	Direction and Location of Travel through DEWA
Milford Road	Pennsylvania	Main north–south road Rural major collector road Concurrent with US 209 between Bushkill and Marshalls Creek Serves existing utility ROW corridor	North–south from Bushkill to Milford
CR 560	New Jersey	Rural major collector road	East–west connection between PA 739 and US 206
Deckertown Turnpike	New Jersey	Rural major collector road	East–west from US 206
Layton Hainesville Road (CR 645/NJ 645)	New Jersey	Rural minor collector road	North–south to CR 560
Walpack Flatbrook Road (NPS 615)	New Jersey	Rural local road	North–south from Old Mine Road at Flatbrookville to Peters Valley

Source: Aerial Photography 2010; NJDOT 2004, PADOT 2009a.

Toll bridges are located outside the study area but within DEWA near Milford on US 206 and at Dingmans Ferry, which connects PA 739 to CR 560. One additional toll bridge is located outside but near DEWA: the Portland toll bridge, which connects Portland, Pennsylvania (on PA 611), to Columbia, New Jersey (on NJ 94), southeast of DEWA.

According to the NPS DEWA Traffic Safety study, the intersection of US 209 and PA 739/Dingmans Turnpike near Dingmans Ferry has experienced one of the highest incidences of motor vehicle accidents within DEWA, along with the two intersections at US 209 mentioned above (NPS 2008d, 15).

Also, as mentioned above, the *DEWA Alternative Transportation Feasibility Study* (NPS 2009h, A-23) identified several roads that provide access to DEWA from the west that originate in dense, planned communities and are a major source of congestion. Outside the study area, these roads include PA 402 (Resica Falls Road), Silver Lake Road, PA 739 (Dingmans Turnpike), and SR 2001 (Bushkill Road/Milford Road) (NPS 2009h, A-23). Additionally, congestion is generally an issue at the toll bridges outside the study area. Congestion issues outside the DEWA boundary also include major north–south and east–west thoroughfares in Monroe and Warren counties. The Middle Smithfield Township 2007 comprehensive plan update identifies congestion along US 209 as being the township’s largest transportation issue and indicates that the Marshalls Creek Bypass Project/US 209 Relief Route is underway to relieve congestion near US 209 and US 402 (Middle Smithfield Township 2007, 8-3–8-4). The Marshalls Creek Bypass Project/US 209 Relief Route is scheduled for completion by the end of 2012.

Outside the study area in New Jersey, US 206 functions as a major transportation artery to the south. In New Jersey, major east–west transportation access is provided by I-80, and I-84. NJ 94 roughly parallels the park east of the Kittatinny Mountain Range, and crosses I-80 near DEWA at Columbia and US 206 in Newton.

On the New Jersey side of DEWA, traffic volumes are relatively low because of the Kittatinny Mountain Range serving as a barrier with few road crossings. However, roads such as CR 560 and Layton Hainesville Road (CR 645) provide access to the study area (NPS 2009h, 14).

Bicycling facilities outside the study area include NPS 615, which provides road touring on a paved road from Flatbrook Ridge to Walpack Center. The route follows 6.5 miles of rolling hills and sharp curves.

Public and private transportation services in and near the parks include:

- Pike County (Pennsylvania) provides shared-ride/demand-response services for handicapped, disabled, and senior citizens in Pike County (NPS 2009h, 16; Pike County Area Agency on Aging 2010).
- Northampton County (Pennsylvania) provides bus service to areas near the southern end of DEWA, via the Easton system route (LANTA 2010).
- New Jersey Transit provides passenger train service from the New York City area to Port Jervis (New York), north of the park, via the Port Jervis–Suffern Line (NJ Transit 2010). New Jersey Transit connects to the Metropolitan Transportation Authority rail system, Amtrak, Greyhound, and other regional public and private transit systems (NJ Transit 2010).
- New Jersey Transit operates “Wheels” Suburban Transportation Services bus routes, with routes 890 and 891 providing access across the Delaware River into Easton, Pennsylvania (located southeast of the study area), where passengers can connect to Lehigh and Northampton Transit Authority service (Warren County 2004, 17). The Shortline bus, a private transportation service, provides private charter tours with regular daily service to Port Jervis, north of the park (State Parks 2010). Sussex County provides bus service within the county and out of county through a loop route. Additionally, a paratransit service is available for seniors, disabled people, and veterans. The major Sussex County bus routes, routes 1 and 2, do not provide access to areas near the study area (Sussex County 2008). Warren County has five intracounty bus routes, two commuter rail lines, and two private bus carriers (Warren County 2004, 15).
- Martz Trailways, the Shortline Bus, and Greyhound provide access to DEWA from surrounding states and counties. Martz Trailways routes buses to a location near the southern end of DEWA from Scranton, Wilkes-Barre, Effort, and Mount Pocono, Pennsylvania, and New York City (NPS 2009h, 16).

No public transit connections are provided from either the Delaware Water Gap borough or Port Jervis (NPS 2010s).

VISUAL RESOURCES

The affected environment for visual and scenic resources is the viewsheds of DEWA, MDSR, and APPA. The viewshed is defined as areas with a line of sight looking toward and away from the proposed transmission line corridors for the alternatives. The viewshed is based on geography in addition to built and natural features, which determine what can and cannot be seen from a given location. For a more detailed discussion of how the viewshed analysis area was established, refer to the “Visual Resources” section of chapter 4 under “Methodologies.”



McDade Trail in DEWA.



A Cliff Trail overlook, at the northern end of DEWA.



The Delaware Water Gap, from I-80.



Watergate picnic area.

This section provides an analysis and evaluation of views at specific key observation points. However, it does not address the actual and overall impacts on scenic resources. Within the study area viewsheds, important representative places from which to view scenic resources that could be impacted by the proposed actions were identified in consultation with NPS staff, and are described in more detail in this section. While these views are meant to represent the character and variety of the scenic resources of DEWA, MDSR, and APPA where they would or may be impacted by the proposed alternatives, there would be points within the resource viewsheds that would be impacted which are not included by the key observation points. The enabling legislation for the park resources directs managers to protect and preserve the scenic resources as an important element of the rationale for establishing the national significance of the individual units. DEWA is itself a cultural landscape of exceptional scenic resource value as is APPA and MDSR. The visual analysis of the affected environment described here and the impacts to the resources described in chapter 4 will help the reader understand the ramifications of the proposed alternatives in specific areas described. The reader can assess the overall scenic impacts themselves using chapter 4 as a tool.

The site vicinity is shown in figure 53. Spanning the border of New Jersey and Pennsylvania, the majority of the viewshed falls within the Delaware River watershed, and includes a variety of geologic features and land cover types. To the north, the geologic features of the Pocono glaciated plateau gives way to ridge and valley formations of the northern Allegheny Mountains. To the south and east, the Great Appalachian Valley gives way to the megalopolis of eastern New Jersey and New York City. Local

population centers include Stroudsburg and East Stroudsburg in Pennsylvania. Outside of these boroughs, the communities are mostly rural with diffuse population centers and densities.

Two distinct landforms compose the study area landscape for all alternatives: the Valley and Ridge physiographic province, including the river lowlands or alluvium-filled basins and the low parallel ridges of the valley, and the Appalachian Plateau province, with its enlarged stream valleys and rounded highlands. The elevation of the valley varies from 300 to 400 feet AMSL. The adjacent highlands rise an additional 600 to 1,000 feet (NPS 1999, 43).

SCENIC AND AESTHETIC RESOURCES

A landscape's visual resources provide the stimulus that results in visual experience. Alternatives can affect visual experience by changing the visual resource base. Therefore, an inventory of existing resources is required to analyze impacts. Important scenic and aesthetic resources within the affected environment viewshed include the following:

- DEWA
- APPA
- MDSR
- Scenic Road US 209
- Old Mine Road, New Jersey
- River Road, Pennsylvania

Given the geographic variety of the proposed alternatives, the location of scenic and aesthetic resources varies for each, as described in the "Landscape Character" section below.

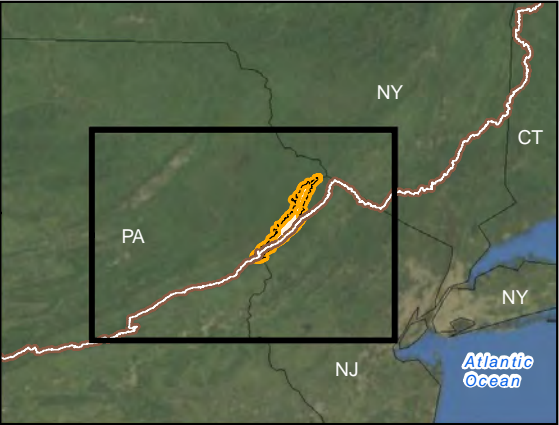
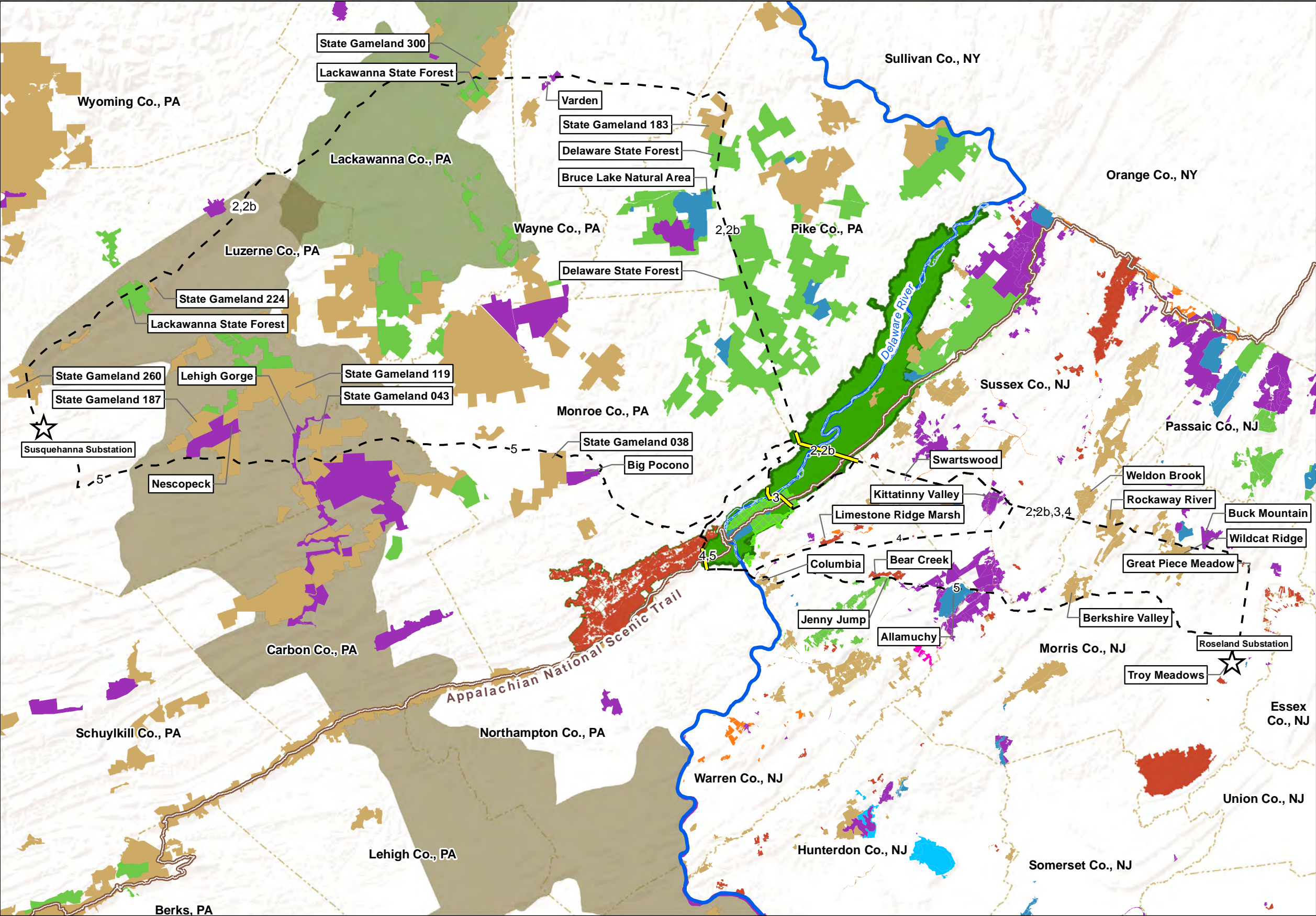
VISUAL CHARACTER

In order to assess impacts on visual resources, the visual character of the affected environment must be established. People do not experience the visual environment as discrete, individual objects, but rather as an integrated whole. Visual understanding or cognition of an environment is based on the visual character of objects and the relationships between them. Visual character is influenced largely by land use patterns within the unique alternatives' study areas (FHWA 1988), which are described individually below. This report uses the Federal Highway Administration protocol to evaluate the quality of views, considering the concepts of unity, intactness, and vividness in a given viewshed. Scenic resources are an important value defined in the Organic Act, the DEWA Enabling Act, and the Wild and Scenic Rivers Designation. Definitions of these terms are as follows:

Unity: the degree to which the visual resources of the landscape join to form a coherent, harmonious visual pattern.

Intactness: the visual integrity of the natural and built landscape and its freedom from encroaching elements.

Vividness: the combination of landform, water, vegetation, and human-made development that form a memorable composition and distinct visual pattern (FHWA 1988).



Legend

- Delaware Water Gap NRA Boundary
- County Line
- Cherry Valley National Wildlife Refuge
- Worthington State Forest
- Lackawanna Valley State Heritage Region
- Delaware & Lehigh National Heritage Corridor
- APPA
- Substations
- MDSR
- Delaware River

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

Alternatives 2-5

- Inside VSL
- Outside VSL

Note: Solid line indicates portion of the alternative inside the study area

Recreation Areas

- State Park
- State Forest
- Wildlife Area/Preserve
- Natural Area
- Wildlife Management Area/Gameland
- Fish Hatchery/Fishing Access
- Recreation Area

As noted above, key observation points were selected to approximate impacts for the entire viewshed. While these views are meant to represent the character and variety of the scenic resources of DEWA, MDSR, and APPA where they would or may be impacted by the proposed alternatives, there would be points within the viewsheds that would be impacted which are not included by the key observation points. For more information regarding this methodology, see “Chapter 4: Environmental Consequences.”

Landscape Character Delaware Water Gap National Recreation Area

DEWA includes over 40 miles of nationally designated scenic river (MDSR) and 27 miles of APPA, plus 100 miles of other trails affording views of streams, ridgetop overlooks, wetlands, and waterfalls (NPS 2010t). As described in the DEWA GMP, “Scenic resources [include a] mosaic of color, form, and texture that has resulted from a unique blending of natural and cultural resources within the Delaware River Valley” (NPS 1987, 11).

The DEWA landscape consists of heavily wooded Pennsylvania and New Jersey uplands, rolling hills of successional forests, open lowlands of the Delaware and Flatbrook valleys, the Delaware River and its tributaries, and lakes (NPS 1987, 13). As mentioned in the “Socioeconomics” section, development in the area has resulted in growth that has rapidly changed the region’s character. The resident population in communities surrounding DEWA is expected to continue to increase by as much as 50% by 2030 (NPS 2003d; 2009h, 8), making the land protected within its boundaries increasingly rare in an area so close to major metropolitan areas.

The DEWA, APPA, and MDSR landscape includes:

- Farms
- Early pre-historic and historic human settlement
- French and Indian war remnants
- Dutch occupation
- Hotels/Resorts



Landforms and vegetation features seen from the Delaware River.

The Delaware River is one focal feature of DEWA, and 40 miles of the river passes through the recreation area boundaries. In 1978, the river section within the NPS boundaries was designated as the MDSR in recognition of its remarkable resources. In keeping with the provisions of the Wild and Scenic Rivers Act, water quality within the river’s upper reaches is extremely high, supporting outstanding natural, fisheries, and recreational resources. In 1992, revised water quality standards designated the river as “Special

Protection Waters” to protect the existing water quality from measurable change in the designated scenic river stretches through a monitoring-based regulatory program (NPS 1999, 2–3). The water in this river segment is renowned for being “cleaner than clean,” exceeding standards for drinking water (NPS 2010u). Water recreation such as floating the river, kayaking, and canoeing offers high-quality views of the forested Kittatinny Ridge and the largely undeveloped river shorelines and valley.

The landscape comprises second- and third-growth forest, old fields and thickets, and croplands, reflecting several centuries of continuous human occupation. Miles of old farm roads, mostly abandoned, once provided access for farming and logging. About 3,000 acres, mainly prime farmland in the valley of the Delaware River, is leased to farmers to preserve the rural agricultural scene. An additional 1,500 acres, primarily old farm fields and home sites in various stages of ecological succession, are now managed to maintain cultural landscapes and enhance scenic wildlife habitat diversity. In recent years, farmers have declined to cultivate some areas that were previously farmed because it is no longer profitable and because there are fewer farmers it may cease to be as valuable a tool. Only the most productive land in the valley is now under cultivation, and much of the remaining land is covered with maturing forest, mainly mixed oak communities that have grown in areas that were logged at least once. Some old farm fields have been restored and planted with warm season grasses to maintain open space and prevent the spread of invasive plants, while maintaining an agricultural landscape. Old fields and shrub thickets provide an “edge” to forested areas (NPS 1999, 43, 46–47).



Old Mine Road.



Historic Millbrook Village.

The DEWA cultural landscape is influenced by its history of human habitation, reflected in the way sites were spatially organized in response to certain natural features and topography, land use patterns, views and vistas, circulation patterns, and vegetation. The flat, fertile floodplains of the Delaware River and the Flatbrook Valley were used for farm fields, which were delineated by primary roads and the river, as well as rock, tree, and fencerows. Dwellings were usually built near a water source, and can still be seen today. Views of and access to farm fields and the river were important to the organization of buildings and circulation. Because of the widespread removal of trees

in this rural landscape and the sloping nature of the overall valley, expansive views of the fields, river, other farmsteads, and villages were a prominent feature of this area. Some of the bridges and roads have been widened with shoulders or changed to conform to modern safety standards. However, the historic pattern of agricultural development remains as one of the pervasive themes of the DEWA cultural landscape (NPS 1999, 50). The park is a tapestry of natural and cultural resources woven into a single large scale cultural landscape that is composed of three separate parks: DEWA, MDSR, and APPA, and also Route 209.

Villages were also part of the historic landscape. Today, Walpack Center and Peters Valley are easily recognized as historic villages. In other valley villages, such as Bushkill, Egypt Mills, Flatbrookville, and Dingmans Ferry, the historic village only partially remains. Villages were situated at the confluence of brooks and streams, along roads, or near mills or quarries. The boundaries of villages are difficult to

determine, because they served surrounding farmsteads and fields. Because villages were sited at the base of a ridge, views of these fields were probably a strong feature from within these villages, as were the views of the village from surrounding fields (NPS 1999, 51).

The cultural landscape changed as the decline of agriculture gave way to the rise in recreation, resulting in the expansion of hotels and boarding houses. Farmers opened their homes to summer boarders, and wealthy individuals purchased secluded farms for summer residences. Through this transition, farms retained some agricultural elements, such as field patterns, outbuildings, and circulation patterns. These traditional settings were embellished with ornamental stonework and plantings, tree-lined walkways, mowed lawns, reflective ponds, and additional cabins or structures. These embellishments still prevail at some properties, including Schoonover Farm, Zimmermann Farm, and Heron's Nest. Views of the rural landscape and the river were "a commanding aesthetic attraction to these recreational visitors" (NPS 1999, 51). In addition to the transformation of farmsteads, new recreation-related facilities, such as Boy Scout camps, were established upland from the river valley in the Pocono Highlands and Kittatinny Ridge. Attractions such as Childs Park and Dingmans Falls were developed, as well as summer residences such as the Crane-Goldhart house (NPS 1999, 51).

The rural character of the communities adjacent to the park has also been changing. The creation of new residential units and resort complexes has led to increases in some commercial development along the major road corridors that border the park. Historically, these new homes were intended for seasonal weekend and vacation use. Now, many have been converted to primary residences because people desire to live in areas with a natural setting. Seventy-five thousand more people reside in the counties surrounding the park than was originally forecast for the year 2000. Strip malls, fast-food restaurants, and other similar developments targeting residents and visitors are concentrated along the area's major roads and interchanges associated with I-80, I-84, US 6, US 206, US 209, PA 739, NJ 15, and NJ 94. However, no large-scale manufacturing or industrial complexes border the park or are planned for the future (NPS 1999, 54).

Despite disturbance associated with human settlement, DEWA supports over 1,300 species of vascular plants and diverse plant communities. Of special importance are those communities that have retained much of their ecological integrity and contribute to the biological diversity of the park and thus its scenic quality. These communities are often home to rare plant and animal species, as discussed in the "Rare and Unique Communities" section.

Overlooks, scenic vistas, and clear air are some of DEWA's most appealing qualities. The quality of the air in and around DEWA is generally considered "good." This normally translates into excellent viewshed conditions for DEWA's natural and cultural resources. Occasionally during summer heat spells atmospheric inversions can occur, causing higher levels of ozone and haze. On average, the recreation area may experience 14 such days during a summer. On these days, the views and vistas of the Delaware Water Gap, the river valley, and the Kittatinny Mountains can be somewhat obscured (NPS 2008e).

Appalachian National Scenic Trail

APPA traces the high points of Kittatinny Ridge along the Pennsylvania and New Jersey state lines, and 27 miles of the trail passes within the DEWA boundary. Much of the trail within the study area is surrounded by forest, so views are frequently limited to the foreground. However, at clearings, the trail's relatively high position affords hikers opportunities for expansive views to the north across the Delaware River Valley or southeast across the continuous forest of rural western New Jersey.

Within gaps and low points, the trail passes beneath mixed oak forest with occasional pine and hemlock, while the highest knolls are typically rocky and grass-covered. Each season highlights a different color

palette for the trail and its vistas. The trail is particularly scenic in autumn, when the canopy changes to a mosaic of red, orange, and yellow. Summers are verdant; winter brings bare branches and occasional snow flurries.



APPA in Pennsylvania.



Vista from APPA in New Jersey.

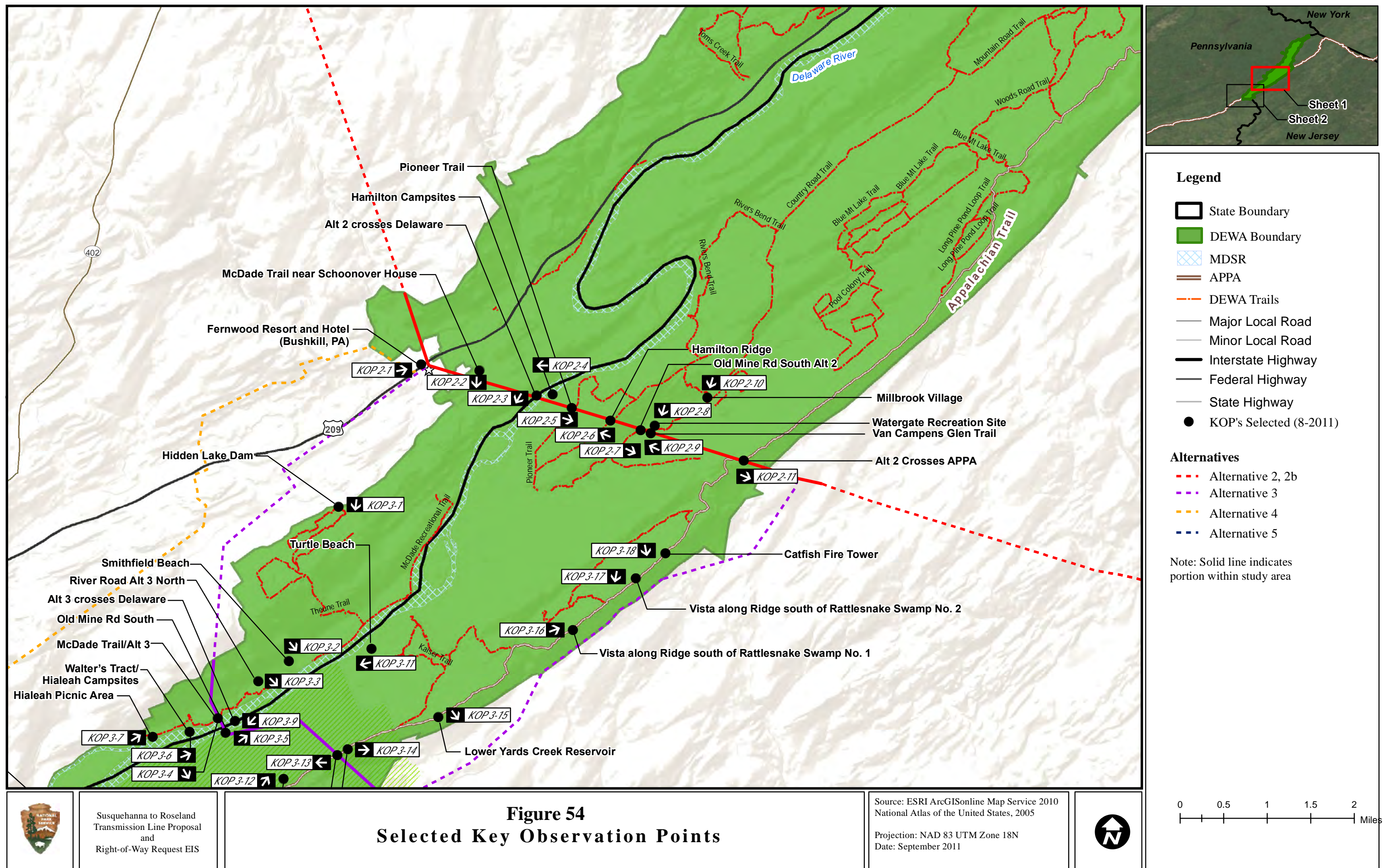
APPA receives an estimated two to three million visitors per year over its entire 2,178 miles. The trail's natural and remote landscape attracts the attention of large numbers of visitors, offering 280 shelter sites and 44 designated overnight-use areas, as well as approximately 4,000 undesignated (visitor-created) campsites. This allows visitors to enjoy APPA for a variety of purposes, from quick day trips to multiday or multiweek journeys along longer stretches of the trail (NPS 2009i, 78–79). As described in the “Visitor Use and Experience” section, the portion of the trail in DEWA is heavily used (NPS 1981, 29). The total number of APPA users in DEWA as reported by the NPS Public Use Statistics Office was 66,700 in 2009 (NPS 2010v). Of the APPA visitors to this region, 36% are day-use visitors. Another 37% stay overnight along the trail, and the remaining 27% hike longer sections of the trail (Manning et al. 2000, 10, 91, 102).

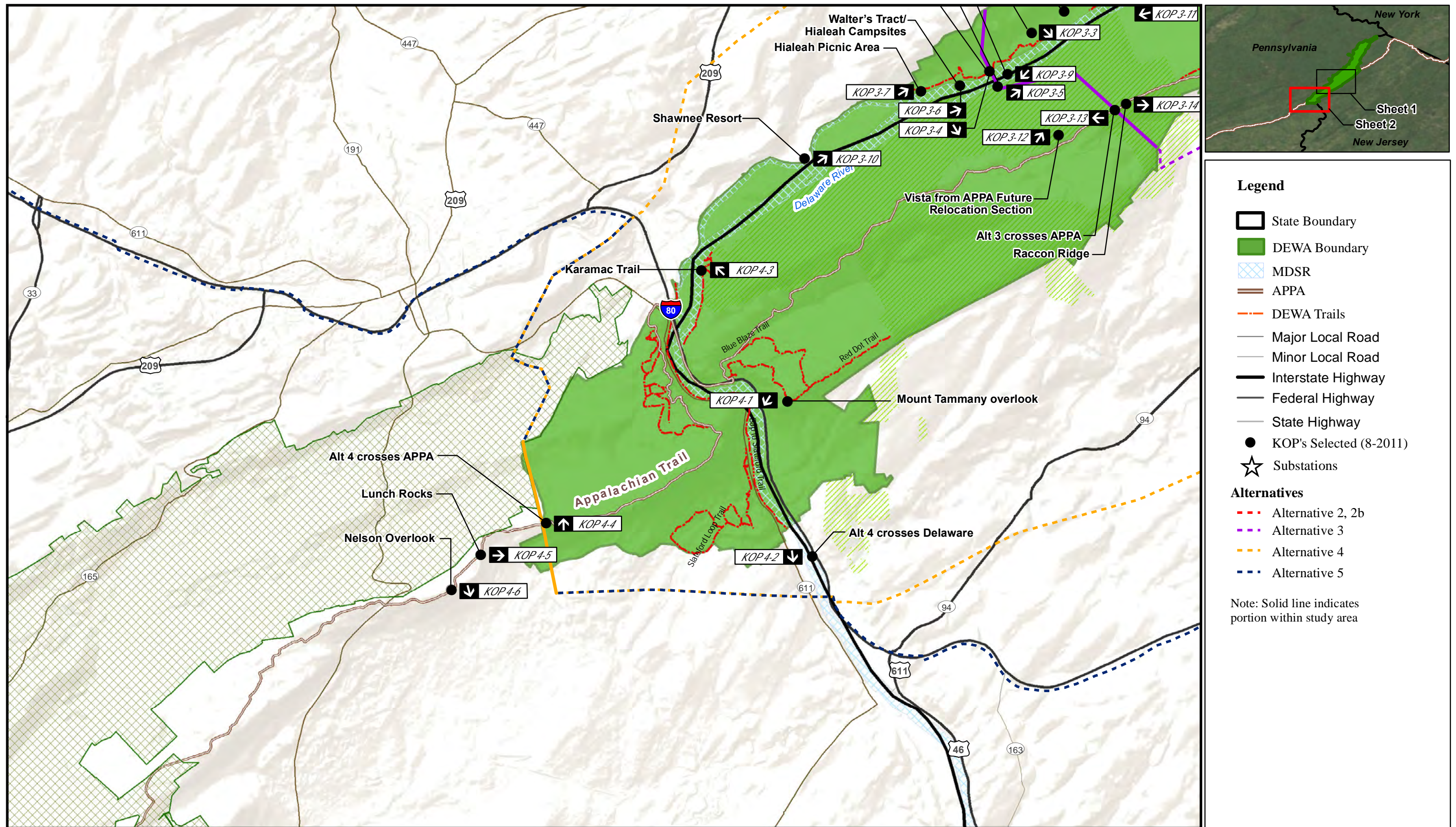
The portion of APPA that would be paralleled or crossed by the transmission line under each alternative follows:

- Alternatives 1, 2, and 2b: At the east edge DEWA and directly west of Sand Pond, which is north of Hardwick Township, New Jersey, the trail emerges from the woods and follows the transmission line ROW for about 600 feet. Where the trail heads north from the ROW, aerial photographs show an approximately 100-foot-wide area cleared of vegetation for about 300 feet along the ROW.
- Alternative 3: At the east edge of DEWA, south of the alternative 2 crossing, and just north of Upper Yards Creek Reservoir, the small utility line crosses the trail approximately perpendicularly at the crest of Kittatinny Ridge.
- Alternatives 4 and 5: At the southernmost boundary of DEWA, the utility line crosses the trail just north of Northampton County Park near Totts Gap Road.

Key Observation Points

“Key observation point” (KOP) is a term used to describe an identified location and position of a viewer. KOPs can be either sensitive points within the viewshed, typical points representing landscape character or view type, or random points (FHWA 1988, 33). KOPs typically document the landscape scene from a stationary viewpoint and in a level position. For this study, NPS staff provided the locations for representative KOPs, shown in figures 54 and 55.



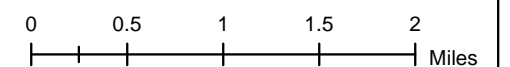


Susquehanna to Roseland
Transmission Line Proposal
and
Right-of-Way Request EIS

Figure 55
Selected Key Observation Points

Source: ESRI ArcGISonline Map Service 2010
National Atlas of the United States, 2005

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



Photographs were taken at each KOP to document existing conditions. Each KOP was assessed using the Federal Highway Administration visual quality rating scale. Vividness, intactness, and unity were rated on a numeric scale from 0 to 7. On this scale, 0 = very low visual quality, 3 to 4 = average/moderate quality, and 7 = very high quality. For more information regarding KOP scoring, refer to the *Visual Resources Technical Report* (DEA 2011). KOPs considered for this study are identified and described by alternative below.

The following sections describe the landscape and visual character by alternative.

ALTERNATIVE 1 (NO ACTION), ALTERNATIVE 2, AND ALTERNATIVE 2b

The alignments for alternatives 1, 2, and 2b coincide and are discussed here collectively. The alternatives' alignment corresponds to the applicant's existing 147-mile 230-kV B-K Line alignment between Susquehanna and Roseland substations. Following the alignment from Susquehanna Substation eastward, the B-K Line roughly parallels the western fringe of the Wilkes-Barre/Scranton metropolitan area, crossing from Luzerne County into Lackawanna County. According to aerial photography, the alignment follows an escarpment feature above the urbanized area. Named landforms include the highpoints Bald, West, and Bell mountains. North of Scranton, outside the town of Blakely, the alignment turns east. Here the photographs indicate that the alignment passes over rural, dispersed developments in Wayne County, Pennsylvania. East of Lake Wallenpaupack, the alignment turns sharply south and enters State Game Land No. 183. After crossing I-84 in Pike County, the alignment passes over the undeveloped, forested terrain of Delaware State Forest before intersecting Bushkill Substation near Fernwood Hotel and Resort and the western boundary of DEWA, off US 209. Here the corridor turns east-southeast.

Within DEWA, the alignment crosses APPA and several natural features, including Arnott Fen, Hogback Ridge, MDSR, and Kittatinny Ridge.

Leaving DEWA, the alignment passes through the Skylands region of northwestern New Jersey. The area is characterized by low topography and dispersed rural and agricultural developments. In the vicinity of Lake Valhalla, just west of I-287, the alignment turns directly south. East of the Jersey City Reservoir, among the residential developments of suburban Parsippany, New Jersey, the alignment reaches the Roseland Substation.

The alignment for alternatives 1, 2, and 2b, which would cross DEWA directly east from the Bushkill Substation and would use the existing B-K Line ROW, would affect the following park resources (as identified by park staff), which are described in more detail in the following sections.

Trails crossed by existing ROW:

- APPA
- Delaware River Water Trail
- McDade Trail (Pennsylvania)
- Hamilton Trail (New Jersey)
- Pioneer Trail (New Jersey)
- Van Campens Glen Trail (New Jersey)

Scenic features crossed by existing ROW:

- Hamilton River Campsites (New Jersey)—12 campsites
- Watergate Picnic Area (New Jersey)—currently, most of the transmission line towers and lines are hidden by trees
- Old Mine Road (New Jersey)—scenic auto tour

Scenic resources with potential views of alternative alignment:

- Watergate Recreation Site
- Millbrook Village
- US 209
- Cliff Trail
- Salamovka House
- Multiple scenic viewpoints along APPA

Alternative 1, 2, and 2b Alignment Crossing APPA

Primary viewer groups: day- and long-distance hikers

At the high point of the Kittatinny Ridge escarpment, APPA passes beneath the existing B-K Line. The trail enters the cleared ROW and follows the corridor for 400 to 500 feet before reentering the woods. Hikers pass close by two large, galvanized-steel lattice tower structures. The clearing creates views both east and west. Looking west, the view overlooks the Delaware River Valley, and the cleared corridor is clearly discernible for several miles.



Looking west from APPA at the B-K Line crossing in New Jersey.

This view demonstrates low to moderately low unity because the large, linear corridor detracts from the overall harmony of the landscape. Similarly, intactness is low, because the lattice towers encroach on the natural surroundings and the wide swath of cleared vegetation visually detracts from the otherwise forested landscape. The view demonstrates average vividness because the transmission line structures and corridor create a human-made anomaly along the primitive foot trail.

Alternative 1, 2, and 2b Alignment Crossing the Delaware River



Looking south from Delaware River toward existing transmission line. Wires are visible midway up the frame.

Primary viewer groups: boaters, canoers/kayakers, anglers, campers

The alignment for alternatives 1, 2, and 2b would cross the Delaware River between river miles 222 and 223, north of Depew Island. As is typical in DEWA, the river is broad, shallow, and swift, and the water is relatively clear. It is most common for river users to let the current carry them downstream and then take out; therefore, the most common view would face downstream to the southwest. From the river, views are limited by the ridges to the east and west and the deciduous vegetation extending to the water's edge. Moving upstream or downstream, views are often free of human-

made developments for several minutes before reaching a recreation facility or a group of riverfront cottages. Large, steel lattice towers and conductors (i.e., wires) can be seen from the river as boaters pass under the existing B-K Line. One tower can be seen at the top of the Hogback Ridge on the Pennsylvania side of the river, and two more are clearly visible within the cleared corridor climbing an eastern ridge through Hamilton River Campsites.

This view has moderately high unity because the river bending away from the viewer adds harmony. Intactness is average to moderately high because the conductors can be seen, but are not overt, and because the tower on Hogback Ridge is so heavily screened by trees. Vividness is similar to other views from the river; the combination of water and vegetation, particularly during fall color, is highly memorable.

Hamilton River Campsites

Primary viewer group: campers

The Hamilton River Campsites, on the New Jersey side, are accessible to the public by watercraft only. About 10 designated primitive campsites follow the bank beneath a canopy of young deciduous trees. Very little vegetated understory exists, giving the area an open appearance. The lack of vehicular roads or constructed appurtenances, except for a wooden restroom, provides a rustic backcountry aesthetic. The existing B-K Line transmission corridor creates a noticeable gap in the scattered tree cover a few hundred feet away.

This view has high unity because the visual elements all complement one another to



Current view within Hamilton River Campsites, looking north. The existing corridor that alternative 2 would follow can be seen in the middleground to the right, although it is screened by tree trunks.

create a pleasing forested bank, shown in the photograph during autumn color. Intactness is high, enhanced by the trees that, for the most part, screen the utility corridor and views of the lattice tower structure. The remote aesthetic, proximity to the river, and vegetation pattern enhances vividness, which is high.

McDade Trail, Community Drive, and Schoonover House



Facing south along McDade Trail; existing no action transmission line structure is visible at left; alternative 2 would replace structures, following the existing route.

Primary viewer groups: hikers, bicyclists, scenic drivers; also nature photographers, bird-watchers, visitors interested in regional history

McDade Trail extends approximately 32 miles—more than three-quarters the length of DEWA—along the Pennsylvania side of the river. The trail parallels Community Drive near the DEWA Headquarters building. Community Drive is a narrow, quiet lane with little visible development other than a few residences. The historic Schoonover House and the Van Auken Barn can be seen along the drive. The existing B-K Line, which the alignment for alternatives 1, 2, and 2b would follow, crosses the trail adjacent to a small meadow.

Van Campens Glen Trail

Primary viewer group: day hikers; also, nature photographers and bird-watchers

Van Campens Glen Trail connects Watergate Recreation Site at the north with Van Campens Glen Picnic Area to the south, a distance of about 2 miles. The trail follows Van Campens Brook through a scenic glen shaded by shagbark hickories and hemlock trees, and passes a waterfall. Before reaching Watergate Recreation Site to the north, the trail passes directly beneath the existing B-K Line. The existing cleared corridor creates an abrupt visual change compared with the previously shaded hike. The grassy-scrub vegetation within the corridor varies from 3 to 7 feet high.

Unity and intactness for this view are low, as the lattice towers and abrupt clearing



Current view facing northwest along the B-K Line corridor from Van Campens Glen Trail; alternatives 2 and 2b would replace existing structures along this route.

create visual conflict and intrusion. Vividness is average, because the towers and corridor themselves are vivid against the landscape. The variety of vegetation surrounding the trail adds to the scene's memorability.

Hamilton Trail



Current northwest-facing view of Hamilton Trail at B-K Line corridor crossing, which alternatives 2 and 2b would follow.

Primary viewer group: day hikers

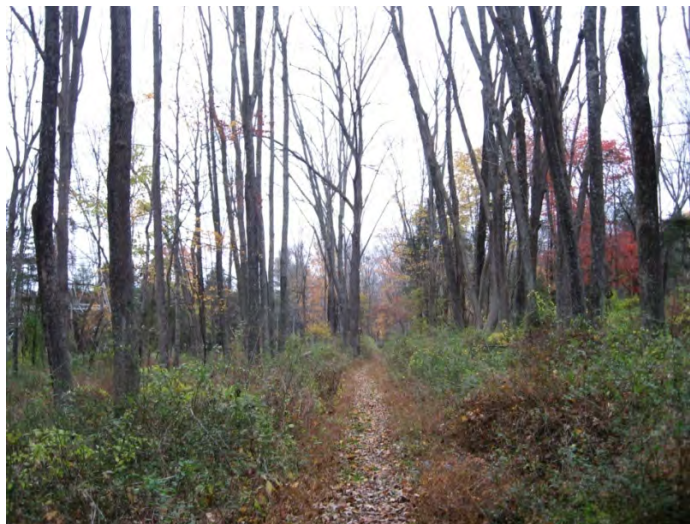
Hamilton Trail is accessed by two obscured trailheads accessible from Old Mine Road (each marks the start and/or end of the trail), or via Orchard Trail near Millbrook Village. The trail is pleasant and mostly flat, following an old asphalt roadbed. The surrounding forest is mixed deciduous, pine, and hemlock. Approximately midway along the trail, the existing B-K Line passes overhead. The corridor is cleared of trees, and abruptly intersects the shaded hike, while tall brush fills the alignment. Looking south, the cleared swath affords views toward Kittatinny Ridge, where the corridor can be seen to its crest.

Unity and intactness are low to average because the intrusion of the cleared corridor and large infrastructure elements detract from the surrounding landscape. Vividness is also low to average, because the towers and corridor create a vivid view, although incongruous with the surrounding landscape.

Pioneer Trail

Primary viewer group: day hikers

Pioneer Trail begins at an intersection with Hamilton Trail (discussed above) and winds down a steep, conifer-covered slope before tracing the edge of a terrace overlooking the Delaware River. Hiked as a loop, the two trails total about 6.5 miles. The vegetation surrounding Pioneer Trail is similar to that of Hamilton Trail. Interesting sights along this trail include a pair of abandoned houses with a car and associated detritus, as well as several collapsed stone boundary walls. The existing B-K Line passes over the Pioneer Trail near the east end of the terrace. One of the lattice towers can be seen in the corridor from the trail through the trees, as shown in the image. The cleared area is a bit more overgrown than at the Hamilton Trail; thick undergrowth and shrubs are 3 to 4 feet high, and canopy trees overhang the corridor.



Looking north from Pioneer Trail toward existing transmission line structures; the alternatives 2 and 2b would follow the same corridor.

Similar to Hamilton Trail (as discussed above), unity, intactness, and vividness all rate low to average at Pioneer Trail where the transmission line crosses the trail.

Watergate Recreation Site



View within Watergate Recreation Site, looking south. Existing transmission structures related to the no action alignment which alternatives 2 and 2b would follow are visible through trees.

Primary viewer groups: picnickers, day hikers, photographers, anglers

Watergate Recreation Site is an expansive, grassy day-use area accessed from Old Mine Road. Amenities include a parking lot, restrooms, and dozens of picnic tables set on a large lawn area. Several ponds associated with Van Campens Brook are visible. The site is in a small valley and is visually enclosed and inward-looking because it is surrounded by large trees and higher topography.

The existing B-K Line that the alignment for alternatives 1, 2, and 2b would follow is visible, abutting the southern end of the lawn area. Although intermittently screened by a row of large trees, the existing transmission line corridor can be clearly seen from many vantage points, with picnic areas farther south more affected than others. The transmission line ascends hills to the east and west; the corridor to the east can also be clearly seen from the site as it climbs a slope.

This viewshed has high unity because the landform, water, and managed landscaping combine to form a coherent scene. Intactness is average, because the existing transmission towers and line encroach somewhat on the scene. Vividness is also average, because the visual elements are attractive but not remarkable in the context of the environment.

Millbrook Village

Primary viewer groups: visitors interested in local history, picnickers, photographers

This collection of historic structures is between Old Mine Road and Van Campens Brook, in the location of a historic grain mill and the hamlet that grew up around it during the mid-1800s. The village is part of the Old Mine Road Historic District. Some of the farmhouses and other structures are original to the location, while others were relocated here in the 1970s from nearby areas. Most of the buildings follow basic Georgian style: one- or two-story white clapboard, with vertical windows and dark-colored



Typical view within Millbrook Historic Village. The proposed alignment for alternatives 2 and 2b would pass near the village. However, it would not be readily seen within the village.

shutters. Green lawns and landscaping fill the spaces created by the buildings, and there are many trees within the village. A central gravel lane, around which many of the buildings are oriented, runs northeast to southwest through the village and then continues south where it connects to the Watergate Recreation Site.

Today, the village is staffed on Saturdays and other days in summer and for special events the rest of the year, such as Millbrook Days, when volunteers demonstrate crafts and skills of the period.

The village is just northwest of Watergate Recreation Site and lies in the same small valley, which is visually completely bounded by tree-covered ridges. Unity is moderately high because the visual elements—both human-made and natural—combine to create visual coherence. Intactness is reduced by the visible utility lines and pole. Vividness is moderately high, because this collection of historic buildings forms a memorable scene.

US 209, Little Egypt Road



Current view south along US 209 at intersection with Little Egypt Road. The existing (no action) B-K Line corridor alternatives 2 and 2b would follow is located in the distance beyond the middleground ridge, and is not visible. Foreground utility lines adjacent to the highway are unrelated to the alternatives.

up- or downvalley toward the forested slope of Kittatinny Ridge. US 209 is a good choice for sightseeing, providing views of the area's fall foliage color display.

This scene demonstrates moderately high unity. Intactness is also average, because the guardrail and visible utility lines detract from the landscape elements. Vividness is average for this view, reduced by the lack of dramatic or contrasting features.

Primary viewer group: scenic drivers, commuters

US 209 serves as one of the primary gateways to DEWA, providing visitors access from Pennsylvania. Entering Delaware Water Gap just south of Bushkill and exiting near Milford, the highway lies within the boundary of DEWA for 21 miles and is listed as one of its scenic and alternate routes (NPS 2010o). The highway is “a straight and level ride past farm fields on the east side and Pocono Plateau on the west. Several side roads turn west to go to the sites of waterfalls” (NPS 2010o). The area near the intersection with Little Egypt Road offers a typical view along the highway: little development can be seen, and the openness of cornfields along the highway provides wide view opportunities

Cliff Trail, Riverview Overlook

Primary viewer groups: hikers, photographers

Accessed from US 209 via Raymondskill Road at the northern end of DEWA, the Cliff Park Trail system offers a series of broad vistas along Cliff Trail, which climbs to a height of 500 feet above the valley floor. A wide, straight trail passes through a mixed hemlock/pine forest for about 2 miles before reaching the Riverview Overlook, which offers wide views to the east, north, and south across the Delaware River Valley.

Farmed fields are the only obvious human-made elements in the immediate view; no transmission alignments are apparently visible. The river draws the eye into the distance to the south, as seen in the image. To the north, the monument at High Point State Park, New Jersey, may be seen.



Current view looking southeast across Delaware River Valley. Existing B-K Line corridor that alternatives 2 and 2b would follow cannot be seen. The proposed transmission line may be seen from this scenic vista.

Unity in this view is exceptionally high. The combination of landform, water, and vegetation, including the farmed fields, creates an extremely harmonious scene. Few to no encroachments can be seen; therefore, intactness is also high. Likewise, vividness, or memorability, is highly enhanced by the high vantage point and appealing combination of natural features.

Salamovka House/Delaware River Valley View



Looking west across Old Mine Road from Salamovka House. The B-K Line corridor cannot be seen due to trees to the left.

Primary viewer group: scenic drivers

The Salamovka House is a large historic home situated on a high bluff along Old Mine Road north of Millbrook Village. Recently, the house was used as a general store. Views from the large porch of the farmhouse span the Delaware River Valley to the west toward the ridge behind Bushkill, Pennsylvania. A large patch of cleared vegetation is currently maintained across Old Mine Road by the NPS to maintain this view.

The existing B-K Line is not visible because of the angle of the view and screening vegetation. This view demonstrates average to moderately high unity, because the visible elements do not combine to enhance harmony. The noticeable utility line and road encroach somewhat on the scene from this viewpoint (although less so in

the case of views from the house itself). Therefore, intactness is average. Vividness for this scene is average, enhanced somewhat by the elevated vantage point and unique context of the historic house.

Raccoon Ridge, APPA

Primary viewer groups: hikers, bird-watchers

Atop a narrow ridge highpoint, this APPA vista offers panoramic views of the Delaware River and valley to the north and the Great Valley to the south. Undulating ridges, continuous deciduous forest cover, and a lack of noticeable human development enhance the view's integrity. The trail's exposed rocky outcrops create visual interest in the foreground as well.

Raccoon Ridge is an extremely high-quality viewpoint. Unity is very high, given the harmonious combination of natural features viewed from a superior position. Intactness is high because few visual encumbrances can easily be spotted that would detract from the scale of the scene. Vividness is very high, particularly when viewed in the fall, when color and texture are very striking.



Current view from summit of Raccoon Ridge, facing north. The no action alignment that alternatives 2 and 2b would follow is at such a distance that is barely discernible.

Vista from Future APPA Relocation Section

Primary viewer group: future APPA hikers

North of Sunfish Pond, APPA follows the Kittatinny Mountain ridgetop, which is a mixture of copses and rocky, scrub-covered bluffs. The view faces northeast, following the Delaware River Valley upstream. The next hillside rises to the right, and a cluster of small trees and brush to the left provides a visual frame, focusing the eye into the distance. Other than farmed fields paralleling the river in Pennsylvania, the view lacks much obvious human-made development. The existing B-K Line crosses DEWA in the distance, and the alignment proposed for alternative 3 climbs the nearby ridge on the opposite side, away from the viewer; therefore, it would not be seen.



Existing view north from a knoll planned for inclusion in a future alignment of APPA.

The combination of interesting landform, water, and vegetation cover create high vividness. These visible elements combine to create a highly harmonious view; therefore, unity is high. No apparent visual encroachments detract from the overall scene; therefore, intactness is high as well.

Rattlesnake Mountain

Primary viewer group: hikers

Along APPA on a narrow stretch of ridgeline, Rattlesnake Mountain provides an expansive and distant view. The panoramic view looks west across the Delaware River and DEWA landscape. A visual sense of remoteness, outstanding (although ephemeral) display of fall color, and exposed rock outcrops contribute to very high vividness. Several scattered communication towers can be seen on a number of distant ridgetops but are at such a distance as to be considered negligible. The existing B-K Line, approximately 10 miles away, cannot be seen. Intactness is high, given the great distance to any noticeably encroaching elements, such as the towers. Unity is enhanced by the distinct layers of the scene: the rocky foreground from which to view, the undulating landscape and dramatic vegetation colors, and the distant background ridge.



Looking west from Rattlesnake Mountain viewpoint. The B-K Line corridor that the alternatives 2 and 2b alignment would follow is too far away to be seen.

Blue Mountain



Current view to the west from APPA at Blue Mountain. The B-K Line corridor that alternatives 2 and 2b would follow occurs too far away to be seen.

Primary viewer group: hikers

Blue Mountain viewpoint is roughly 1 mile north of Rattlesnake Mountain, with similar views to the west. There are more ridgetop trees here, but the view is still panoramic. Given the distance to the existing B-K Line corridor, 10 miles or more, the transmission line is not discernible from this viewpoint.

Similar to Rattlesnake Mountain, unity and intactness are high. Vividness is very high.

Sunrise Mountain Pavilion

Primary viewer group: sightseers, hikers

At the top of a 1,600-foot-high knoll, Sunrise Mountain scenic overlook is a developed viewpoint operated by Stokes State Forest, New Jersey. Foreground deciduous trees frame the view to each side and from below, screening the view to some extent. APPA is below the developed overlook. Some scattered rural residential development is visible.

Unity from this view is moderately high, because the visual elements appear coherent, but the scene is limited by the lack of a strong focus. Intactness is average to moderately high, reduced somewhat by the screening effect of the tall foreground trees. Vividness is moderately high, given the expansiveness of the vegetation cover and the high point from which to view.



Overlook view at Sunrise Mountain. The existing transmission corridor and alignment that alternatives 2 and 2b would follow cannot be seen due to distance and view angle.

ALTERNATIVE 3

Alternative 3 would follow the same route as alternatives 1, 2, and 2b to the Bushkill Substation, where the alignment would diverge to the southwest, following a horseshoe-shaped existing transmission line corridor. The route would parallel US 209 to the north among large-lot residential developments and a golf course. Just east of the Shawnee Mountain Ski Area, the transmission line would turn south, passing through an undeveloped tract of forest. The alternative 3 alignment would enter DEWA from the north at Mosiers Knob Road. On the east side of the Delaware River, the route would cross River Road and McDade Trail about 1 mile south of the Smithfield Beach Picnic Area and 0.75 mile north of the Hialeah Picnic Area. On the east side of the Delaware River in New Jersey, the route would pass through Worthington State Forest. The route would perpendicularly cross APPA before exiting DEWA and state forest boundaries.

The route would then trend northeast, on the east side of the upper and lower Yards Creek reservoirs, roughly paralleling the DEWA boundary and APPA for approximately 6 miles. The distance between the trail and the transmission line route would vary between about 0.25 mile and 1 mile along this 6-mile stretch. For nearly 2 miles of this stretch, the route would follow (but remain outside) the DEWA boundary, where it would also be closest to APPA—approximately 0.25 mile away and topographically lower. About 2 miles farther north, the alternative 3 route would then reconnect with the B-K Line alignment, continuing east beyond the study area boundary to the Roseland Substation.

Trails crossed by existing ROW:

- APPA
- Delaware River Water Trail
- McDade Trail

Scenic features crossed by existing ROW:

- River Road scenic auto tour
- Old Mine Road scenic auto tour

Scenic resources with potential views of alternative alignment:

- Multiple scenic viewpoints along APPA
- Walter's Tract River Campsite
- Hialeah Picnic Area
- Hialeah Air Park
- Smithfield Beach
- Turtle Beach
- Shawnee Resort
- Hidden Lake Dam

Alternative 3 Alignment Crossing APPA

Primary viewer group: hikers

Just south of the Raccoon Ridge vista, the existing transmission corridor that alternative 3 would follow passes perpendicularly over APPA at the crest of Kittatinny Ridge. Three wood monopoles are clearly seen from the trail, and the corridor is approximately 90 feet wide. The cleared corridor affords views in two directions. A view across the Delaware River Valley can be seen to the northwest and some distance beyond. The river itself cannot be seen from the trail. To the southeast, the view is wider and overlooks the Yards Creek Reservoir area and beyond. The combination of visible water and the adjacent landform make this the more appealing view.



Current view along APPA beneath the transmission line crossing proposed for alternative 3, looking south.

The scene has average unity, as demonstrated at other utility crossings; the poles and conductors, combined with the linear vegetation cut, conflict with the natural environment. The utility line is very

apparent in the clearing; therefore, it creates a significant encroachment on the scene. Intactness is moderately low to average. Vividness maintains a moderately high rating because the transmission line is an anomaly. However, the cleared corridor provides some views into the distance. Vividness is also enhanced by the variety and patterning of vegetation seen.



View from APPA overlooking Yards Creek Reservoir facilities to the south. The existing transmission corridor that alternative 3 would follow is somewhat discernible across the reservoir.

View Overlooking Lower Yards Creek Reservoir

Primary viewer group: hikers

Above the two Yards Creek Reservoir water bodies, this view south from APPA exhibits high quality. The combination of distinct foreground, middleground, and background elements contribute to very high unity and vividness in this view. Specifically, the contrasting foreground texture of the stone and water enhance these elements. The existing transmission corridor that alternative 3 would follow is visible below, which reduces intactness to moderately high.

Rattlesnake Swamp Ridge, View 1

Primary viewer group: hikers

At the eastern edge of DEWA, Kittatinny Ridge drops steeply into the Great Valley to the south, and for several hundred feet APPA traces the edge of a ledge following a series of narrow rocky outcrops. The experience is unusual for APPA in this area, because most other segments pass beneath forest canopy, limiting continuous outward views. Many opportunities are present to view up and down the valley, which is for the most part covered by continuous forest. The existing transmission line that alternative 3 would follow is clearly visible below. In contrast to the wooden poles used elsewhere along this alignment within DEWA, the tower structures in this segment consist of larger lattice towers, which create a greater encroachment on the scene compared with wood.



Current view from APPA to the northeast from ridge near Rattlesnake Swamp. An existing transmission structure along the alignment that alternative 3 would follow is visible to the lower right.

The view quality from several points along this escarpment ledge is very high. Unity, intactness, and vividness are all high to very high.



Current view from APPA along ridge near Rattlesnake Swamp, looking south. The existing transmission corridor alternative 3 would follow parallels the trail for 3 miles and the superior view position from APPA emphasizes visibility of the corridor against the vegetation.

Rattlesnake Swamp Ridge, View 2

Primary viewer group: hikers

Farther north along APPA, another high-quality viewing opportunity exists along the same ridge, this one looking to the south toward the Yards Creek reservoirs.

As with the first view, this expansive view overlooks mostly uninterrupted forest cover for many miles. The addition of visible water enhances the vividness of the view, which is very high. Unity and intactness are high.

Catfish Fire Tower

Primary viewer group: hikers

The Catfish Fire Tower north of the Mohican Outdoor Center facility is situated at the top of a small bald knoll. APPA passes just beneath the 60-foot New Jersey Forest Fire Service tower structure. A sign at the base of the stairs prohibits entering the tower; however, no gate or barrier impedes passage. A narrow view looking southeast can be seen before the gravel road trail reenters the woods descending the knoll.

Because the tower is not an NPS facility and cannot be lawfully entered, views from the tower platform cannot be considered for this study. However, the view from the trail was evaluated. Unity from this view is moderately high. Intactness is very high. Vividness is moderately high, because it is similar to many points along APPA in the area.



Looking southeast from APPA near Catfish Fire Tower. The existing corridor that alternative 3 would follow is near the base of the ridge that APPA follows, and existing structures cannot be seen from the trail.

Alternative 3 Alignment Crossing the Delaware River



Current southeast-facing view of corridor crossing location proposed for alternative 3, seen from the New Jersey bank of the Delaware River.

Primary viewer groups: canoers, kayakers, anglers

The existing alignment that alternative 3 would follow crosses the Delaware River between Tocks and Labar islands. An H-pole can be seen on the Pennsylvania bank, while three poles are visible upslope from the New Jersey bank. The poles and narrow corridor are only briefly visible at the crossing point because the poles cannot be seen above the canopy created by surrounding vegetation, which somewhat screens the alignment.

The slow-moving river and landform create very high unity. While the utility crossing is visible, its narrow width

and the small scale of the wood poles help it to be somewhat visually absorbed into the hillside; therefore, intactness is not greatly reduced by its encroachment. Vividness for the scene is high.

Walter's Tract/Hialeah Island Campsites

Primary viewer group: watercraft campers

Three campsites accessible from the river compose Hialeah Island Campsites and Walter's Tract. Walter's Tract campsite, #106, is on the Pennsylvania bank north of the Hialeah Picnic Area and adjacent to McDade Trail. Campsite #106 includes a metal fire ring centered in a large cleared area surrounded by hardwoods. The river is partly visible through the deciduous understory. The existing transmission corridor that alternative 3 would follow crosses the river just north of this campsite. However, the existing lines and a short segment of cleared corridor can only be seen from the river's edge, not from within the campsite. It is likely that more of the existing structures and conductors would be visible during winter leaf-off conditions.



View within Walter's Tract campsite, adjacent to Delaware River. The existing transmission corridor that alternative 3 would follow is behind trees in the center of the image.

This view has high unity because the water, sloping landform, and trees combine to create a coherent river scene. Intactness is also high because no encroaching elements can be seen. Vividness is average.

Alternative 3 Alignment from River Road



River Road, looking north. The existing alignment that alternative 3 would follow is visible in the background to the right.

Primary viewer groups: scenic drivers, bicyclists

River Road begins at I-80 and winds north along the floodplain edge of Pennsylvania, ending at Bushkill Village. The nearby US 209 carries most through traffic, so River Road is used primarily for sightseeing. The road passes farm fields and mixed woods and provides infrequent glimpses of the river. The existing transmission line that alternative 3 would follow crosses River Road just south of Tocks Island, then turns north upslope. Farther north along the road, the cleared corridor is plainly visible across the river as it crests the far ridge.

This view is typical of much of River Road: the lanes are narrow and vegetation clings to each side, with regular vistas opening up across farmed fields. Unity is high for this view. The small utility line in the foreground and the visible corridor reduce intactness to moderate. Vividness is high, enhanced by the contrasting scenic road, field, and sloping landform backdrop.

Alternative 3 Alignment Crossing McDade Trail

Primary viewer groups: hikers, bicyclists

As discussed previously, the McDade Trail extends for approximately 32 miles on the Pennsylvania side of the Delaware River. To reach this view, access to the trail is provided at a trailhead just north of Hialeah Picnic Area.

A hill and vegetation to the west block views from the trail until the transmission line crossing, where a wooden H-pole is clearly visible immediately adjacent to the trail. Three wooden poles can be seen on the opposite (east) side of the river, but the transmission line turns sharply north (upstream) and the corridor is blocked by vegetation. Not much of the transmission line can be seen to the west due to a sharp topographic incline. However, the corridor opening is an obvious change in a mostly wooded area. Just north of the crossing, the trail turns sharply west and vegetation blocks views of the transmission line for hikers traveling south.



Current view looking east across Delaware River toward the existing corridor proposed for alternative 3 (visible in center).

Viewed from the transmission line crossing, unity is moderately high because the river and dense vegetation in the foreground dominate the view. The corridor across the river is narrow and the wooden poles visually blend in with the surrounding trees; therefore, intactness is moderately high. Vividness is average, because the view angle on the river is perpendicular and not unusual.

Hialeah Picnic Area



Current view within Hialeah Picnic Area. The existing corridor that alternative 3 would follow is not visible.

Primary viewer groups: picnickers, hikers

Hialeah Picnic Area is accessed from River Road on the Pennsylvania side of DEWA. Situated on a long, narrow terrace just above the river level, the area provides opportunities to view the river, but most areas are densely screened by trees along the riparian edge. Many tall trees are also clustered between picnic sites and along the narrow, gravel access road, limiting distant views within the site. The existing utility line that alternative 3 would follow crosses the area about 1 mile to the northeast but cannot be seen from within the picnic area due to the surrounding trees. However, it is very likely that the expanded transmission line and taller towers would be visible from the picnic area's one-way exit road.

Views within the picnic area exhibit high unity and intactness, enhanced by the lack of distracting or intrusive elements in this primarily natural scene. Vividness is moderately high, enhanced by the proximity to the river's edge.

Smithfield Beach

Primary viewer groups: river recreationists (canoers, kayakers, inner tubers, boaters), picnickers, swimmers

Smithfield Beach is a large, developed day use and boat launch area accessed from River Road on the Pennsylvania side of the river. This beach is about 1 mile north of the point where the alternative 3 route would cross River Road. From the wide, grassy waterfront area, a segment of the alternative 3 corridor can be seen across the river as it climbs the far slope; however, no poles or tower structures are visible.

Otherwise, the area near the river is park-like and visually pleasing. The swim beach and the boat ramp are the



Current view toward Delaware River from Smithfield Beach, facing east. Existing corridor proposed for alternative 3 to follow is visible on the far slope.

only waterfront areas with unobstructed river views; elsewhere at Smithfield, the river is screened by tall trees.

This photograph of Smithfield Beach exhibits high unity and intactness because the cleared corridor is visible but does not dominate the viewshed. Vividness is moderately high.

Turtle Beach Recreation Site



View facing south from Turtle Beach picnic and swim area.

Primary viewer groups: picnickers, swimmers, river recreationists

Turtle Beach is accessed from Old Mine Road, between two of the proposed alignments considered for this report. It is north of the existing transmission line that alternative 3 would follow and south of the B-K Line. Turtle Beach was opened for public use in 2010 and is one of the few grassy, park-like riverside recreation areas on the New Jersey side of DEWA. Large deciduous trees to the south and west of the picnic area block views; the existing transmission line cannot be seen from the picnic area. The beach itself is farther south and is entirely grass (no sand). It is a large,

open expanse. Another picnic area is farther inland; many large trees to the south might block views in that direction. The existing transmission line is not apparently visible downstream.

Unity and intactness are very high. Vividness is high because the water, adjacent landforms, surrounding tree cover, and incorporation of the developed area compose a memorable view.

Shawnee Inn Beach

Primary viewer groups: resort patrons, river recreationists, golfers

The Shawnee Inn is a private golf resort and hotel northeast of the Delaware Water Gap, but outside DEWA boundaries. The existing transmission line that alternative 3 would follow crosses the Delaware River approximately 2.3 miles east of the resort. Looking upstream from a sloping gravel canoe launch on the bank of the resort's large, landscaped grounds, the existing transmission line cannot be seen. However, it is possible, although unlikely, that widening the cleared zone under alternative 3 may cause the corridor to be visible.

The view at the river's edge exhibits high unity. Intactness is also very high. Vividness is moderately high to average, given that the view is somewhat typical of other, less scenic areas along the river.



Shawnee Inn resort facilities.



Shawnee Inn Beach. The existing alignment that alternative 3 would follow is too far away to be seen.

Hialeah Air Park

Primary viewer group: model airplane club members

The Roxbury Area Model Airplane Club flies radio-controlled model airplanes at the Hialeah Air Park, which is accessed from River Road north of Smithfield Beach. The park is a large, open lawn area visible from River Road. Farmed fields abutting the site and its level to inferior position emphasize the site's broad floodplain aesthetic. The existing transmission line that alternative 3 would follow can be seen ascending the far hillside about 1 mile away across the river to the south. The corridor is not visible on the near side of the river. As at Smithfield Beach, the existing wooden towers do not extend above the canopy, and vegetation has grown into the corridor, making the towers blend in with the landscape somewhat—more so here than at Smithfield Beach because the distance is slightly greater.



Current view of Hialeah Air Park, looking south. The existing corridor proposed for alternative 3 can be seen in the background, climbing the slope to the right.

This view demonstrates high unity because the scene is highly cohesive. Intactness is moderately high, impeded just slightly by the visible transmission corridor clearing and minor elements in the foreground.

Vividness is low to average, reduced by the lack of dramatic or remarkable features.

Hidden Lake Dam



Current view of Hidden Lake Dam. The existing alignment proposed for alternative 3 to follow cannot be seen.

Primary viewer groups: picnickers, anglers, hikers

Hidden Lake is a small, dammed lake on the western boundary of DEWA between US 209 and River Road. Access is from Hidden Lake Road / Highway 517, which is not very busy. A short trail begins at the northernmost parking lot and parallels the lake, which anglers access for fishing, for about 500 feet. The alternative 3 transmission line would be behind (northwest of) the lake. There currently is too much vegetation to see the existing transmission line. Aerial photographs show a park road encircling part of the lake and the larger parking lot to the southwest.

The photographs show trails leading to the lake from the northwest, but none from the southeast. Therefore, it is likely that most visitors face away from the existing transmission line that alternative 3 would follow.

This view exhibits very high unity and intactness. The fall color seen here and the combination of natural elements, including the still water's reflectivity, make it highly vivid.

ALTERNATIVE 4

The alternative 4 alignment would be 162 miles long and would follow the existing B-K Line through northeastern Pennsylvania until reaching Bushkill Substation. As with alternative 3, the alternative 4 alignment could then veer southwest of the Bushkill Substation to create a loop to the south that would reconnect with the B-K Line east of the parks. However, the alternative 4 loop could extend farther south compared to alternative 3, crossing a total of approximately 1 mile of DEWA as the route rounds the southern DEWA boundary. This alignment would not cross Worthington State Forest, and would cross but not follow any part of APPA.

Leaving Bushkill Substation, the route would travel southwest, paralleling the western DEWA boundary and passing through several rural residential communities. East of East Stroudsburg, Pennsylvania, the alignment would turn to the south. This area is forested and includes scattered golf courses and vacation communities. A new ROW would be required for the alternative 4 transmission line in this area.

The route could continue south across I-80 and veer east just north of the Cherry Valley Golf Course, where the alternative 4 alignment could turn across a 0.4-mile stretch with no ROW to meet and follow another existing transmission line with a 100-foot ROW.

In this section, the proposed alignment for alternative 4 would cross about 1 mile of DEWA land near its southern extent, roughly following the DEWA boundary, and would perpendicularly cross APPA near Totts Gap Road. Just south of DEWA, the alternative 4 alignment would turn east and travel 2.7 miles over land with no existing ROW, where the alignment would cross the Delaware River adjacent to a historic rail bridge. On the east side of the Delaware River in New Jersey, the route could travel east, passing through Knowlton Township in Warren County, which is characterized by farmed fields, rural communities, and forested patches. This route would follow a railroad ROW for 21 miles, the

construction of which left a discernible linear path through the landscape where cut and fill segments are visible in the terrain. However, the alignment is vegetated to either side. Near Andover, New Jersey, the alternative 4 proposed route could rejoin the B-K Line and coincide with that route southeast to Roseland Substation.

Trails crossed by existing ROW:

- APPA (crossing coincides with alternative 5, discussed below)
- Slateford Loop Trail (not examined for this report)

Scenic resources with potential views of alternative alignment:

- Mount Tammany summit
- Karamac Trail

Mount Tammany Summit

Primary viewer groups: hikers, photographers

The viewpoint at the summit of Mount Tammany, New Jersey, provides an excellent vantage point from which to view the Delaware Water Gap and surrounding landscape from above. The summit view is reached via the Red Dot (Tammany) Trail, which starts at the Dunnfield parking lot, accessed from westbound I-80. The trail climbs 1,250 feet in 1.5 miles and is extremely steep and very rocky, similar to a talus slope in many places, making hiking challenging. The trail is forested with deciduous trees and no views can be seen until a small southeast-facing clearing about halfway to the top, from which Mount Minsi can be clearly seen approximately 1 mile to the south. A small clearing appears again near the summit, providing views to the south that are partially blocked by foreground vegetation. From a boulder-covered slope at the 1,527-foot summit, Mount Minsi (which is at a slightly lower elevation, at 1,463 feet) can be seen again. Views of the Delaware in both directions are also quite scenic from this position.



Current view from Mount Tammany summit, looking southwest across Delaware Water Gap to Mount Minsi.

This is an example of an extremely high-quality view because it demonstrates very high unity and vividness. Intactness is also high, although impeded somewhat by the encroachments of I-80 and PA 611 and the railroad that parallels PA 611 within the Delaware Water Gap.

Karamac Trail



Karamac Trail along the Pennsylvania side of Delaware River. Piers from a deconstructed rail bridge are visible. The existing alignment that alternative 4 would follow is not visible.

Primary viewer group: hikers, river recreationists

Karamac Trail is accessed from Old Mine Road just east of the point where I-80 bridges the Delaware River. The short trail provides access to the Delaware River at the former New York, Susquehanna and Western Railroad Bridge abutment and the site of the former Karamac Hotel. The trail closely hugs the river, which is many feet below, and observant hikers may notice several examples of historic stone masonry and slope engineering related to the rail bed. Stone support piers in the river visible from the northern end of the trail are all that remains of the railroad's truss bridge.

No existing transmission structures are visible. However, it is remotely possible that the alternative 4 transmission line may be visible from this point.

Unity at this view is high, reduced somewhat by the concrete treatment of the bank. Intactness is high; the bridge piers do not encroach on the scene but add visual interest. Therefore, vividness is very high in the scene.

Arrow Island Overlook

Primary viewer group: any

Arrow Island Overlook is on the south side of the river from PA 611. Visual connection to the river below is mostly screened by foreground and riparian trees and shrubs. Mount Tammany is plainly visible above across the river. The overlook faces northeast, away from the proposed alternative 4 transmission line. The overlook is also close to the river elevation, with Mount Minsi directly to the south, forming a natural barrier between the overlook and the transmission line location.



Arrow Island Overlook view toward Mount Tammany.

Therefore, the proposed alternative 4 transmission line cannot be seen from this overlook.

The integration of the simple overlook into the landscape enhances the unity of the scene, which is very high. Few visual encroachments are visible; therefore, intactness is high, yet could be enhanced by opening greater views to the river below. The unique landform of Mount Tammany and its angled,

exposed rock layers, coupled with the surrounding vegetation and glimpses of the river, combine to create very high vividness.

Alternative 4 Alignment Crossing the Delaware River



Decommissioned railroad bridge as viewed from the Delaware River. The alignments for alternatives 4 and 5 both propose to cross the river within the rail ROW.

Primary viewer groups: kayakers, canoeists, anglers

The alternative 4 alignment would cross the Delaware River adjacent to an existing decommissioned railroad bridge between the riverside towns of Slateford and Portland, Pennsylvania. This stretch of river can be very shallow and difficult to navigate; therefore, access to this view would be restricted to those with appropriate watercraft or on foot from the Pennsylvania bank. I-80 hugs the riverbank on the New Jersey side; therefore, views from that side are restricted. The bridge, the Delaware River Viaduct, is approximately 0.8 mile beyond the DEWA boundary and therefore outside the river

segment designated as scenic and recreational, though it is possible the crossing may be visible from the designated river section. The historic concrete arch span bridge itself is very scenic and contributes considerable vividness to the scene. The combination of the scenic built feature within the surrounding landscape also creates very high unity. Intactness is very high as well, because no encroachments disrupt the view.

Alternative 4 Alignment Crossing APPA

Primary viewer group: hikers

The existing transmission line proposed for the alternative 4 alignment crosses APPA just inside the westernmost DEWA boundary. The corridor at the trail intersection is overgrown with woody vegetation. The corridor crosses the trail nearly perpendicularly, and provides views to the north and south. Views in both directions overlook forested valleys, and the cleared corridors are visually obvious and distracting into about the middle of the view. Two parallel cleared corridors, separated by a vegetated strip about 200 feet wide, are visible looking north. Two wooden double poles stand to either side of the trail.



APPA, viewed at the crossing of the existing transmission line alignment proposed for alternatives 4 and 5.

This crossing viewpoint is rather typical. Unity is average. Intactness is low. Vividness is moderately low.

ALTERNATIVE 5

Decommissioned railroad bridge as viewed from Delaware River. The alignments for alternatives 4 and 5 both propose to cross the river within the rail ROW.

In contrast to alternative 4, the alternative 5 alignment would not follow any portion of the B-K Line, but would follow an existing transportation corridor rather than a utility route. The alternative 5 alignment would follow the same proposed route through DEWA as alternative 4. The alternative 5 alignment would consist of 110 miles from the Susquehanna Substation to the Roseland Substation. The majority of the route would follow I-80.

Starting at the Susquehanna Substation, the alternative 5 alignment would follow an existing 230-kV transmission line with an approximately 150- to 200-foot ROW. It would pass through farmland for a few miles before

intersecting I-80, where it would diverge from the existing 230-kV alignment. The interstate is a two-lane road each direction, and includes a narrow, planted median. Just west of the DEWA boundary, the proposed transmission line would veer off the I-80 ROW and follow the same route proposed under alternative 4 around the southern end of DEWA, where it would cross APPA as described for alternative 4.

Alternative 5 would then reconnect with I-80 in New Jersey east of the park unit. From that point eastward, the transmission line would continue following the I-80 ROW for approximately 17 miles after leaving DEWA, where the visual character would resemble that described for alternative 4 until Stanhope, New Jersey. Here, the landscape surrounding the interstate shifts to become more developed and suburban. Large patches of forest can still be seen between developed tracts. The route would leave the interstate ROW for a few miles through Allamuchy, which is densely forested, before reconnecting with I-80, paralleling the interstate to the intersection with I-280, where it would turn in a southerly direction. The route would reach Roseland Substation via an existing transmission line ROW, which it would follow for approximately 3 miles through a large-scale mosaic of subdivisions and fragments of forested flatlands.

Trails crossed by existing ROW:

- APPA

Alternative 5 Crossing the Delaware River:

- Same as alternative 4

Alternative 5 Crossing APPA:

- Same as alternative 4

SOUNDSCAPES

According to the NPS, the acoustical environment is composed of a combination of acoustic resources, including natural, cultural, and historical sounds. A soundscape is defined as the way in which humans perceive this acoustic environment (NPS 2010w). Specifically, the natural soundscape encompasses all the natural sounds that occur in parks, including the physical capacity for transmitting those natural sounds and the interrelationships among park natural sounds of different frequencies and volumes (NPS 2006c, 56). Natural sounds may range from wildlife calls and insect chirps to sounds produced by physical processes, such as wind rustling leaves on trees, thunder, and water moving through rivers, creeks, and streams within a park. A 1998 study by Colorado State University found that 72% of Americans surveyed regarded opportunities to experience natural peace and the sounds of nature as a “very important” reason for preserving national parks, 23% found it “somewhat important,” 4% “slightly important,” and 1% “not at all important” (Hass and Wakefield 1998).

The soundscape in the parks could be affected by non-natural human-caused sounds expected under the proposed alternatives, including the no-action alternative, and from sound produced by the transmission lines during operation. Under the action alternatives, the use of equipment for decommissioning, construction, and maintenance activities would also generate sound in the short term. These sources of non-natural human-caused sounds have the potential to affect the soundscape.

The affected environment for soundscapes could be more than 1 mile from the areas where construction would occur along the proposed alternative alignments and along the access roads needed to construct and maintain the transmission lines. It is estimated that 6,400 feet (1.2 miles) from construction activities is the distance at which construction noise is expected to decrease to about the background level. This estimate was calculated assuming a noise level decrease of approximately 7.5 decibels for every doubling of distance from the noise source across a soft surface such as vegetation (Caltrans 1998, 27). Background sound level monitoring was conducted to assess the existing acoustical environment. Six monitoring locations were identified in consultation with NPS staff to provide a representative sample of ambient sound levels in the study area and facilitate the comparison of proposed alternatives with respect to their potential effect on the soundscape.

NOISE FUNDAMENTALS

Sound can be perceived as noise because of loudness, frequency, duration, occurrence at unwanted times or from an unwanted source, or interruption of or interference with a desired activity. In a national park setting, noise is a subset of human-made sounds that may adversely affect park resources, including visitor experiences or biological resources, by modifying or intruding on the natural soundscape or by impeding or covering the natural sounds that are an intrinsic part of the park environments (NPS 2000a). Noise can vary in character from day to night and from season to season.

Sound is measured in a logarithmic scale using units called decibels (dB). Sound is composed of various frequencies, but the human ear does not respond to all frequencies. The A-weighted decibel scale (dBA) is commonly used to describe noise levels because it emphasizes the frequencies between 1 kilohertz (kHz) and 6.3 kHz to simulate the relative response of human hearing. Sound levels measured using the A-weighted decibel scale are generally expressed as dBA. Table 36 shows a range of decibel levels for recognizable sounds. Table 37 shows the effects of different levels of sound on people.

TABLE 36: COMMON SOUNDS AND THEIR ASSOCIATED NOISE LEVELS

Source	Level (dBA)
Normal breathing	10
Rustling leaves	20
Whisper	20–30
Quiet rural area at night	32–35
Ambient noise in an average home	50
Normal conversation at 3 feet	60–65
Vacuum cleaner	60–82
Freeway traffic at 165 feet	70
Noisy urban area during daytime	70–80
Garbage disposal at 3 feet	80
Pick-up truck (55 mph at 50 feet)	80–82
Chainsaw	85
Rock concert	90–115
Jet flyover at 1,000 feet	110
Space shuttle liftoff	188

Source: CPUC 2009; Michael Minor and Associates 2001, 1–2.

TABLE 37: SOUNDS AND THEIR EFFECTS ON HUMANS

Sound Level (dBA)	Relevance
35	Blood pressure and heart rate increase in sleeping humans
45	World Health Organization's recommendation for maximum noise levels inside bedrooms
52	Speech interference for interpretive programs
60	Speech interruption for normal conversation

Source: Berglund et al. 1999; Haralabidis 2008; USEPA 1974.

HUMAN AND WILDLIFE RESPONSES TO CHANGES IN NOISE LEVELS

It is widely accepted that the average human ear cannot perceive noise level changes of less than 3 dBA. A change of 5 dBA is readily perceptible and an increase or decrease of 10 dBA is perceived as being twice or half as loud, respectively (MPCA 1999, 5, 9). Noise may interfere with human activities, such as sleep, verbal communication, and tasks requiring concentration. Noise may also cause annoyance, hearing damage, and other health-related problems. The degree of disturbance from unwanted sound depends on the amount and nature of the intruding noise and the type of activity occurring where the noise is heard. Because individuals have different sensitivity to noise, the degree of disturbance also depends on the person experiencing the noise. For example, in the context of a park unit, if regions of a park were dedicated to enjoying the tranquility and serenity of the natural environment, sounds from motorboating and hunting would be distracting. However, if these activities were consistent with the purpose of a particular region of the park, these sounds would be considered appropriate. For these reasons, noise is a subjective term requiring consideration of which sounds are appropriate or necessary for park purposes.

within the various park management zones, and which sounds are inappropriate or adversely affect park purposes within various park management zones (NPS 2000a).

Studies have shown that, in addition to their effects on humans, intrusive and other human-induced noises can result in adverse physiological and behavioral changes in wildlife communities. For example, some sound sources have been associated with increased stress levels, as well as suppression of the immune system, in wildlife. Additionally, increases in ambient noise levels may interrupt communication networks of insects, birds, and mammals, which are necessary for survival and reproduction. Specifically, wildlife communications may signal readiness for mating, danger from predators, and territorial claims (NPS 2010x).

NOISE ATTENUATION

Factors influencing how noise affects the surrounding noise-sensitive receptors include the distance from the noise source, the frequency (pitch) of the sound, the absorbency of the intervening terrain, the presence or absence of obstructions, and the duration of the noise event. The degree of impact also depends on the listener, the existing sound levels, and the time the noise event occurs. Topographic features and structural barriers that absorb, reflect, or scatter sound waves can increase or decrease noise levels (USFS 2007, K-4–K-5).

Distance: Noise levels depend on the distance from the noise source and the attenuation of the surrounding environment. At distances greater than 50 feet from a sound source, every doubling of distance across a soft surface such as vegetation produces a 7.5 dBA reduction in sound (Caltrans 1998, 27).

Air Absorption: Sound energy is absorbed into the air as a function of temperature, humidity, and the frequency of the sound. This attenuation can be up to 2 dBA over 1,000 feet. Such attenuation is short term and occurs over a great distance. Sound waves bend toward cooler temperatures, and temperature inversions may allow sound to travel greater distances (New York State Department of Environmental Conservation [NYSDEC] 2000, 9–10).

Land Forms and Structures: Sound levels can be accentuated or focused by certain features, causing noise at specified locations. For example, canyons or cliffs can cause echoes or reflect sound (NYSDEC 2000, 10). The landscape of the Delaware River Valley within DEWA is characterized by gently rolling to steep river terraces and floodplains (NPS 2005c, 43). Thus there would be localized areas of accentuated sound levels.

Trees: Vegetation can provide a noticeable noise reduction, but to do so it must be at least 15 feet high, 100 feet wide, and dense enough to completely obstruct the line of sight between the source and the receiver. This type of vegetation may provide up to 5 dBA of noise reduction. Taller, wider, and denser areas of vegetation may provide greater noise reduction. The maximum reduction that can be obtained is approximately 10 dBA (FHWA 2010). Evergreens provide better vegetation screening than deciduous trees (NYSDEC 2000, 21). The vegetation in DEWA consists of croplands, old fields and thickets, and mature forests of evergreen and deciduous trees (NPS 2005c).

TRANSMISSION LINE NOISE

Once the transmission line is operational, noise sources would include noise from the transmission lines and noise from maintenance and inspection activities. Transmission line noise includes corona, insulator, and aeolian noise, as described below (CPUC 2009).

Corona Noise: Corona is the breakdown of air into charged particles caused by the electrical field at the surface of conductors. The crackling or hissing sound caused by the corona effect is the most common noise associated with transmission lines. The voltage of the line and current weather conditions affect both the type and level of noise generated by the transmission line. An electric field surrounds power lines and causes implosion of ionized water droplets in the air, which produces the sound. Therefore, heavy rain and high humidity typically produce corona noise levels near the transmission line that are higher than those under dry conditions. The noise levels also vary depending on the voltage of the transmission line.

Insulator Noise: This noise is similar to corona noise and is produced by dirty, worn, or damaged insulators. Current technology typically uses polymer insulators instead of ceramic or glass insulators to minimize this type of noise.

Aeolian Noise: This noise is caused by wind blowing through the conductors and/or structures and is dependent on wind velocity and direction. If the wind blows steadily and perpendicular to the lines it can create an aeolian vibration, which can produce resonance if the frequency of the vibration matches the natural frequency of the line. Dampeners can be attached to the lines to minimize aeolian noise.

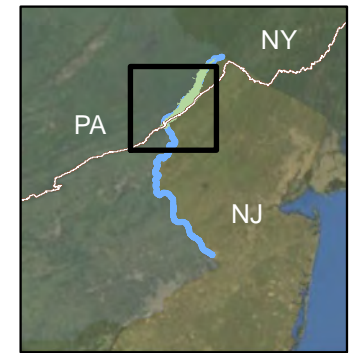
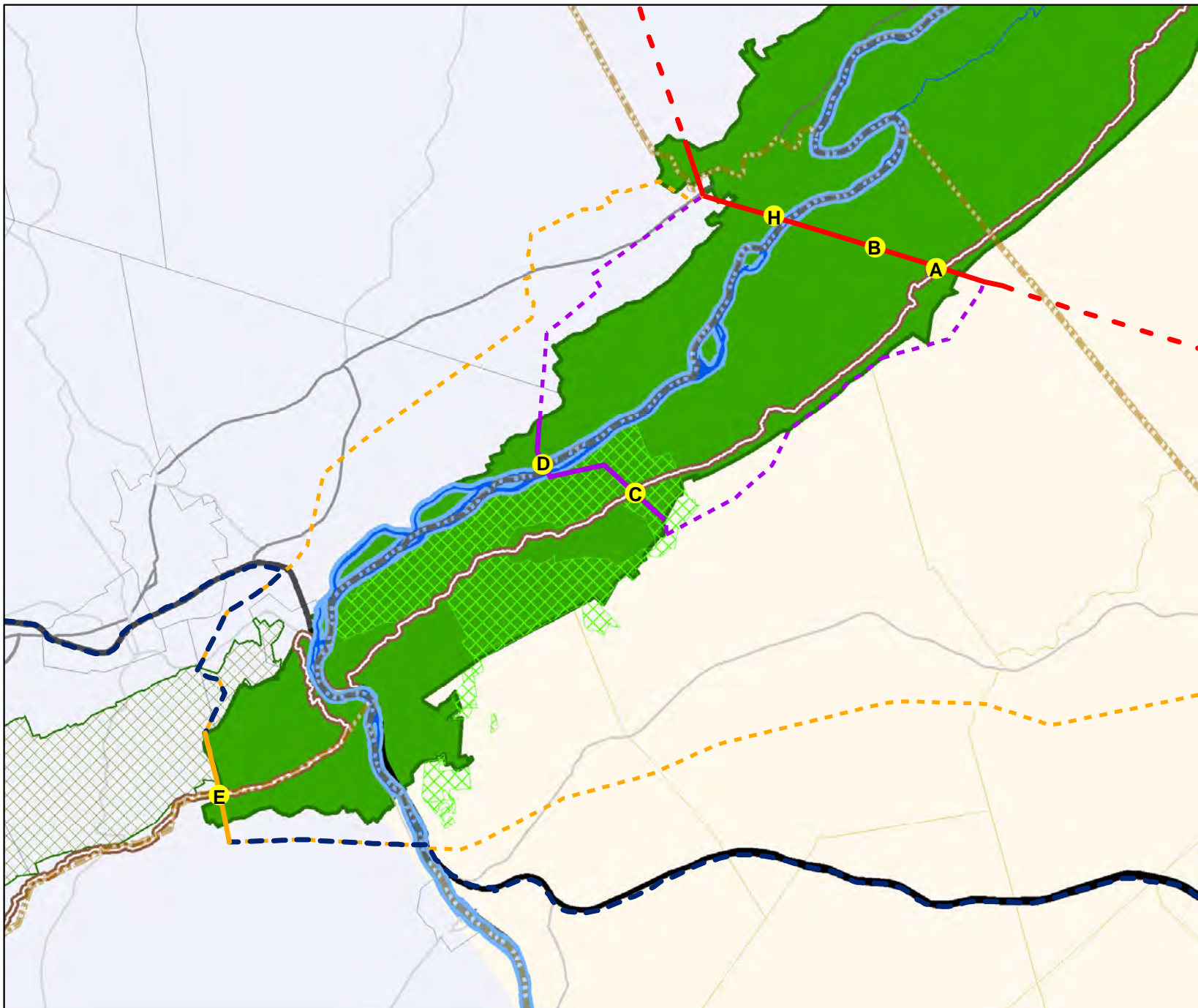
CONSTRUCTION NOISE

Noise from construction equipment can vary from intermittent to nearly continuous. Assuming that a truck (90 dBA), scraper-grader (87 dBA), movable crane (82 dBA), tractor (85 dBA), and two power saws (78 dBA) are operating in the same area, peak construction period noise would generally be about 93 dBA at 50 feet from the construction site (USEPA 1971, cited in USFS 2007). As distance from the noise source doubles, the decibel level would decrease by 7.5 dBA. Therefore, using this scenario, peak construction noise would be approximately 40 dBA at a distance of 6,400 feet (1.2 miles) from the source. This is very close to the background noise levels in the project area (see discussion of sound level monitoring below).

SOUND LEVEL MONITORING

Sound level monitoring was conducted at eight locations to establish a baseline for the acoustical environment in the project area. Sound level monitoring was conducted between October 7, 2010, and November 14, 2010. Figure 56 shows the location of each monitoring station with respect to the alternative alignments. Sites were monitored with Cesva SC310, Larson Davis 831, or Norsonic Nor140 ANSI Type 1 sound level meters set to log 1/3-octave band sound levels every second. Each sound level meter was calibrated before and after the measurements and fitted with 3- or 7-inch-diameter windscreens. The windscreens reduce the self-noise created by wind passing over the meter's microphone. Each microphone was placed approximately 4.5 feet above the ground. In each case, the ground was considered "soft"; that is, it was suitable for vegetation growth. In addition to the sound level meters, each monitor was equipped with an audio recorder and an anemometer, a device used to measure wind speed.

Weather data for the general area was obtained for the Mount Pocono meteorological station. Temperatures during the monitoring period ranged from a low of 24°F to a high of 71°F, with an average temperature of 46°F. Wind speeds ranged from 0 feet per second to 53 feet per second, with an average of 13 feet per second. The area received 3.91 inches of precipitation over the course of 15 days. Data collected during sustained winds greater than 16 feet per second were not taken into account in the monitoring results.



Legend

- DEWA Boundary
- Cherry Valley NWR
- WSF
- APPA
- MDSR
- Delaware River

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

Alternatives

- Alternative 2, 2b
- Alternative 3
- Alternative 4
- Alternative 5

Note: Solid lines indicate study area (350 ft either side of centerline)

- Sound Monitoring Location
- County Boundary
- New Jersey
- Pennsylvania
- New Jersey Municipality
- Pennsylvania Municipality
- Interstate
- U.S. Highway
- State Highway



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

Figure 56
Sound Monitoring Locations

Source: NPS 2010, EA Engineering 2010,
DEWA 2008, NJOIT - OGIS 2008, PASDA 2010,
USGS 2006, NJ DEP 2008, Penn State 2010,
ESRI ArcGISonline Map Service 2010

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

The existing acoustical environment, based on the sound monitoring results, are presented below by alternative. The data in this summary includes the natural ambient sound level, the existing ambient sound level, and the types of noises that were audible at each site during the monitoring period. The natural ambient sound level—that is, the environment of sound that exists in the absence of human-caused noise—is the baseline condition, and the standard against which current conditions in a soundscape (acoustic resource) will be measured and evaluated” (NPS 2006a, 104). However, the desired acoustic condition may also depend on the resources and the values of the park, the land use, and the kinds of activities and developments that are appropriate for the purpose of the park (NPS 2006a, 100).

The measurements of the natural ambient sound level exclude human-produced sources of sound. The existing ambient sound level includes both natural and human-produced sources of sound. These measurements are presented statistically using the level of sound exceeded 50% of the time during the monitoring period, which represents the median level of the sound recorded. Monitoring results generally show that the existing ambient sound level is within 5 dBA of the natural ambient sound level. At the six monitoring sites, the existing daytime ambient sound level ranged from 36 to 48 dBA, and the natural daytime ambient sound level ranged from 33 to 48 dBA. Common natural sounds included animals, wind, and water rushing. The most prevalent human-produced sound was associated with aircraft. Vehicular traffic, people, and gunshots were also audible at many sites. Hunting is permitted in most parts of DEWA. Hunting seasons vary based on animal and firearm type, but are generally from mid-fall to early winter. Therefore, gunshot sounds would not be heard during peak summer visitation months. The existing transmission lines were not audible at any of the sites during the monitoring period. More detailed information is available in the *Soundscape Technical Report* (Resource Systems Group, Inc. 2010). In addition to developing statewide noise standards, New Jersey created a model noise ordinance as a performance code to be adopted and enforced by local municipalities (NJDEP 2010b). However, it is up to each local municipality to determine whether they want to create their own noise ordinance or adopt the state’s rules without specifying a local noise ordinance.

Of the four counties and 8 townships in both Pennsylvania and New Jersey adjacent to the alternatives on federal lands, 3 of the townships have noise ordinances that could apply to this proposed action. No boroughs are adjacent to the alternatives on federal lands. Stroud Township, Pennsylvania, has adopted noise level regulations within their ordinance in section 6.420, “Noise Control” (Nauman pers. comm. 2010). Table 38 presents the permissible continuous sound levels by land use type.

TABLE 38: STROUD TOWNSHIP CONTINUOUS SOUND LEVEL LIMITS BY RECEIVING LAND USE

Receiving Land Use Category	Time	Sound Level Limit (dBA)
Residential, public space, open space, or institutional	7:00 a.m.–9:00 p.m.	60
	9:00 p.m.–7:00 a.m. plus Sundays and legal holidays	50
Commercial or business	7:00 a.m.–9:00 p.m.	65
	9:00 p.m.–7:00 a.m. plus Sundays and legal holidays	60
Industrial	All times	65

Per the Stroud Township ordinance, applicable exceptions to the above noise level rules include “construction operations, between the hours of 8:00 a.m. and 6:00 p.m.” Therefore, this ordinance would only apply to the proposed alternatives if construction activities occur outside this time frame.

In addition to noise-level thresholds, the Stroud Township ordinance includes vibration control guidelines. Vibration controls prohibit the use of “any device that creates vibration which is above the vibration perception threshold of an individual at or beyond the property boundary of the source if on private property or at 50 feet from the source if on a public space or public right-of-way” (Stroud n.d.).

Lehman Township, Pennsylvania, has adopted noise level regulations within its ordinance in section 505 (Lehman n.d.). Table 39 shows the permissible continuous noise levels by land use type.

TABLE 39: LEHMAN TOWNSHIP CONTINUOUS SOUND LEVEL LIMITS BY RECEIVING LAND USE/DISTRICT

Land Use or Zoning District Receiving the Noise	Hours/Days	Sound Level Limit (dBA)
At a lot line of a residential use in a residential district	7:00 a.m.–9:00 p.m. other than Sundays, Christmas Day, Thanksgiving Day, New Year’s Day, Labor Day, and Memorial Day	62
	9:00 p.m.–7:00 a.m. plus Sundays, Christmas Day, Thanksgiving Day, New Year’s Day, Labor Day, and Memorial Day	55
At any other lot line	At all times and days	70

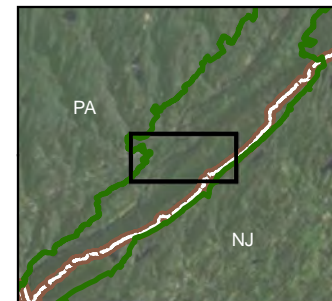
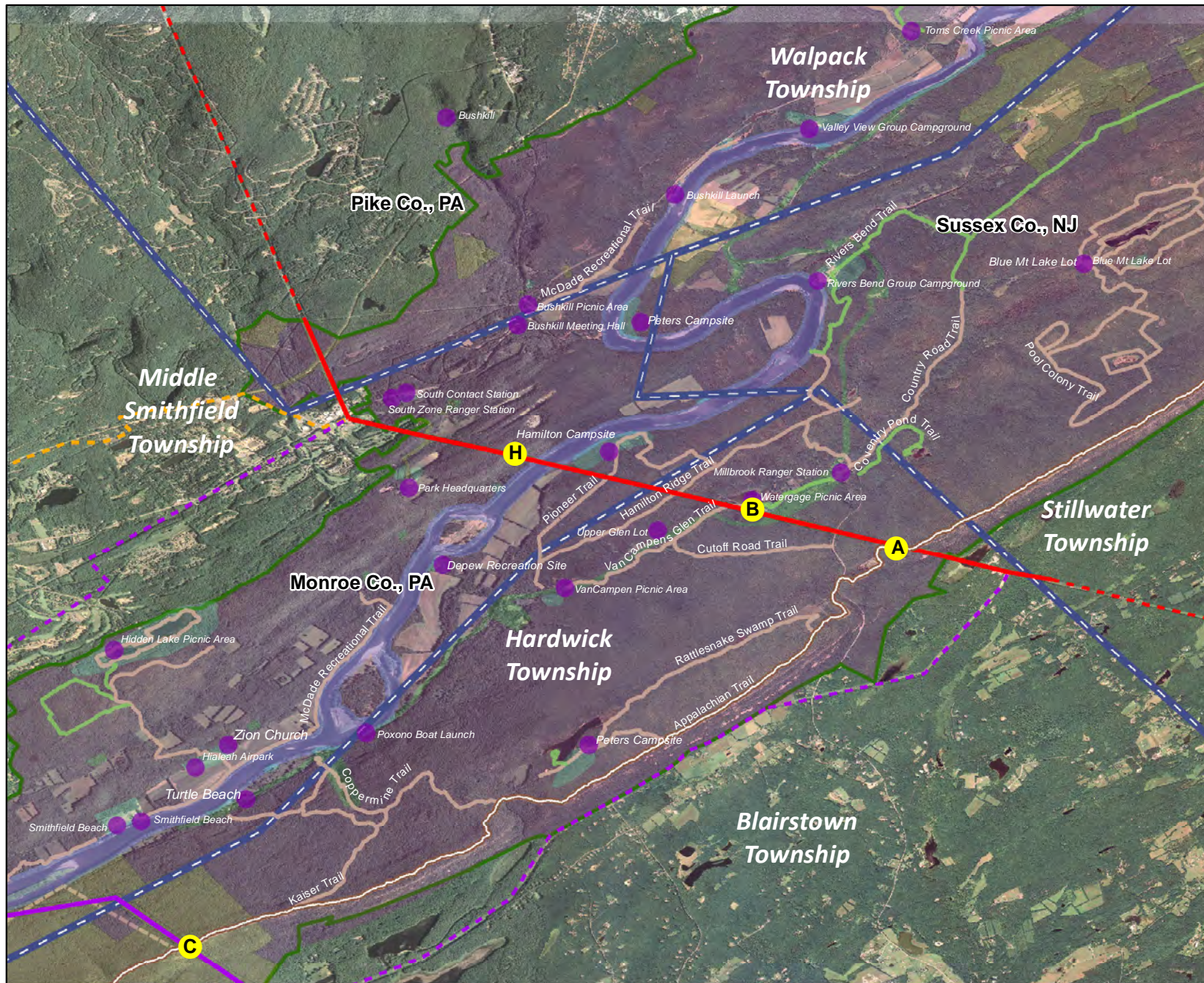
Per the Lehman Township ordinance, applicable exceptions to the above noise level rules include “repair or installation of utilities or construction of structures...between the hours of 7:00 a.m. and 8:00 p.m.” (Lehman n.d.). Therefore, this ordinance would only apply to the proposed alternatives if construction activities occurred outside this time frame.

Upper Mount Bethel Township, Pennsylvania, has a specific noise ordinance that would apply to the proposed alternatives (Cartwright, pers. comm. 2010). However, the contact at the township declined to provide a copy of the noise ordinance or any specific information on permissible noise levels and exemptions for public utilities.

ALTERNATIVE 1 (NO ACTION), ALTERNATIVE 2, AND ALTERNATIVE 2b

Inside the study area, the alternative 1, 2, and 2b alignments would follow the B-K Line ROW, which is designated as quasi-public land in a special use zone as defined in the DEWA GMP. The surrounding areas are primarily zoned natural, but the alignment would also cross a cultural zone and would be near two small areas designated as development zones. As shown on figure 57, sound monitoring was conducted at three locations along this alignment.

Site H: This site is west of the Delaware River between a small wetland and power line at the top of the ridge between Freeman Tract Road and Community Drive on the northern edge of the B-K Line ROW, about 65 feet from the existing power lines. This site is near the crest of the eastern side of the ridge and is representative of wildlife habitat on the west side of the Delaware River. The natural ambient sound level at this site was measured at 34 dBA during the day and 29 dBA during the night. Animal noises were quite varied, ranging from crickets and birds to larger animals such as raccoons and groundhogs. Canopy wind noise was also recorded. The existing ambient sound level at this site was measured at 37 dBA during the day and 33 dBA during the night. Human-produced sound was audible at Site H typically 30% to 48% of the time during the day. The soundscape at Site H was dominated by aircraft noise during the early morning through evening periods. There was also intermittent road traffic and siren noise.



Legend

Alternatives

- Alternative 2, 2b
- Alternative 3
- Alternative 4
- Alternative 5

Note: Solid line indicates study area (350 ft either side of centerline)

- Sound Monitoring Location
- Recreation Site
- Existing Trails
- Proposed Trails

Management Zones

- Development Zone
- Historic Zone
- Natural Zone
- Special Use Zone

Base Map Data

- County Boundary
- Appalachian Trail
- DEWA Boundary
- Delaware River



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

Figure 57
Alternative 2 Monitoring Sites

Source: NPS 2010, EA Engineering 2010,
Pike County 2010, Monroe County 2010,
Sussex County 2010, Northampton County 2010,
NAIP 2007, DEWA 2008, ESRI 2002,
NJOIT - OGIS 2008, PASDA 2010
Projection: NAD 83 UTM Zone 18N
Date: October 2011



0 0.5 1 Miles

Site B: This site is in a small island of dense foliage next to the Watergate Recreation Site and approximately 130 feet north of the B-K Line ROW. This site is representative of a lakeside, road-accessible visitor use area. The monitor was placed approximately 65 feet south of some picnic tables and 65 feet north of a stream. The natural ambient sound level at this site was measured at 48 dBA during the day and night. Site B was dominated by the constant sound of the stream, with birds also audible during the day. The existing ambient sound level at this site was measured at 48 dBA during the day and night. Human-produced sound is audible at Site B typically 20% to 30% of the time during the day. Sources included aircraft, automobile traffic, and people. Gunshots and the sound of vehicle doors closing were also heard, but were more distant. At night, the only sounds other than the stream were typically aircraft or traffic noise.

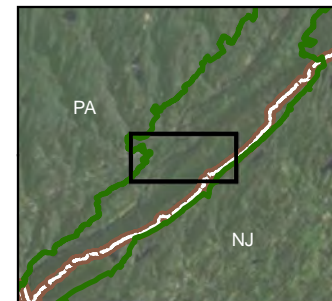
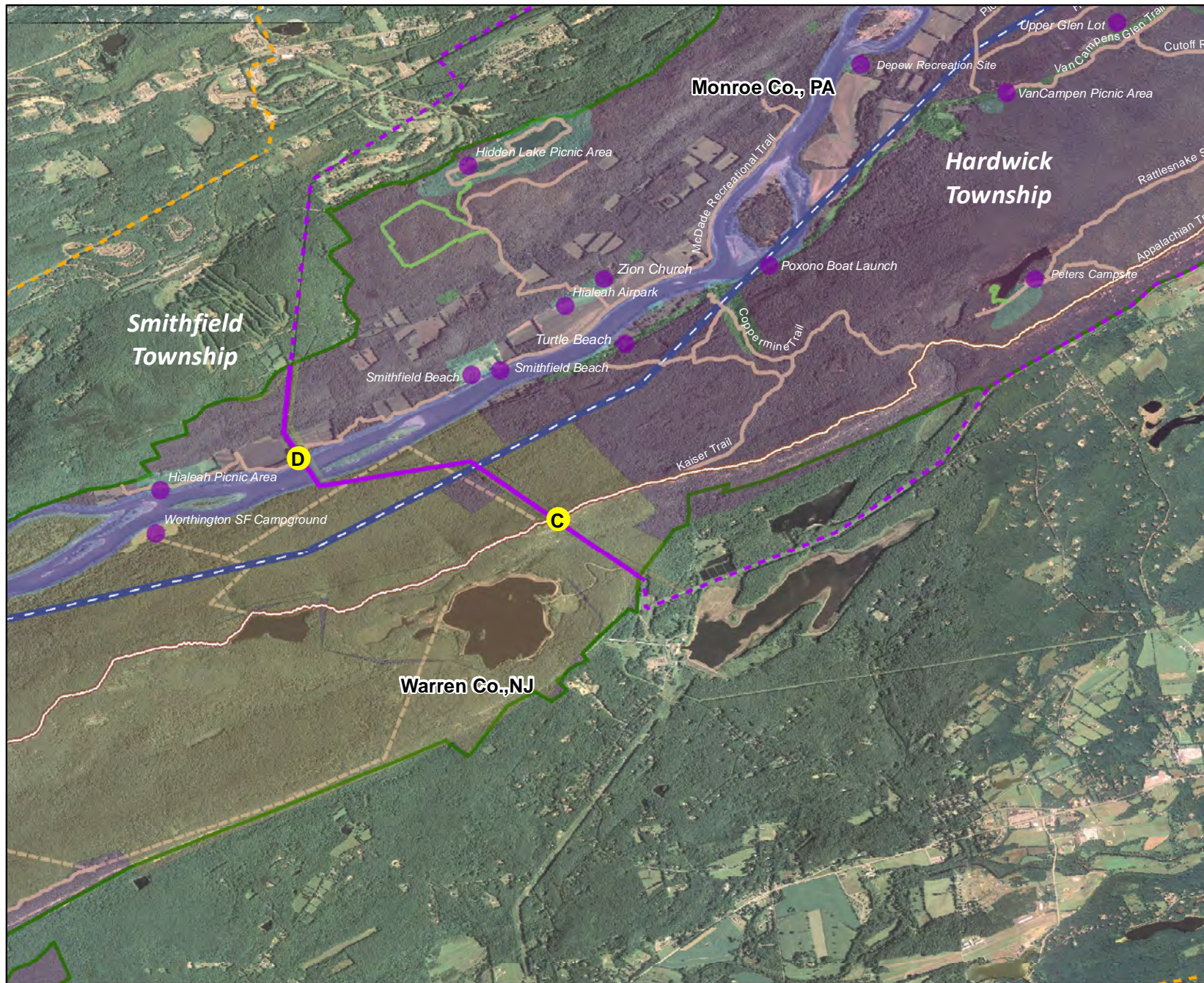
Site A: This site is near the B-K Line's crossing of APPA. The site is approximately 163 feet east of APPA and 30 feet south of the existing transmission line ROW, with power lines approximately 65 feet away. The site is exposed and somewhat remote, approximately 1 kilometer north of NJ 602 and 1,200 feet west of Sand Pond. It is representative of ridgetop land on the east side of the park. The natural ambient sound level at this site was measured at 33 dBA during the day and 32 dBA during the night. Natural sounds included wind, as well as animal sounds from birds, squirrels, deer, and coyotes. The existing ambient sound level was measured at 36 dBA during the day and 34 dBA during the night. The primary human-produced sound at Site A was aircraft noise, which was audible 40% to 60% of the time during the day. Sirens, distant traffic, and gunfire were also audible during quiet periods. During the day, especially weekends, hikers are frequently audible as well.

ALTERNATIVE 3

Inside the study area, the alternative 3 alignment would follow an existing transmission line corridor that is designated by DEWA as quasi-public land in a special use zone. The surrounding areas are designated as natural zones on the west side of the Delaware River and in the Worthington State Forest on the east side of the Delaware River. As shown on figure 58, sound monitoring was conducted at two locations along this alignment.

Site D: This site is approximately 0.5 mile northeast of the Hialeah Picnic Area on the west bank of the Delaware River. The site is at the existing transmission line ROW approximately 65 feet east of the McDade Trail and 1,100 feet from River Road along the alternative 3 alignment. This site is representative of an accessible riverfront location. The natural ambient sound level at this site was measured at 36 dBA during the day and 30 dBA during the night. Natural sounds included frequent bird calls. The existing ambient sound level at this site was measured at 36 dBA during the day and 31 dBA during the night. The primary human-produced sound at this site was aircraft noise, which was audible 20% to 35% of the time during the day. A fairly consistent hum of distant traffic was audible at this site both night and day. Other sounds included traffic on River Road, construction or heavy equipment noise, and sounds from hikers on the McDade Trail. Between 9:00 a.m. and 12:00 p.m., there was an increase in the human-produced sounds not associated with aircraft. An occasional distant gunshot was also recorded.

Site C: This site is in a fairly remote area of the park near the alternative 3 alignment's crossing of APPA north of Upper Yards Creek Reservoir. This site is approximately 1 mile east of Old Mine Road and overlooks the Delaware River to the west. This site is directly adjacent to the northern edge of the existing transmission line ROW and approximately 65 feet east of APPA. Site C is representative of high land overlooking the river. The natural ambient sound level at this site was measured at 33 dBA during the day and 29 dBA during the night. Natural sounds included substantial wind noise and birds. The existing ambient sound level at this location was measured at 36 dBA during the day and 34 dBA during the night. The primary human-produced noise source at Site C was aircraft noise, which was audible 10% to 35% of the time during the day. Other sounds included people and gunshots.



Legend

Alternatives

- Alternative 2, 2b
- Alternative 3
- Alternative 4
- Alternative 5

Note: Solid line indicates study area (350 ft either side of centerline)

- Sound Monitoring Location
- Recreation Site
- Existing Trails
- Proposed Trails

Management Zones

- Development Zone
- Historic Zone
- Natural Zone
- Special Use Zone

Base Map Data

- County Boundary
- Appalachian Trail
- DEWA Boundary
- Delaware River



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

Figure 58
Alternative 3 Monitoring Sites

Source: NPS 2010, EA Engineering 2010,
Pike County 2010, Monroe County 2010,
Sussex County 2010, Northampton County 2010,
NAIP 2007, DEWA 2008, ESRI 2002,
NJOIT - OGIS 2008, PASDA 2010
Projection: NAD 83 UTM Zone 18N
Date: October 2011



0 0.5 1 Miles

ALTERNATIVE 4

Inside the study area, the alternative 4 alignment would follow an existing transmission line corridor that is partially designated by DEWA as quasi-public land in a special use zone. The surrounding areas are designated as natural zones. As shown on figure 59, sound monitoring was conducted at one location along this alignment.

Site E: This site is at the alternative 4 alignment's crossing of APPA near Totts Gap. This site is on the western side of the existing transmission line ROW, approximately 100 feet south of APPA and just below the crest of the ridge. Totts Gap is at the height of the ridge that follows APPA in this area. Site E is representative of an area adjacent to the southwestern portion of DEWA. The natural ambient sound level at this location was measured at 36 dBA during the day and 35 dBA at night. The primary natural source of noise was wind, with birds audible in the background. The existing ambient sound level at this site was measured at 37 dBA during the day and 35 dBA at night. The primary human-produced sound at Site E was aircraft noise, which was audible 10% to 35% of the time during the day. Traffic noise was frequently audible in the background, as well as a variety of occasional sounds, including sirens, hikers, off-highway vehicles, dogs, and gunshots. In general, the soundscape at Site E is more residential than the other sites monitored.

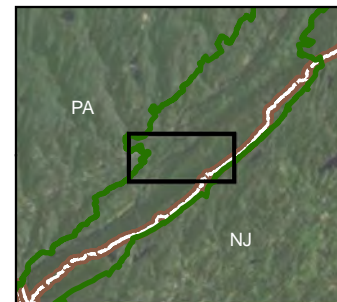
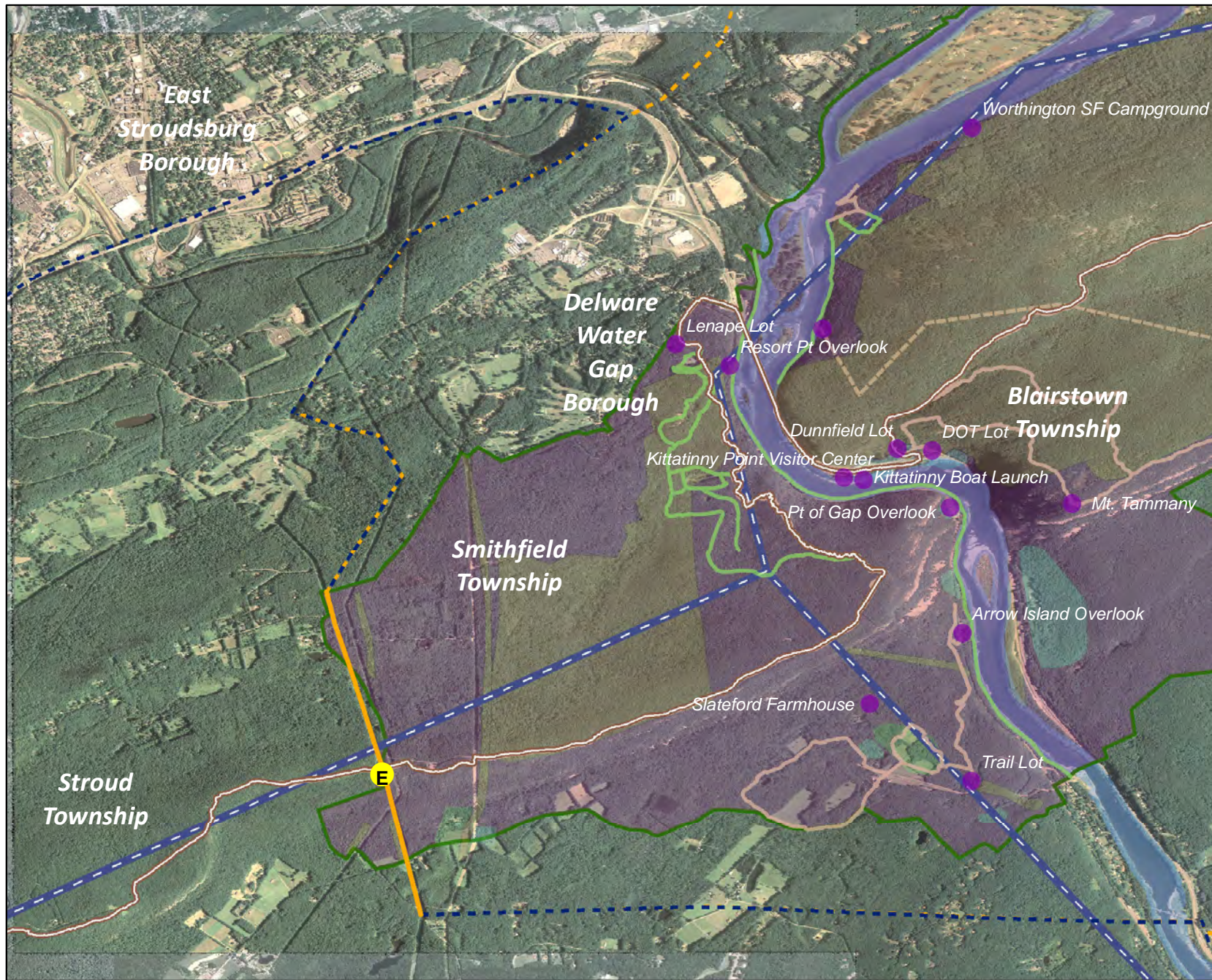
ALTERNATIVE 5

Inside the study area, the alternative 5 alignment would follow the same existing ROWs through DEWA and across APPA as alternative 4, except for the portion of the B-K Line between the western portion of DEWA and the Bushkill Substation. The existing soundscape conditions for alternative 5 would be the same as those described under alternative 4.

OUTSIDE THE STUDY AREA

Outside the study area in Pennsylvania, the S-R Line could pass through Northampton, Monroe, Pike, Wayne, Carbon, Lackawanna, and Luzerne counties. The alignment could traverse state forest land, parks, and game lands, as well as rural, residential, urban, and recreation areas. The alignment could also cross or approach major transportation facilities. Daytime sound levels in sparsely populated areas are expected to be similar to the existing ambient sound levels in the study area. These levels would vary depending on proximity to sources of noise, such as roads. Segments of the line traversing more populated areas and closer to major transportation facilities would likely have higher levels of ambient sound.

Outside the study area in New Jersey, the S-R Line could traverse Warren, Sussex, and Morris counties. The alignment could traverse private land, as well as some state lands designated for wildlife management, forest, parks, and game lands. The private land is agricultural, rural, rural residential, and suburban. The route could also pass through numerous residential areas and close to three airports. Ambient sound levels would generally be greater in areas with a higher occurrence of human-produced sounds.



Legend

Alternatives

- Alternative 2, 2b
- Alternative 3
- Alternative 4
- Alternative 5

Note: Solid line indicates study area (350 ft either side of centerline)

- Sound Monitoring Location
- Recreation Site
- Existing Trails
- Proposed Trails

Management Zones

- Development Zone
- Historic Zone
- Natural Zone
- Special Use Zone

Base Map Data

- County Boundary
- Appalachian Trail
- DEWA Boundary
- Delaware River

Figure 59
Alternatives 4 and 5 Monitoring Sites

Source: NPS 2010, EA Engineering 2010, Pike County 2010, Monroe County 2010, Sussex County 2010, Northampton County 2010, NAIP 2007, DEWA 2008, ESRI 2002, NJOT - OGIS 2008, PASDA 2010
Projection: NAD 83 UTM Zone 18N
Date: October 2011



0 0.35 0.7 Miles



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

VISITOR USE AND EXPERIENCE

Visitors come to national park system units to enjoy recreational facilities and services and experience the unique characteristics of each unit. For many visitors, being immersed in the natural environment or cultural landscape is the experience they are seeking for spiritual renewal. These two aspects of visitor satisfaction are interrelated — the quality of the recreational opportunities available affect how visitors experience the area, and the experience visitors expect affects which recreational facilities they seek. Each of these components is discussed in more detail below.

The study area for this topic for DEWA and MDSR is the northernmost point at which the alternatives may be experienced (typically, but not necessarily, seen or heard), i.e., Bushkill Launch, and the southern boundary of DEWA.

VISITOR USE OF RECREATIONAL FACILITIES

This section presents general information about visitation to DEWA, MDSR, and APPA and their respective recreational offerings, as well as specific recreational locations that could be affected by each alternative.

Delaware Water Gap National Recreation Area and Middle Delaware Scenic River

Visitation: As one of the largest public open spaces remaining in the northeastern metropolitan corridor, DEWA provides a broad diversity of close-to-home recreational opportunities to more than 60 million people who live within a 6-hour drive of the park (NPS 2003a, 6). DEWA is located close to major population centers, including New York City and Philadelphia, and their bedroom communities. The park is easily accessible by private vehicles and offers a variety of recreational opportunities, which makes it a popular destination for predominantly urban and suburban residents.

DEWA experienced the fourteenth highest total annual visitation (combined recreation and nonrecreation) of all national park system units in FY 2009. It experienced the eighth highest annual recreation visitation in the same year (NPS 2010y). In seven of the last nine years, DEWA was eighth in visitation. DEWA ranked ninth out of the top 10 most visited national park system units nationwide in 2010, with over 5 million annual visitors (NPS 2010b).

DEWA visitor use data from 1990 indicate that the largest number of visitors live in New Jersey (49 %), with another 22 % from New York and 18 % from Pennsylvania. Twelve % originate from other locales (Madison and Machlis 1990, 5). According to a survey of visitor use conducted in July 1989, approximately 60 % of those sampled were reported to be returning visitors to DEWA. The majority of visitors (71 %) spent less than 8 hours in the park and nearly half (47 %) spent less than 4 hours in the park (Madison and Machlis 1990, 10). (Other visitor studies are planned for the future.) Visitation statistics for APPA are described under “Appalachian Trail,” below.

As shown in figure 60, total annual visitation has fluctuated slightly over the last 10 years (2000 to 2009) and has ranged from between approximately 5 million visitors in 2001 and 2007 to nearly 5.5 million visitors in 2006 (NPS 2010b).

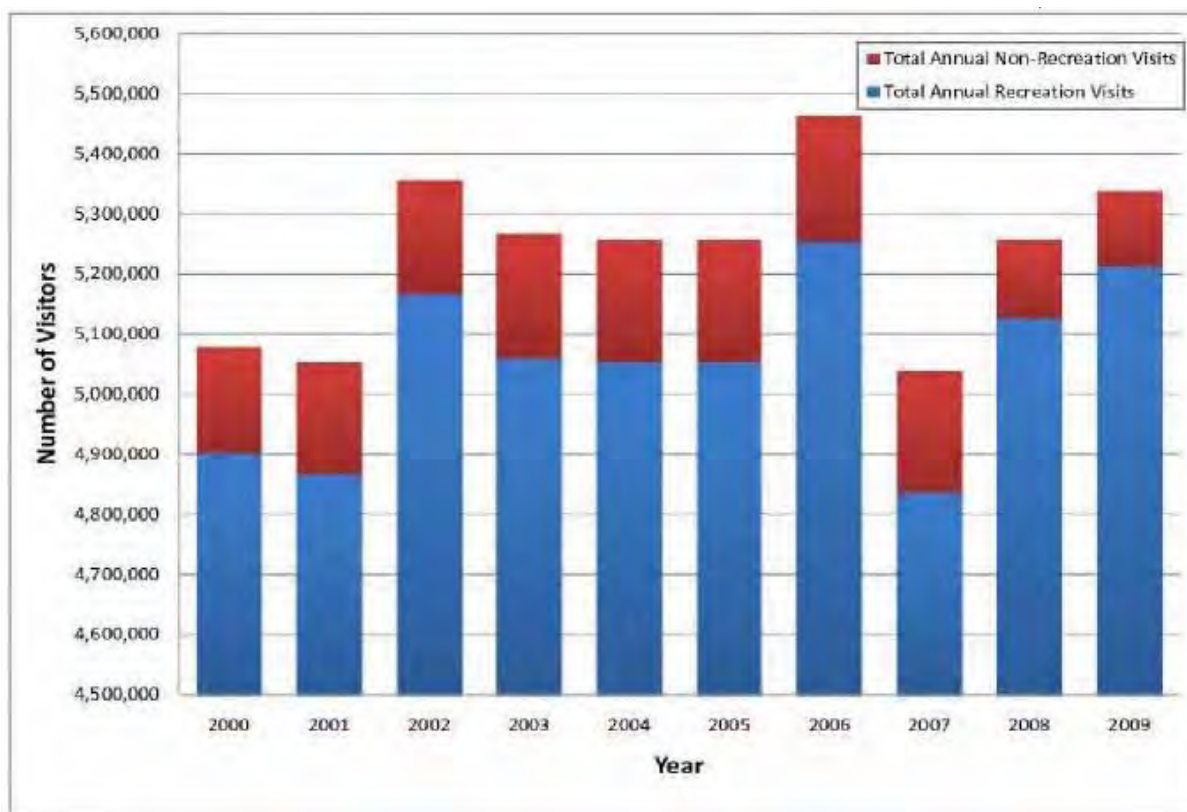


FIGURE 60: DEWA ANNUAL VISITATION – HISTORIC DATE (2000 TO 2009)

Peak visitation occurs in the summer (May through August) and is also high in October, when fall foliage is visible. In 2009, June marked the highest total visitation (approximately 675,000 visitors). February 2009 marked the lowest total visitation, at approximately 270,000 visitors. Overnight stays at campgrounds, in the backcountry, and at other lodging in the park are highest from June through August (NPS 2010b). Figure 61 depicts total (combined recreation and nonrecreation) parkwide visitation for DEWA by month for 2009.

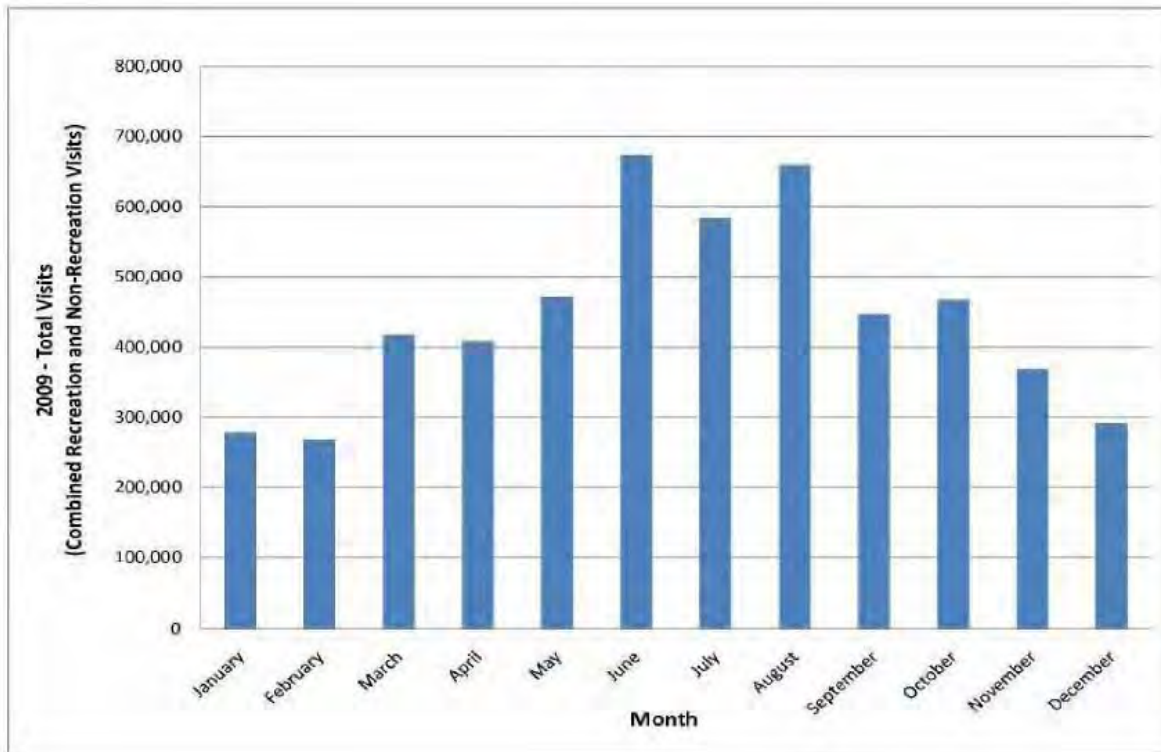


FIGURE 61: DEWA VISITATION BY MONTH

Visitor Activities

DEWA visitors engage in a wide variety of activities and make use of several NPS facilities. Table 40 shows those locations most visited within DEWA.

TABLE 40: MOST VISITED LOCATIONS WITHIN DEWA

Location	% Visitors Reported Visiting Location
Bushkill Access	17
Kittatinny Point Visitor Center	17
Smithfield Beach	17
Millbrook Village	9
Watergate Recreation Site	7
Appalachian Trail	6
Dunnfield Parking Area	4

Source: Madison and Machlis 1990.

Note: Percentages do not add up to 100 because visitors could report more than one activity.

DEWA provides opportunities for boating, scenic driving, camping along the MDSR and APPA, and staying at the Mohican Outdoor Center, as well as visiting historic villages and districts, scenic waterfalls, river beaches, and campgrounds, described in more detail below. Hunting is allowed in most parts of the recreation area in both Pennsylvania and New Jersey (NPS 2010z). The 1989 visitor survey indicates that sightseeing and picnicking were the most common recreational activity, with 56 % and 35 % of visitors

(respectively) engaging in those activities. Large numbers of visitors also engage in swimming, hiking, and canoeing/innertubing (Madison and Machlis 1990, 11). Table 41 shows the most popular visitor activities at DEWA.

TABLE 41: VISITOR ACTIVITIES ENGAGED IN AT DEWA

Activity	% of Visitors who Engaged in Activity
Sightseeing	56
Picnicking	35
Swimming	32
Hiking	30
Canoeing/tubing	26
Other (i.e. attending craft fair, rafting, relaxing)	21
Visit historic sites	18
Nature study	16
Fishing	16
Camping	16
Boating	7
Hunting	5

Sources: Madison and Machlis 1990; Penn State 1989, 75.

Note: Percentages do not add up to 100 because visitors could report more than one activity.

Upon arrival at DEWA, visitors can obtain information about their visit at visitor centers, entrance stations, DEWA Headquarters, and Millbrook Village. Kittatinny Point Visitor Center is located in the Delaware Water Gap, the park's namesake geological feature, and provides park information, a ranger-staffed desk, restrooms, Eastern National Bookstore, a picnic area, a canoe launch, and scenic viewing. The visitor survey conducted in 1989 indicates that 17 % of visitors visited the Kittatinny Point Visitor Center (Madison and Machlis 1990, 12). Also within the study area, additional information is available for visitors at DEWA Headquarters and south entrance station in Bushkill, Pennsylvania; and Millbrook Village, New Jersey (NPS 2010z). In addition, the Bushkill Meeting Center is used for special events and lectures. Park information is provided by the Friends of DEWA on summer weekends when volunteers are available (NPS 2010z). Outside the study area, visitors may obtain information at the Dingmans Falls Visitor Center and at the DEWA north entrance station.

The Delaware River is one of the park's important focal points, providing opportunities such as canoeing, kayaking, rafting, inner tubing, and swimming. These activities keep the park's three beaches and nine boat access areas very busy, particularly on weekends during the summer (NPS 2003a, 6). A visitor study was conducted of DEWA river users during the summer of 2010. Table 42 provides a profile of river users from that study.

TABLE 42: PROFILE OF RIVER USERS AT DEWA

Group size and type	<ul style="list-style-type: none"> Two-person groups: 33% Groups of six or more: 26% Groups consisting of family members: 53%
Residence of visitors	United States: 97% <ul style="list-style-type: none"> New Jersey: 40% Pennsylvania: 31% New York: 19% Other: 10%
Frequency of visits	<ul style="list-style-type: none"> Visited the park six or more times in their lifetime: 40% First visit in past 5 years: 37%
Reason for visiting	"Recreation" ranked as number one reason for visiting DEWA: 63%
Average length of stay	<ul style="list-style-type: none"> Day-use visitors (<24 hours): 5 hours Overnight visitors (>24 hours): 2.6 days All visitor groups: 19.9 hours (0.8 day)

Source: Blotkamp et al. 2010, 5-6, 41.

A summary of the most common visitor activities and sites used specifically by river visitors at DEWA is provided in table 43. Recreational activities are described by alternative later in this section.

TABLE 43: SUMMARY OF RIVER USER ACTIVITIES AT DEWA

Locations visited	Most visited: <ul style="list-style-type: none"> Milford Beach (34%) (outside the study area) Smithfield Beach (33%) Dingmans Boat Launch (30%) (outside the study area) Least visited: <ul style="list-style-type: none"> Watergate Recreation Site (1%)
Most common activities	<ul style="list-style-type: none"> Swimming (56%) Viewing scenery/river views/ waterfalls (52%)
Most important activity	Canoeing with private canoes/ kayaks (28%)
Personal canoe/ kayak/boat trips	Personal (non-livery) canoe/kayak/boat trip: 45% <ul style="list-style-type: none"> 56% canoes 44% kayaks

Source: Blotkamp et al. 2010, 43, 45-47

Swimming is one of the park's most common activities and is allowed on the Delaware River at lifeguarded beaches. Lifeguarded swimming is available at three beaches within DEWA — Smithfield Beach and Turtle Beach, which are within the study area, and Milford Beach, outside of the study area. Swimming elsewhere in the river is not recommended due to strong currents, steep drop-offs, and constantly changing river conditions. Swimming is not allowed at Van Campens Glen, within 50 feet of a boat launch or canoe launch, or on top of any waterfall (NPS 2010q, 2010aa).

The park's second most common activity among river users is canoeing, including privately-owned boats and canoe liveries. The NPS Public Use Statistics Office reports that nearly 130,000 annual visitors engaged in day-use canoeing and another 40,000 annual visitors engaged in overnight canoeing in 2009 (NPS 2010v). Many river trips begin at the northern part of the park, such as Milford Beach (outside the study area), and the majority end at locations within the study area, specifically Smithfield Beach and

Kittatinny Point (Blotkamp et al. 2010, 48). Several private liveries provide a range of nonmotorized boat rentals (NPS 2010aa). These companies are permitted to drop off and pick up rentals within the park. Data gathered by the NPS for 2010 indicates that the majority of the canoe liveries operating within DEWA use the park or its resources as a primary or exclusive destination. The amount of time per person spent by the liveries in DEWA generally ranges from 1 hour to 3 days (NPS 2011d). Motorized boating is allowed on the Delaware River with a 10 mph speed limit on the entire length of the river. Information about the Delaware River Water Trail is included under the “Wild and Scenic Rivers” section.

Fishing is permitted throughout the Delaware River with a valid New Jersey or Pennsylvania fishing license. The Delaware River and its tributaries provide a variety of fishing. The “shad run,” the annual migration of spawning American shad, up the Delaware passes through DEWA in May and June (NPS 2010z).

Several scenic driving routes provide access to destinations, as well as a way to experience the flora and fauna, historic structures, and scenery in DEWA. Rural scenery and waterfalls are some of the attractions along the park roads (NPS 2010z). Scenic drives are described in more detail by alternative later in this section.

Hiking is also popular at DEWA. The 1989 visitor survey indicates that 30 % of visitors spent time hiking in the park (Madison and Machlis 1990, 11). Approximately 100 miles of trails along streams, ridges, and mountains are found throughout the park, including approximately 27 miles of APPA. Hiking opportunities range from short, easy scenic hikes to overnight hiking on the APPA (NPS 2010z). The total number of annual trail users at DEWA is estimated to be approximately 181,000, which includes 177,000 hikers, 3,500 bicycle users, and 500 horseback riders. Hiking is the dominant trail use in DEWA and most trails do not allow other trail uses (NPS 1999, 53). Bicycling off road is permitted only on the McDade Trail (described in more detail later in this section). Although horseback riding is permitted at specific locations in DEWA, none of these are within the study area (NPS 2010z).

Trails are designated as part of four networks: APPA, Country Road, Gap View, and River Valley networks (NPS 1999, 19). Rather than a geographic focus, each network serves a particular type of visitor experience and provides for specific uses (NPS 2001c, 24). For example, APPA Network provides an isolated, remote, wooded hiking experience, whereas the Gap View Network primarily focuses on the unique scenic view of the Delaware Water Gap and the Delaware River (NPS 1999, 24, 25). The study area includes trails in all four networks. Details about specific trails are described under the alternative descriptions later in this section.

Bicycling is permitted on ungated roads open to vehicle traffic. Road bicycle touring is also allowed on both paved and dirt roads throughout the park; however, due to heavy traffic, bicycling is not recommended on US 209, PA 739, or River Road in Pennsylvania. The McDade Trail in Pennsylvania, the only trail in the park designated for bicycling, is a multi-use trail allowing hiking, bicycling, and cross-country skiing (NPS 2010z). The DEWA trails plan identifies other trails for bicycling use; however, environmental review and planning, as well as special use regulation approvals, are required before they can be developed. This trail is described in more detail later in this section.

Rock climbing is allowed throughout the park and no registration is necessary.

Eagle watching is recommended during the winter months, when bald eagles are active along the Delaware River. The park typically hosts between 10 and 20 wintering bald eagles (NPS 2010z).

Hunting is allowed and occurs throughout the park. All applicable state and additional park-specific federal regulations must be followed. Bow hunting is very popular in the park and is allowed in DEWA

except on Sundays (NPS 2010z). Solitude is an important part of the hunting experience, particularly for bow hunters. Hunters typically hold extremely positive attitudes toward their environment, and place a higher priority on companionship and being outdoors than on shooting an animal. The hunting attitude is strongly affiliated with enjoying camaraderie, aesthetics, and the outdoors (Penn State 1989, 19–20). DEWA hunters have an average of 10 years of experience hunting in the park. The reason most often cited by hunters for hunting in the park was their general “[liking] for the area,” followed by “availability of game,” and “familiarity with the area,” which “reinforces the importance of experience as a motivating factor in using [DEWA]” (Penn State 1989, 56). “The traditional bonds among family and peer groups was also reflected in [hunters’] tenure of use within [DEWA] and their overall positive attitudes and allegiance toward this management area” (Penn State 1989, 71). Annually, hunters spend an average of 10 days hunting in DEWA. DEWA hunters also participate in other activities at the park, most commonly fishing, boating, and camping. Participating in these other activities typically added another six activity days recreating within the park (Penn State 1989, 68).

In DEWA, the most popular hunting season is the deer firearm season. Deer archery, pheasant/rabbit, and small game seasons are also popular (Penn State 1989, 30–32). Deer hunting generally occurs from September through January depending on antlered/antlerless and type of firearm; small game is late September through May depending on the type of game, with woodchuck hunting occurring in the summer in New Jersey (March through September). Some small game seasons are unlimited in Pennsylvania (NJDFW 2010h; PGC 2010b).

Visitors are attracted to specific recreational locations in DEWA, and regularly return to these locations rather than visiting other areas in DEWA. This leads to an imbalance of park usage, as some areas are extremely crowded while others are virtually unoccupied even on a summer weekend day (NPS 2003a, 14).

Visitors can choose from a variety of overnight accommodations when visiting the area. Camping, hotel/motel, and other lodging options are available both in and near the park. More than 60 primitive campsites are available to canoeists and boaters. Numerous private campgrounds are located in both Pennsylvania and New Jersey outside the park. Several Pennsylvania and New Jersey state park campgrounds are also located nearby, as is the Worthington State Forest Campground (NPS 2010z), described in more detail below.

Chain motels are along I-80 near the park, and local motels are along US 209 between Bushkill, Pennsylvania, and East Stroudsburg, Pennsylvania. The majority of local lodging options are at Stroudsburg and East Stroudsburg. Smaller communities in the study area, such as Bushkill and Marshalls Creek in Pennsylvania and Columbia in New Jersey, offer one or two lodging options (US Parks.com 2010). Several bed-and-breakfast establishments are found in Shawnee-on-Delaware, Pennsylvania, and rural western New Jersey. There are also large resorts near Bushkill and Shawnee-on-Delaware, Pennsylvania (NPS 2010z). The Mohican Outdoor Center on Catfish Pond provides hostel-like lodging for backpackers (NPS 2010z), and is frequently used by APPA hikers.

A visitor survey was conducted for DEWA in FY 2009 to measure visitor satisfaction and visitor appreciation. According to the survey, 96% of park visitors are satisfied overall with DEWA facilities, services, and recreational opportunities. This satisfaction measure is a combined percentage of “good” and “very good” responses to survey questions. Although the overall 96% satisfaction level is essentially unchanged from the baseline measurement (FY 2005–FY 2008), there was a noticeable increase of “very good” responses from “good” in the FY 2009 survey. Approximately 94% of 2009 respondents were satisfied overall with walkways, road, and trails; 96% were satisfied overall with campgrounds and/or picnic areas; 78% were satisfied overall with commercial services in the park (the lowest rated category); and 94% were satisfied overall with outdoor recreation opportunities (University of Idaho 2009, 1–4).

Appalachian Trail

Delineated in the 1920s, APPA was the first designated national scenic trail in the United States. The trail extends along the spine of the Appalachian Mountains from Springer Mountain, Georgia, to Mount Katahdin in Baxter State Park, Maine, traversing 2,174 miles through 14 states and various jurisdictions. The 27 miles of APPA within DEWA follows the Kittatinny Ridge west of the Delaware River (NPS 1981). The trail is a unit of the national park system, but is managed cooperatively by the NPS and the Appalachian Trail Conservancy. This nonprofit organization in turn oversees 31 independent hiking clubs that maintain and improve the trail. The two hiking clubs that maintain APPA in DEWA are the New York–New Jersey Trail Conference (NY–NJ Trail Conference) and the Wilmington Trail Club of Delaware. These groups are made up of volunteers who maintain and hike the trail (NPS 2004c, 1–2).

Visitation: The portion of APPA in DEWA is identified as heavily used (NPS 1981, 29). The total number of APPA visitors in DEWA as reported by the NPS Public Use Statistics Office was 66,700 in 2009 (NPS 2010v). “Long-distance hikers” walk the entire trail in one continuous journey. “Section-hikers” piece the entire trail together over years (ATC 2011).

Entering DEWA from the south at Totts Gap, Pennsylvania, APPA travels northward over Mount Minsi to the Borough of Delaware Water Gap, Pennsylvania, and crosses the Delaware River on a walkway alongside I-80. The trail descends from the highway, passes Kittatinny Point and the Kittatinny Point Visitor Center, crosses under the highway, and enters Worthington State Forest at Dunnfield parking area. The trail then climbs Kittatinny Ridge and travels 6 miles through the state forest. The trail exits the state forest, and, still within DEWA, continues 15 miles more, finally exiting the recreation area at Stokes State Forest in New Jersey. There are no trail shelters in DEWA (NPS 2010ab, 1), but primitive camping is allowed for long-distance hikers.

Visitor Activities: The surroundings of the APPA in this segment provide users with an environmental setting that is scarce within this region of the Trail. The vast and pristine natural lands provided by DEWA and the relative dearth of development in the immediate surroundings provides hikers with a wilderness-like aesthetic and mood. This is an uncommon offering in the heavily developed region from where many of APPA’s visitors come.

Although APPA provides a unique long-distance hiking opportunity, most visitors are short-term hikers (NPS 1981, 28). In the spring of each year, between 1,700 and 2,500 hikers start north from Springer Mountain to hike the entire length of the trail. Approximately 20% of these long-distance hikers successfully walk the entire trail, normally crossing the Delaware Water Gap in the month of June.

The most popular activities reported on APPA, as reported in a study of APPA users, include day hiking, backpacking, camping, scenic viewing, picnicking, photography, and nature studies (Manning et al. 2000, 17). Backcountry camping is also allowed along APPA (NPS 2010z). Approximately 14,000 overnight stays along the trail’s entire length were reported in 2009 (NPS 2010v).

In DEWA the following regulations apply to use of APPA:

- Camping is restricted to hikers who are hiking APPA for 2 or more consecutive days.
- Camping is limited to 1 night per campsite.
- Camping is limited to 10 persons per campsite.
- Hikers must camp a minimum of 50 feet and no more than 100 feet from the trail.
- No fires are permitted.

- Persons may not camp within:
 - 100 feet of any stream/water source, or
 - 0.5 mile of an established road, or
 - 200 feet of another camping party, or
 - the stretch that begins 0.5 mile south of Blue Mountain Lake Road and continues north to the intersection of APPA and Buttermilk Falls Trail (NPS 2004c, 2).

Other Recreation Areas

The following recreation areas lie outside NPS park boundaries but within the study area, and visitors to these sites may be affected by the proposed alternatives.

Worthington State Forest: Worthington State Forest is located on the Delaware River along Old Mine Road within DEWA's legislative boundary, 3.5 miles north of I-80 New Jersey Exit 1 in the Delaware Water Gap (NPS 2010z). Worthington State Forest covers almost 6,584 acres, extending about 7 miles along the southern part of Kittatinny Ridge. Boating and fishing access is provided on the Delaware River, and the forest is almost completely covered in woodland, with opportunities for hiking and camping (NY–NJ Trail Conference 2010). There are over 26 miles of trails within the forest, including 5 miles of canoe trails on the Delaware River Water Trail, the MDSR, and over 7 miles of APPA. All trails within the forest are for hiking only. A demanding climb on the Red Dot (Tammany) Trail (within both Worthington State Forest and DEWA) to the top of Mount Tammany at 1,527 feet AMSL provides the park visitor with a panoramic view of the Delaware Water Gap. A new interpretive trail, the Rockcores Trail, has been developed and offers some natural and historic information to the forest visitor (NJDEP 2010c).

Among the forest's features is a glacial lake, Sunfish Pond, along APPA. At the southern end of Worthington State Forest is the Dunnfield Creek Natural Area. The forest's trails are among the most heavily used in New Jersey, with the summit of Mount Tammany and Sunfish Pond being popular destinations (NY–NJ Trail Conference 2010). Sunfish Pond is reached by a steep and rocky climb along APPA. No swimming or camping is permitted at this area; however, 0.25 mile south of the pond along APPA is a backpacking wilderness camping area (NJDEP 2010c). APPA runs through the center of the forest, and many other trails connect to it, making a variety of loop hikes possible. There are 10 marked trails, many of them rugged, ranging from 0.4 to 6.9 miles (NY–NJ Trail Conference 2010).

The Worthington State Forest Campground is located approximately 1.5 miles north of I-80 on Old Mine Road. The campground provides 69 tent and trailer sites along 2 miles of river with picnic tables and fire rings. Three group sites with a capacity of 35 people each are also provided. Campgrounds are open April 1 through December 31. A small family picnic area has been added to the area under a hemlock grove near the Delaware River. Interpretive programs are offered seasonally from April to October in the campground. Programs are also offered year-round for schools and organized groups (NJDEP 2010c).

Cherry Valley National Wildlife Refuge: In December 2008, Cherry Valley NWR was authorized in Monroe County, Pennsylvania. The first parcel was purchased in 2010 (USFWS 2010f). Ultimately, approximately 20,000 acres are expected to become the Cherry Valley NWR; however, not all of these lands are currently owned or managed by the USFWS. According to the 2008 Cherry Valley final environmental assessment, the refuge would permit public access for day use on many of the newly acquired lands provided there are no expected negative effects on sensitive species or habitats. Generally, the refuge would allow hunting based on the Pennsylvania State hunting seasons and consistent with the Cherry Valley NWR annual hunting plan (once developed). Fishing would be allowed along Cherry

Creek where accessible, and fishing derbies for children may be provided. Working with state and local agencies, the refuge would study the feasibility of converting existing historic logging roads into public use trails. The refuge also may provide interpretive and environmental education programs, and increase partnership opportunities to interpret the cultural and natural resources within the refuge and the watershed. Activities commonly reported in Cherry Creek watershed within Cherry Valley NWR include gardening, bird watching, hiking, biking, hunting, fishing, horseback riding, and cross - country skiing (USFWS 2008, 1, 2, 2-39, 3-23, 3-24, B-13). Cherry Valley NWR expects that the draw of DEWA “would likely contribute to enthusiastic use of a new refuge” (USFWS 2008, 3-24).

Recreation areas between the study area and the Susquehanna and Roseland substations are listed in table 44.

TABLE 44: RECREATION AREAS OUTSIDE THE STUDY AREA

Recreation Areas Outside the Study Area	Alternatives 1, 2, 2b, and 3	Alternative 4	Alternative 5
Outside the study area to Susquehanna	Pike County, PA <ul style="list-style-type: none"> • Delaware State Forest (south) • Bruce Lake Natural Area (Recreation Area) • Delaware State Forest (north) • State Game Land 183 Wayne County, PA <ul style="list-style-type: none"> • Varden State Park Lackawanna County, PA <ul style="list-style-type: none"> • Lackawanna State Forest (north) • State Game Land 300 • Lackawanna Valley State Heritage Region Luzerne County, PA <ul style="list-style-type: none"> • Lackawanna Valley State Heritage Region • Lackawanna State Forest (south) • State Game Land 260 	Same as alternatives 1–3, plus Monroe County, PA <ul style="list-style-type: none"> • Cherry Valley NWR 	Monroe County, PA <ul style="list-style-type: none"> • Big Pocono State Park • State Game Land 038 • Cherry Valley NWR Carbon County, PA <ul style="list-style-type: none"> • Hickory Run State Park • State Game Land 043 • Delaware and Lehigh National Heritage Corridor Luzerne County, PA <ul style="list-style-type: none"> • State Game Land 119 • Nescopeck State Park • Lehigh Gorge State Park • State Game Land 187 • Delaware and Lehigh National Heritage Corridor

Recreation Areas Outside the Study Area	Alternatives 1, 2, 2b, and 3	Alternative 4	Alternative 5
Outside the study area to Roseland	<p>Sussex County, NJ</p> <ul style="list-style-type: none"> • Smartswood State Park • Kittatinny Valley Wildlife Management Area / Game Land • Weldon Brook Wildlife Management Area / Game Land <p>Morris County, NJ</p> <ul style="list-style-type: none"> • Rockaway River Wildlife Management Area / Game Land • Wildcat Ridge Wildlife Management Area / Game Land • Buck Mountain State Par • Great Piece Meadow Wildlife Area/Preserve • Troy Meadows Recreation Area 	<p>Warren County, NJ</p> <ul style="list-style-type: none"> • Limestone Ridge Marsh Wildlife Area/Preserve <p>Sussex County, NJ</p> <ul style="list-style-type: none"> • Weldon Brook Wildlife Management Area / Game Land <p>Morris County: same as alternatives 1–3</p> <p>Northampton County, PA</p> <ul style="list-style-type: none"> • Cherry Valley NWR 	<p>Warren County, NJ</p> <ul style="list-style-type: none"> • Columbia Wildlife Management Area / Game Land • Bear Creek Wildlife Area/ Preserve • Jenny Jump State Forest • Allamuchy Natural Area • Allamuchy State Park <p>Morris County, NJ</p> <ul style="list-style-type: none"> • Allamuchy State Park • Berkshire Valley Wildlife Management Area / Game Land • Troy Meadows Recreation Area <p>Northampton County, PA</p> <ul style="list-style-type: none"> • Cherry Valley NWR

VISITOR EXPERIENCE

The general dictionary definition of “experience” is “a particular instance of personally encountering or undergoing something.” Visitors come to national parks in part to engage in a specific experience offered by that park, typically a natural or cultural resource experience. Visitors’ preferences for experiences, activities, and management decisions differ greatly (Dorwart et al. 2010, 34). The experience sought by each visitor is unique to that person and can serve various purposes, such as relaxing, conquering challenges, developing camaraderie, or sight-seeing. Despite such differences, direct contact with nature, regardless of the method, is believed to increase mental health and psychological development (Davis 2004, 1). Research in environmental psychology has shown that people’s desire to experience contact with nature serves an important adaptive function, specifically psychological restoration (van den Berg et al. 2007, 79). Over 100 research studies show that stress reduction is a key perceived benefit of experiencing nature (Davis 2004, 1). People tend to perceive natural environments as more restorative than urban environments, and there is evidence that contact with natural environments can promote restoration from stress and mental fatigue (van den Berg et al. 2007, 82–83). For example, studies have shown that 82% of the general population has “experienced the beauty of nature in a deeply moving way” and 49% felt this had a lasting influence. Approximately 45% of the general population and 50% of a large sample of students said “beauties of nature” led to “an intense spiritual experience.” When asked to describe where their peak life experiences had occurred, 78% of a sample of city college students said “outdoors” or in a “natural setting” (Davis 2004, 6–7).

Natural environments provide psychological restoration because they possess several qualities that, in combination, are less common in other environments. These qualities include being away from daily routines, encountering aesthetically pleasing stimuli, being able to explore, and achieving individual recreational goals. This does not mean that restorative experiences only occur in natural environments, but that there is appreciation for their restorative potential. However, people tend to perceive natural environments as more beautiful than urban environments, which is closely related to perceived restorative

quality. Several studies have documented strong relationships between preferences for scenic beauty and perceived restorative quality. Frequent, brief restorative experiences may, over time, offer cumulative benefits (van den Berg et al. 2007, 84–85, 89). In addition, intense experiences are often attained in specific landscapes. For example, solitude in a natural environment can assist a person in gaining life perspectives (Murphy 1999).

The features people notice during their visits to natural settings can affect their overall experiences (Dorwart et al. 2010, 33–34). Studies have shown that the park features most often identified as having an effect on the visitor experience are water, vistas, management features, vegetation, wildlife, and human impacts. Points of interest, views, curves in a path, and waterways attract visitors' attention (Dorwart et al. 2010, 33–35).

Generally, visitors to a natural environment expect certain qualities to be available in particular areas, such as solitude in “wilderness” areas (Murphy 1999). While many nature experiences have a solitary component, many involve a social component as well. Natural environments provide opportunities for affiliation, social support, intimacy, and group bonding in a new setting (Davis 2004, 5). Experiencing or not experiencing desired qualities and characteristics may influence the meaning associated with that place (Murphy 1999).

The various qualities and characteristics visitors expect comprise discrete elements of visitor experience. However, visitor experience is not static; it varies dynamically over the course of the engagement (Hull et al. 1992, 240). A series of changing events contributes to one overall experience, or story. It is theorized that people may seek recreational experiences to provide “stories that enrich their lives” (Patterson et al. 1998, 423). In such cases, the meaning of the experience, i.e., how it is constructed and remembered, is more important than the nature, or characteristics, of the experience (Patterson et al. 1998, 425). The opportunity to reflect on, relive, define the meaning of, and share an experience can be an important component of overall visitor experience, especially for people whose experience was intense (Patterson et al. 1998, 447).

An emotional bond commonly develops between visitors and natural recreation areas during recreation activities. This experience is referred to as place bonding, place attachment, or sense of place. People often develop not only an emotional bond, but a sense of belonging and even a dependence on a natural recreation area, to the extent it becomes “their place,” a “favorite place,” or the “only place” for their outdoor pursuits. Such emotional bonds may vary in intensity from an immediate sense of familiarity to a long-lasting and deeply entrenched attachment. When the strength and character of a place bond is very strong, visitors will consider no other place to recreate. These place bonds are associated with a set of collectively held images that evolve from direct or indirect interaction with a particular place. A recreational genealogy is associated with these places, rooted in family members, environmental settings, and past experiences. Stories that develop through recreating at rooted places become stable components of the visitor experience. It is usually difficult to shift or distribute use from such places because of these strong emotional place bonds (Hammitt and Cole 1998, 189–191).

The specific experience of visitors to DEWA, MDSR, and APPA reflects the findings from the research highlighted above. Representative comments describing visitor experience at these parks collected during public scoping for this EIS are included below unless otherwise referenced (a full set of comments can be found in appendix I).

I have been riding and walking parts of ... the McDade Trail [at DEWA] for the past year. Last night was near magical—the warm breeze, and the smells of the forest and open fields—was a real tonic. I was there just at dusk when the lightning bugs come out in full force. What a chance to experience nature.

When I get out in that water [Delaware River], and swimming in the river is like nothing in the universe. It's not a lake. It's not an ocean. It's unique. I don't know any other place you can swim in the river. And there you are, and you turn around and you look at the hills where the Minisink Indians were surrounding you. And you get a sense of what this place looked like 400, 500, 600 years ago.

Part of what makes the simple things in life, like eating fresh picked blueberries on the Appalachian Trail, exploring old cemeteries and copper mines, and canoeing on a river where you can occasionally spy a bald eagle, so great is that they are HERE.

Aside from the historical value of the Delaware Water Gap, it also holds value to many yearly visitors. It provides a place for those people who live in busy areas to escape the hustle and bustle of their everyday lives.

The views seen from throughout DEWA, along the river and the Appalachian Trail are priceless.

One of the most beautiful memories I have as a child was my father bringing me hiking in the mountains and the amazing peace I felt looking down at the world below.

[DEWA] has one of the most spectacular views from a hot air balloon.

Beautiful, scenic. I drive through here a few times a year and marvel (NPS 2011e).

A nice place to hang out with family and friends (NPS 2011e)

The park is wonderful. First time here and would return in a heartbeat (NPS 2011e).

It is a jewel in the crown of the Park Service because of its variety and beauty (NPS 2011e)

Overall it makes for a wonderful outdoor experience (NPS 2011e).

We love this place (NPS 2011e).

These comments on visitor experience at DEWA reflect the park's enabling legislation, which established the park "for public outdoor recreation use and enjoyment of the proposed Tocks Island Reservoir and lands adjacent thereto and for the preservation of the scenic, scientific, and historic features contributing to the public enjoyment of such lands and waters" (PL 89-158; USC 460). Similarly, the Wild and Scenic Rivers Act specifies that the primary emphasis of rivers such as MDSR "will be given to protect the area's aesthetic, scenic, historic, archeological, and scientific features."

During a 2010 river user survey, DEWA visitors identified specific elements that detracted from their experience. When asked if power lines and signs detracted from their experience, 56% of visitors noted they did not notice these features. Of those who did, 81% said that power lines and signs did not at all distract from their experience. However, when asked if expanding the power lines within the river corridor through a section of DEWA and MDSR would affect their experience, 64% of river users indicated that power line expansion would detract from their park experience, 34% said there would be no effect, and 3% said it would add to their experience (Blotkamp et al. 2010, 70).

Visitor experience as it applies specifically to APPA is addressed by the Appalachian Trail Conservancy policy. This policy states:

The Trail experience ... is intended to represent the sum of opportunities that are available for those walking the Appalachian Trail to interact with the wild, scenic, pastoral, cultural, and natural elements of the Appalachian Trail environment, unfettered and unimpeded by competing sights or sounds and in as direct and intimate a manner as possible. Integral to this Trail experience are:

- Opportunities for observation, contemplation, enjoyment, and exploration of the natural world
- A sense of remoteness and detachment from civilization
- Opportunities to experience solitude, freedom, personal accomplishment, self-reliance, and self-discovery
- A sense of being on the height of the land
- Opportunities to experience the historic and pastoral elements of the surrounding countryside
- A feeling of being part of the natural environment
- Opportunities for travel on foot, including opportunities for long-distance hiking (ATC 1997)

The APPA experience as envisioned by the Appalachian Trail Conservancy is supported by numerous reports. APPA is known worldwide not only for its length and number of visitors, but for the singular experience it provides. “Hiking the Appalachian Trail, as opposed to a lesser-known trail, gives people the feeling of becoming a part of something larger than themselves” (DeGagne 2007, 7). “Mere miles can’t express the significance of the trail — something powerful enough to inspire a man to change not only his lifestyle, but his entire life” (Thorkelson 2002). “This experience, the sheer *opportunity* presented by such a long footpath, has made an indelible impression on many a casual hiker” (DeGagne 2007, 5). People from all over the world and of all ages, levels of experience, and backgrounds come to APPA, each for unique reasons: to escape the stress of city life; reconnect with nature; take in a scenic view; enjoy the sights, sounds, and smells of the forest; explore one’s inner self; get physically fit; and get back to a simpler way of life (McCorkle 2002). The Great Outdoor Recreation Pages, referring to the APPA as “America’s most significant sanity check,” further underscores the iconic nature of the trail:

There are other long-distance hiking trails in America, to be sure, but none has captured the American imagination, indeed the international imagination, in quite the same way that the Appalachian Trail has. If all people wanted to do was take a hike, any trail in any state or national park or forest would do. America offers a lot of them. But the Appalachian Trail is much more than a walk in the woods. (GORP 2010)

Numerous APPA visitors have described their experiences of hiking the trail. These experiences reflect the Appalachian Trail Conservancy policy; the restorative, aesthetic, and social nature of the experience; and the trail’s iconic nature:

All throughout the trail I felt as though I was free. I felt as though none of the troubles I had back home could get me here. All I ever saw was nature at its finest. It was as though mankind had never even laid their hand on the entire land (Student Trail Stewards 2009).

This is a hundred times harder than I ever imagined. And a thousand times more rewarding (McCorkle 2002).

I have seen sights at the mountaintops that no man should be allowed to see till he reaches the gates of heaven (McCorkle 2002).

Number one it is just beautiful and so it's memorable. The scents and the sounds and the sights kind of reminded me of trips we've taken to the northwest ... it's almost like nostalgia (Dorwart et al. 2010, 33).

I learned that on the trail, everyone is equal ... You begin to look at people the way you're supposed to and what's at their heart and mind and that's all that matters. If we can bring this back to our families and communities [the world] will be a better place to live (McCorkle 2002).

All the strangers that became close friends, the times where I was speechless looking at the mountains, perfect strangers opening their homes to me, slogging through endless rain and the sheer joy of what is ahead. That is what the trail is ... My spirit for adventure and the unknown has been woken up and is restless (Everett 2010).

The AT will always be a part of me. I will remember the crunch of fresh snow under my boots, the way the sun feels after many days of rain. The joy a cold soda can bring from a complete stranger. The daily rhythm of hiking that seems to bring tranquility. I have pushed myself physically, mentally, and emotionally. It was not easy to do. But the rewards are many. Horizons are now limitless, what can and cannot be done is redefined. I have learned more about myself than I thought I could know. I now have a better idea of who [I am]. The memories and experiences of the trail will always be a part of me ... in my heart and thoughts, I will still be on the trail (NPS 2007d, 6).

As with DEWA and MDSR, these comments on visitor experience at APPA reflect the park's purpose, which is "to provide for maximum outdoor recreation potential as an extended trail and for the conservation and enjoyment of the nationally significant scenic, historic, natural, or cultural qualities of these areas through which the trail passes" (NPS 2008f).

According to a report on APPA published by the National Parks Conservation Association in 2010, the biggest threat to the trail is the encroachment of development, which interrupts natural viewsheds, diminishes the hiking experience, and facilitates illegal motorized vehicle use. A protective corridor that has been acquired along the trail averages 1,000 feet in width. However, that corridor is "vulnerable to adjacent development, as well as energy, communications, and transportation projects." The report notes that "power lines are one example of adjacent development that mars the scenic viewshed along the trail. It is a major priority of the Appalachian Trail Conservancy and NPS APPA office to protect the trail's miles of uninterrupted views by opposing projects that would mar adjacent scenic and historic landscapes." The report cites an example of a voluntary agreement with a telecommunications company to design facilities in a way that protected the trail experience (NPCA 2010, 22).

The following sections further describe visitor use and experience at those locations that would be affected by the alternatives. Where data are available about visitor experience at those areas, they were included. Visitor experience data are not available for all locations.

ALTERNATIVE 1 (NO ACTION), ALTERNATIVE 2, AND ALTERNATIVE 2b

As mentioned above, many DEWA visitors engage in river activities. According to a study of river users, the majority of DEWA river trips end at locations within the study area, specifically Smithfield Beach and Kittatinny Point. Well over half of the park's river users therefore pass under the B-K Line (Blotkamp et al. 2010, 48).

In addition to providing access to recreation destinations, DEWA roads provide a scenic driving experience; 56% of all park visitors engage in sightseeing activities (Madison and Machils 1990). In Pennsylvania, River Road between Bushkill and Shawnee-on-Delaware provides views of hilly farmlands, and was originally a trail used by American Indians along the river. The road was used by European settlers and for various military purposes. The River Road corridor retains a high level of the feeling and association with agricultural and recreational uses. Its rural, narrow, two-lane, meandering character recalls its historic origins as one of the earliest main transportation corridors in Monroe County (NPS 2005d, 1–5).

Visitors seeking to tour the park by automobile are often directed along New Jersey's Old Mine Road (NPS 2009j). The NPS lists Old Mine Road as a scenic route over hills and through villages. The road is considered a cultural landscape and a National Register Historic District. Old Mine Road winds through hills and past historic villages where several historic structures are open for visitors in the summer. The historic road followed a American Indian trail connecting the Hudson River, Port Jervis, and the Philadelphia area. The road passes a copper mining site, a school built in 1881, and Watergate Recreation Site, where only the stone pillars of a dam remain from the once extensive landscaping of the 1950s (NPS 2000b, 1–4). The B-K Line crosses Old Mine Road near Watergate Recreation Site. A 26-mile section of the road is included in the Old Mine Road Historic District Nomination, including where the B-K Line crosses the road. This 26-mile section of the road retains the most substantial historic integrity, based in part on the relative absence of nonhistoric intrusions, as noted in the "Cultural Resources" section. The transmission line clearing creates an opening where it crosses Old Mine Road at mile marker 11, which passes primarily through wooded forests that create an overhead canopy. As noted in the "Vegetation" section, canopy height at lower elevations, such as this location, is approximately 50 to 60 feet. The B-K Line corridor can be seen extending to the east and west, and towers are visible (DEA 2010a).

Old Mine Road is a moderately hilly and scenic touring route for road bicycles. Paved sections of Old Mine Road, combined with NPS 615, provide a paved touring route of more than 20 miles (NPS 2010z). The New Jersey Department of Transportation created a brochure about bicycling on Old Mine Road. The brochure describes the route as moderately hilly with two major climbs and a steep descent, with vehicular traffic likely on summer weekends due to popularity with anglers, hikers, boaters, and rafters. Four separate maps indicate route sections along the entire road (NJDOT 2002, 1–3). The Adventure Cycling Association also identifies Old Mine Road as a component of the Atlantic Coast Bicycle Route (ACA 2007, 18). The Appalachian Trail Conservancy notes that Old Mine Road is a popular destination for bicyclists because traffic is almost exclusively limited to hikers, campers, and anglers (AMC 2010). Bicycle rentals are available near the southern end of DEWA in the communities of Delaware Water Gap and Minisink Hills, Pennsylvania (NPS 2010z).

Bicycling is permitted on portions of the McDade Trail in Pennsylvania. The trail offers a pulverized stone bicycling/hiking trail free from intersections with roads, and the majority of the trail is complete. This trail is suitable for mountain and hybrid bicycles. When completed, the McDade Trail will extend for 37 miles on the Pennsylvania side of the park.

The McDade Trail passes under the B-K Line at Community Drive approximately 0.25 mile south of River Road (Community Drive is located about 0.5 mile north of DEWA headquarters). The transmission

line is noticeable through a large meadow as hikers approach the transmission line from the south. Canopy height at this location is approximately 50 to 60 feet. Where the B-K Line crosses the trail, there currently is no canopy opening and the transmission line is barely noticeable due to heavy growth within the ROW (DEA 2010a). However, this condition may change after the applicant clears the corridor of vegetation.

North of River Road, Bushkill Access provides public river access from which eagles are routinely seen (NPS 2010z). Bushkill Access is a large motorized and nonmotorized boat launch area north of the B-K Line crossing and is accessed from US 209. This is one of the park's most visited locations for river users, with 22% of river users indicating that they used this site (Blotkamp et al. 2010, 43). The B-K Line cannot be seen from this boat launch (DEA 2010a). However, after boaters launch and travel downstream, they would pass under the B-K Line en route to their destinations.

Picnicking is popular at DEWA; 36% of visitors picnicked as part of their trip (Madison and Machlis 1990). Most picnic areas are free of charge; however, some are located within fee areas (as noted). Picnic areas located near the existing B-K Line alignment are listed below.

- Millbrook Village, New Jersey
- Watergate Recreation Site, New Jersey (fee area)
- Van Campens Glen Picnic Site, New Jersey (NPS 2010q, 2010aa)

Watergate Recreation Site is a very large, manicured, grassy picnic area accessed from Old Mine Road. This area is mostly open and wide, with several small ponds and few trees. Some trees surround and delineate the perimeter of the site. The B-K Line is close and is clearly visible, abutting the southern end of the site. This transmission line can be seen from many vantage points, with picnic areas closer to the south more affected than others. The B-K Line ascends hills to the east and west; the eastern ascent can also be seen from the site. A cleared trail approaches the transmission line at the southern end of the site. The trail continues under the transmission line, the corridor of which is obvious to the east and west. Vegetation under the transmission line is about 3 to 7 feet high. The trail then enters deciduous/evergreen woods and leads to the Upper Glen parking area and trailhead. From the Upper Glen parking connector, the Van Campens Glen Trail continues to the Van Campens Glen Picnic Site (Lower Glen parking lot). As at the McDade Trail, canopy height along this trail is approximately 50 to 60 feet (DEA 2010a).

Van Campens Glen Trail connects Watergate Recreation Site at the north with Van Campens Glen Picnic Site to the south, a distance of about 2 miles. The trail is also accessible from the Upper Glen parking lot. The trail follows Van Campens Brook through a scenic glen shaded by shagbark hickories and hemlock trees, and passes a waterfall. Before reaching Watergate Recreation Site to the north, the trail passes directly beneath the B-K Line. The existing cleared corridor creates an abrupt visual change compared with the previously shaded hike (DEA 2011). The grassy-scrub vegetation within the corridor varies from 3 to 7 feet high.

The Hamilton Trail is accessed from two undeveloped and unmarked trailheads on Old Mine Road or from Millbrook Village via the Orchard Trail. The road/trail is a very smooth and flat double track through the woods. At about 0.25 mile, the intersection for the Pioneer Trail appears to the right. The Pioneer Trail makes a loop off Hamilton Ridge and is also crossed by the B-K Line. Continuing on the Hamilton Trail, the road passes two old residences and associated detritus. The B-K Line crosses the trail after approximately 1 mile. The ROW clearing for the transmission line creates a large opening. The transmission line corridor is visible downhill to the west and uphill to the east. Towers are only a few feet from the trail. Canopy height along this trail is approximately 50 to 60 feet (DEA 2010a).

After following the Hamilton Trail for approximately 1 mile, an unofficial trail leads to the river and the Hamilton river campsites. There is a large cornfield between the woods and the camp. These fields are farmed as part of the DEWA agricultural leasing program to help maintain open space and cultural landscapes. The campsite is large, with several trees. The transmission line is visible both from the campsite and from across the river. Twelve designated primitive campsites follow the bank divided by the transmission line, which crosses between campsites 97 (north of the ROW) and 98 (south of the ROW).

The Rivers Bend campground within the study area is available for groups of a minimum of five people and requires reservations. The yearly average use for this campground was 1,852 for 2007–2009, with the majority of visitors staying in June (NPS 2011f). This campground is a large, grassy area high above the river. The river can be seen from an overlook through the trees at the southern end of the campground that provides views of the Walpack Bend region and downstream. Canopy height in this location is approximately 50 to 60 feet. There are also six primitive river campsites, the Peters river campsites, on both sides of the river near Walpack Bend (NPS 2010z).

Visiting historic sites is a popular visitor activity at DEWA. A 2010 study of river users indicated that 13% experienced historic sites as part of their trip to DEWA (Blotkamp et al. 2010, 45). Several historic sites are open to visitors interested in experiencing local history. Millbrook Village, New Jersey, is a historic village with several historic structures in DEWA and the study area. Craft demonstrations and house tours are available on summer weekends. A series of historic activity days are also offered on topics such as “Victorian Holidays” and “Maple Sugaring” throughout the year. Hands-on History days are open to the general public. Several public events are also held throughout the year, including Millbrook Days in October. In 2010, seven special events were held during the year, during which interpretive staff and volunteers presented over 6,000 craft and skill demonstrations to more than 25,000 visitors. Approximately 8,000 visitors were drawn to the demonstrations, exhibits, games, and nineteenth century music presented by costumed volunteers from the Millbrook Village Society and park staff (NPS 2010ac). The B-K Line cannot be seen from Millbrook Village.

Visitors to DEWA from 2007 to 2009 made the following comments about their experience at Millbrook Village (NPS 2011e):

We visited Millbrook Historical Town—a wonderful history lesson for my children.

Millbrook Village is awesome!!!!

Millbrook Village is a little piece of history that we were glad could be shared [with our] 10-year-old daughter who is interested in this time period.

Millbrook Village is a living park important for generations of young people to enjoy and experience. Frankly, I was pleasantly surprised by the quality of Millbrook Village considering there was no entrance fee.

Millbrook Village holds intrinsic historical value. We live close—visit often—always find something that holds priceless value to us and many others.

Millbrook Village is the hidden gem. It needs better publicity.

We enjoyed learning about the area from the historian of Millbrook.

Excellent historical events.

The alignment for alternatives 1, 2, and 2b would cross APPA near the eastern boundary of DEWA west of Sand Pond in New Jersey. The trail passes beneath the B-K Line at the high point of the Kittatinny Ridge escarpment. The trail enters the cleared ROW and follows the corridor for 400 to 500 feet before reentering the woods. Hikers pass close by two large galvanized-steel lattice tower structures. The clearing creates views both east and west. Looking west, the view overlooks the Delaware River Valley, and the cleared corridor is clearly discernible for several miles.

More details about activities and recreational provisions at specific sites are provided in the *2010 Visitor Use Technical Report* (DEA 2010a).

Alternatives 1, 2, and 2b Photographs



View of existing B-K Line corridor looking west from Old Mine Road.



B-K Line corridor where it presently crosses McDade Trail, looking east. The B-K Line is virtually invisible.



B-K Line corridor where it crosses Watergate Recreation Site, looking west.



B-K Line corridor where it crosses Hamilton Ridge Trail, looking north.



Looking north from Hamilton Campsite #98 at B-K Line corridor.

ALTERNATIVE 3

As mentioned previously, swimming is one of the most popular activities at DEWA, and 56% of river users engage in that recreational activity when they visit (Madison and Machlis 1990; Blotkamp et al. 2010, 44). Lifeguarded swimming is provided within the study area at Smithfield Beach, a large, open, grassy recreation area accessed from River Road. This is one of the most visited locations in DEWA, and 33% of river users indicated that they used this site (Blotkamp et al. 2010, 43). There is a small, grassy

swim beach in the center of the Smithfield Beach area, surrounded by picnic areas and a large, grassy expanse. Several picnic areas are close to the river (DEA 2010a). Picnicking was rated as the second most popular activity at DEWA; 35% of visitors engage in that recreational activity when they visit (Madison and Machlis 1990). Smithfield Beach is also identified by NPS as a good location from which to view wintering bald eagles from December through March. Views of the river and the opposite side are screened by tall vegetation. Canopy height in this area is approximately 50 to 60 feet. The existing transmission line that alternative 3 would follow is very close to this area. The existing transmission line and corridor can be seen across the river from the swim area and boat launch to the south (DEA 2010a).

Turtle Beach also provides lifeguarded swimming within the study area, and is accessed from Old Mine Road north of the existing alternative 3 transmission line. Visitors pass a large picnic area en route to the beach. Large deciduous trees to the south and west of the picnic area block views; the transmission line that alternative 3 would follow cannot be seen from here. The beach itself is farther south and is entirely grass (no sand). It is a large, open expanse. Another picnic area is located farther inland; many large trees to the south block views to that direction. The existing transmission line cannot be seen (DEA 2010a).

Formal launches for nonmotorized and motorized boats are available at Smithfield Beach. Poxono Access, New Jersey, is another formal boat launch (NPS 2010q; 2010aa). Poxono Access is a small boat launch area north of the alternative 3 crossing and is accessed from Old Mine Road. The transmission line that alternative 3 would follow cannot be seen from Poxono Access (DEA 2010a). However, boaters would pass under the existing transmission line as they continue their trip downstream.

Inside the study area, River Road, Old Mine Road, and McDade Trail, as described for alternatives 1, 2, and 2b, would also be affected under alternative 3. The alternative 3 transmission line would cross Old Mine Road within Worthington State Forest just south of the northern Rockcores Trailhead. The NPS road bicycle touring brochure lists Old Mine Road as a moderately hilly and scenic touring route for road bicycles, and describes a 20-mile route starting from the Douglas parking area at the north end of Worthington State Forest. The clearing created for the existing transmission line that alternative 3 would follow is obvious as drivers come through a shaded canopy of trees into a bright, open area. Canopy height in this area is approximately 50 to 60 feet. The wooden poles and towers are visible to the west, where the line descends gently to the river, crosses it, and ascends the hill on the other side. The corridor and three wooden transmission line poles are also visible at the top of a steep rise to the south, marking the sharp turn in the alignment to the northeast. The continuation of corridor cannot be seen after that point (DEA 2010a).

A trailhead for McDade Trail is located just north of the Hialeah Picnic Site, from which the trail is accessed, and the trail travels north. This section of the trail is mostly level, but with some steep climbs and descents. The trail takes a steep drop through a wooded area, approaching river level. The hill to the west and the vegetation block views all around. At the bottom of the hill, a spur trail leads to river camp #106. From the river's edge at camp #106, the existing transmission line that alternative 3 would follow can be seen where it crosses the river to the north. The corridor on the opposite side of the river is barely visible due to distance. The campsite itself is on higher ground and is mostly surrounded by vegetation (DEA 2010a).

About 1 mile north of the trailhead, the trail crosses the existing transmission line. Double-pole wood towers are close to the trail. Not much of the transmission line can be seen to the west due to a sharp topographic incline. However, the corridor opening is an obvious change in a mostly wooded area. Just north of the crossing, the trail turns sharply west and vegetation blocks views of the transmission line. Canopy height in this area is approximately 50 to 60 feet. Just north of the crossing, the trail opens to another cornfield to the west, and the existing transmission line that alternative 3 would follow can be seen when looking back to the south (DEA 2010a).

Picnic areas located near alternative 3 are listed below. Most picnic areas are free of charge; however, some are located within fee areas (as noted).

- Hialeah Picnic Site, Pennsylvania
- Smithfield Beach, Pennsylvania (fee area)
- Hidden Lake Recreation Site, Pennsylvania
- Turtle Beach, New Jersey (fee area) (NPS 2010q; 2010aa)

Hialeah Picnic Site is a large picnic area accessed from River Road that hugs the river's edge, although views of the river are screened by tall vegetation. This developed area is enclosed by tall deciduous and evergreen trees. The existing transmission line that alternative 3 would follow is about 1 mile northeast of this area but cannot be seen due to the distance and the dense vegetation (DEA 2010a). Canopy height in this area is approximately 50 to 60 feet.

Two local clubs fly their radio-controlled model aircraft in DEWA. Visitors are welcome to watch. Within the study area, the Roxbury Area Model Airplane Club uses the Hialeah Air Park in Pennsylvania on River Road just north of Smithfield Beach. The park is a large, open, grassy area close to River Road. The existing transmission line that alternative 3 would follow can be seen on the other side of the river to the south, but not on the west side of the river (DEA 2010a).

A popular rock-climbing area within the study area is Ricks Rocks, approximately 1 mile east of Millbrook Village (NPS 2010z). There is a small parking area on CR 602 near the alternative 3 transmission line, just within the eastern DEWA boundary. Rock steps signify a trailhead here but it is not marked. The trail is faint and extremely steep and rocky. The alternative 3 transmission line can barely be seen through the trees from this location due to distance and dense vegetation (DEA 2010a).

APPA crosses Camp Road just south of the Mohican Outdoor Center, which is a popular overnight location for trail users. The trail climbs gently to the northeast through deciduous woods and follows the ridgeline, where the trail is mostly level with some rocky sections. As the trail more closely approaches the eastern edge of the ridge, the existing transmission line that alternative 3 would follow, which parallels the trail, becomes visible below. The line can be seen for miles to the north and south. As vegetation begins to give way farther north, the transmission line that alternative 3 would follow becomes apparent below the trail and for long distances to the north and south. Very little vegetation blocks the views. Eventually the trail reaches an intersection with the Rattlesnake Swamp Trail. APPA then veers west, away from the exposed ridge rim, and vegetation blocks views of the transmission line (DEA 2010a). However, during leaf-off seasons, the transmission line may be visible from this area.

More details about activities and recreational provisions at specific sites are provided in the *2010 Visitor Use Technical Report* (DEA 2010a).

Alternative 3 Photographs



Looking east from Old Mine Road at transmission line corridor that alternative 3 would follow.



Looking west from Old Mine Road at alternative 3 transmission line corridor.



McDade Trail where alternative 3 transmission line corridor would cross the trail, looking south.



View to the southeast from Smithfield Beach of alternative 3 transmission line corridor.



View to the east from Smithfield Beach boat launch of alternative 3 transmission line corridor.



View to the southeast from Hialeah Air Park of alternative 3 transmission line corridor.



View to the southeast from APPA near Mohican Outdoor Center of alternative 3 transmission line corridor.

ALTERNATIVE 4

Inside the study area, those sites described for alternative 3 along the west side of the Delaware River would also apply to alternative 4. In addition, the following information describes more details about locations near the south end of DEWA where the alternative 4 alignment would cross the parks.

Scenic viewing and photography opportunities are available throughout both DEWA and APPA, particularly at the Delaware Water Gap itself. PA 611, south of I-80, provides scenic views of the Delaware Water Gap with three formal overlooks: Resort Point Overlook, Point of Gap Overlook, and Arrow Island Overlook. Kittatinny Point Visitor Center, in the Delaware Water Gap, also provides scenic views, as do many other nondesignated sections throughout the parks. In addition, eagle watching and photography is recommended at Kittatinny Point Visitor Center (NPS 2010z). Kittatinny Point also offers free picnicking sites and a motorized boat launch. The Kittatinny Point Visitor Center is one of the most commonly visited sites at DEWA and is one of the top three most widely used take-out points for river users (Blotkamp et al. 2010, 43, 48). None of the proposed alternatives would affect these overlooks or the visitor center.

The Red Dot (Tammany) Trail starts at the Dunnfield parking lot, which is accessed from westbound I-80 within the Delaware Water Gap. The trail climbs 1,250 feet in 1.5 miles and is steep and rocky. The trail is forested with deciduous trees, and no views can be seen until a small southeast-facing clearing about halfway to the top, from which Mount Minsi can be clearly seen approximately 1 mile to the south. Mount Minsi is a high point in the Delaware Water Gap, beyond which the alternative 4 transmission line would be located. The trail then becomes wooded again, with views obscured by vegetation. A small clearing appears near the summit, providing views to the south, partially blocked by foreground vegetation. At the 1,527-foot summit of Red Dot (Tammany) Trail, Mount Minsi (which is at a slightly lower elevation at 1,463 feet) can be seen again. Some foreground vegetation interferes with the views as well. These views would be more prominent during leaf-off conditions.

APPA climbs northeast from the trailhead parking at Dunnfield, just off westbound I-80 on the north side of the Delaware River. After about one-half mile, the Dunnfield Hollow Trail branches to the right, following a creek. APPA climbs about 4 miles and 300 feet northeast to Sunfish Pond. The Worthington State Forest map indicates that Sunfish Pond is at a high point of about 1,400 feet elevation AMSL (NJDEP 2010d).

APPA is also accessible from PA 611 across from Resort Point Overlook on the south side of the Delaware River. The trail roughly parallels I-80 for approximately 1 mile. The area is heavily wooded, following the contours of a hillside to the south. The trail veers away from the highway en route to a high overlook approximately 1 mile into the hike. From the overlook, hikers can see canoes and kayaks at the Kittatinny Point Visitor Center canoe launch. The trail turns sharply south en route to Mount Minsi. As hikers proceed farther south along the trail, they would cross the alternative 4 transmission line ROW near Totts Gap Road (DEA 2010a).

The Farview Trail originates in Worthington State Forest and is accessed from Old Mine Road. It heads east and eventually intersects APPA, as well as other trails that lead to Sunfish Pond. The trail is a gently climbing, wide, double track surrounded by deciduous vegetation. Noise from I-80 can be heard to about 1,200 yards (DEA 2010a).

The Karamac Trail is accessed from Old Mine Road just east of the point where I-80 bridges the Delaware River. The trail follows a segment of a former railroad line (NPS 2003d). The trail closely hugs the river, which is many feet below. Stone support piers in the river visible from the northern end of the trail are all that remain of the railroad's truss bridge. No existing transmission structures are visible (DEA 2011).

The Worthington State Forest campground is approximately 1.5 miles north of I-80 on Old Mine Road. The campground is heavily wooded to the south and east. The topography also rises to the east. The alternative 4 transmission line cannot be seen from the southernmost campsite in this campground (DEA 2010a).

Alternative 4 Photograph



View of Mount Minsi looking south from Red Dot (Tammany) Trail toward the alternative 4 alignment.

ALTERNATIVE 5

Inside the study area, the same area would be affected as described for alternative 4.

Outside the Study Area

Outside the study area, the S-R Line could cross any of the recreation sites shown in table 44. Specific areas in Pennsylvania include sections of Delaware State Forest lands in Pike County, as well as recreational areas and state game lands en route to Susquehanna. The line could also cross Varden State Park in Wayne County; Lackawanna State Forest and Lackawanna Valley State Heritage Region in Lackawanna and Luzerne counties; Delaware and Lehigh National Heritage Corridor in Luzerne County; and Hickory Run State Park, Delaware and Lehigh National Heritage Corridor, and Weiser State Forest in Carbon County. Potential routes to the south could cross Cherry Valley NWR.

Outside the study area in New Jersey, the S-R Line could traverse Smartswood, a very small state park, and Kittatinny State Park in Sussex County. The line could also cross Columbia Wildlife Management Area / Game Land and possibly Jenny Jump State Forest and Bear Creek Wildlife Area/Preserve in Warren County, as well as Allamuchy Natural Area in Warren County and Allamuchy State Park in both Warren and Morris counties. In Morris County, the line could cross game land areas, Berkshire Valley Wildlife Management Area / Game Land, and Troy Meadows, a small natural area near the Roseland Substation.

WILD AND SCENIC RIVERS

In November 1978, PL 95-625, section 705, section 3 (a) of the Wild and Scenic Rivers Act was amended, establishing MDSR. Title 16 USC 1274 page 1592, (20) stipulates the following:

DELAWARE, NEW YORK, PENNSYLVANIA, AND NEW JERSEY – The segment from the point where the river crosses the northern boundary of the Delaware Water Gap National Recreation Area to the point where the river crosses the southern boundary of such recreation area; to be administered by the Secretary of the Interior. For the purposes of carrying out this Act with respect to the river designated by this paragraph, there are authorized to be appropriated such sums as may be necessary. Action required to be taken under subsection (b) of this section with respect to such segment shall be taken within one year from the date of enactment of this paragraph, except that, with respect to such segment, in lieu of the boundaries provided for in such subsection (b), the boundaries shall be the banks of the river. Any visitor facilities established for the purposes of use and enjoyment of the river under the authority of the Act establishing the Delaware Water Gap National Recreation Area shall be compatible with the purposes of this Act and shall be located at the appropriate distances from the river.

The Classification Map of MDSR was published in the *Federal Register Notices* on January 17, 1980 (vol. 45 no. 12, 3397), and is also found in appendix A of the DEWA GMP (NPS 1987, 110). The northern 35 miles of the MDSR are designated a national scenic river of the national wild and scenic rivers system, and the remaining 5 miles within DEWA are designated a recreational river of the national wild and scenic rivers system (distances are approximate).

The Wild and Scenic Rivers Act defines scenic river areas as those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

Recreational river areas are defined in the Wild and Scenic Rivers Act as those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

Section 10 (a) of the Wild and Scenic Rivers Act stipulates "...that each component of the national wild and scenic rivers 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 give to protect (the area's) esthetic, scenic, historic, archaeological, and scientific features. Management plans...may establish varying degrees of intensity for (the area's) protection and development, based on the special attributes of the area." The Interagency Wild and Scenic Rivers Coordinating Council interprets Section 10(a) as a "nondegradation and enhancement policy for all designated river areas, regardless of classification;" therefore, each alternative will be reviewed for effects on the resource values that supported the establishment of MDSR.

A 1986 amendment to the Wild and Scenic Rivers Act requires the administering agency of designated units to develop a comprehensive river management plan within 1 year of establishment. MDSR was created prior to this requirement, and therefore does not have its own specific comprehensive river management plan. Instead, the DEWA GMP provides management guidance for the resources of MDSR and DEWA. Although MDSR is an individual park unit, it is administered by DEWA. The DEWA GMP states, "Although the national recreation area and the scenic and recreational river have separate legislative origins, the land and water areas are considered as an integrated whole for the purposes of this document. Therefore, whenever the term national recreation area is used, the scenic and recreational river is also meant, unless otherwise noted" (NPS 1987, 3).

The statement in the GMP is consistent with section 10(c) of the Wild and Scenic Rivers Act, which stipulates "...that any component of the national wild and scenic rivers system that is administered by the Secretary of the Interior through the National Park Service shall become a part of the national park system, and any such component that is administered by the Secretary through the Fish and Wildlife Service shall become a part of the national wildlife refuge system. The lands involved shall be subject to the provisions of this Act and the Acts under which the national park system or national wildlife refuge system, as the case may be, is administered, and in case of conflict between the provisions of these Acts, the more restrictive provisions shall apply." The Interagency Wild and Scenic Rivers Coordinating Council interprets section 10(c) to mean that the NPS and USFWS are allowed to use their general statutory authorities to protect wild and scenic river values. Thus, the resource values, goals, and desired conditions identified in the DEWA GMP include the resource values that could potentially be affected by alternatives crossing MDSR. The resource values (more fully described under individual resource topics in this EIS) and descriptions relevant to MDSR (from Walpack Bend downstream to the southern boundary of MDSR) include the following.

Water Resources: The entire Delaware River segment within the national recreation area is free-flowing, without impoundments or areas of slack water, and the water quality is high enough to support aquatic life and allow for recreational use. The water quality is of such high value that the Delaware River Basin Commission adopted special protection water standards in 1992 to prevent measurable change in water quality except toward natural conditions. These antidegradation standards were adopted, in part, to protect the exceptional water quality that originally qualified the river for designation under the Wild and Scenic Rivers Act.

Scenery: The DEWA landscape consists of heavily wooded Pennsylvania and New Jersey uplands, forested areas in various stages of succession, and historic farm fields. Views from the river corridor include riparian forest, the forested slopes of the Hogback and Kittatinny ridges, the Delaware Water Gap,

and largely uninterrupted views of a free-flowing river. Occasional views of historic farm fields and roads are reminders of past land use. The scenery is a combination of the cultural landscapes, geologic features, and vegetation. Together these form the mosaic of color, form, and texture that has resulted from a blending of natural and cultural resources within the Delaware River Valley.

Recreation: The Delaware River continues to be the focus of recreational activities in DEWA, as identified in the GMP. Canoeing, inner tubing, rafting, and swimming dominate the river-based activities in warmer months. Eagle watching is a popular river-based activity in winter months. Fishing occurs throughout the year and limited waterfowl hunting occurs from fall through spring. Campsites along the river offer the only backcountry camping opportunities in DEWA.

Wildlife: The Delaware River provides habitat for a wide variety of local wildlife and a migratory corridor for fish and birds. The mostly ice-free conditions during the winter months provide foraging habitat for both wintering and resident bald eagles. The forested shorelines provide nesting habitat for bald eagles, which use the river for foraging. The adjacent Kittatinny Ridge is a migratory corridor for raptors, which likely use the river corridor for foraging. Migrating songbirds use the river valley for foraging and resting during migration and migrating waterfowl use the river for similar purposes. Some migratory songbirds such as cerulean warbler nest in the riparian corridor. Wading birds such as great blue heron and green heron are numerous along the river's shorelines during the summer months and both resident and migratory waterfowl use the river.

Vegetation: From the perspective of someone on the river the vegetation appears as mostly unbroken forest. Some open farmland is visible from the river corridor between Depew Island and Tocks Island. This section of river also contains three NPS river access points.

Section 12(a) of the Wild and Scenic Rivers Act stipulates the following:

The Secretary of the Interior, the Secretary of Agriculture, and the head of any other Federal department or agency having jurisdiction over any lands which include, border upon, or are adjacent to, any river include within the National Wild and Scenic Rivers System or under consideration for such inclusion, in accordance with section 2(a)(ii), or 5(a), shall take such action respecting management policies, regulations, contracts, plans, affecting such lands, following the date of enactment of this sentence, as may be necessary to protect such rivers in accordance with the purposes of this Act. Such Secretary or other department or agency head shall, where appropriate, enter into written cooperative agreements with the appropriate State or local official for the planning, administration, and management of Federal lands which are within the boundaries of and rivers for which approval has been granted under section 2(a)(ii). Particular attention shall be given to scheduled timber harvesting, road construction, and similar activities which might be contrary to the purposes of the Act. The Interagency Wild and Scenic Rivers Coordinating Council interprets this section as being applicable to activities conducted by a federal department or agency that are within or proximate to a WSR designated under Sections 2(a)(ii) or 3(a).

Figures 62 and 63 show existing conditions of the river at the proposed crossings for alternatives 1, 2, 2b, and 3.



FIGURE 62: DELAWARE RIVER NEAR THE PROPOSED CROSSING FOR ALTERNATIVES 1, 2, AND 2b, LOOKING SOUTH



FIGURE 63: DELAWARE RIVER NEAR THE PROPOSED CROSSING FOR ALTERNATIVE 3, LOOKING EAST

PARK OPERATIONS

This section refers to the current management and operations of the parks to adequately protect and preserve vital park resources and provide for an effective visitor experience. Approximately 90 permanent staff members and 75 seasonal employees manage the 70,000 acres of DEWA park lands, including all of MDSR and portions of APPA (NPS 2010ac, 1). As of December 2010, the operations and maintenance of the parks includes the following programs: resource management and science division; interpretation, education, and partnership; visitor management and resource protection; maintenance; and management, as well as volunteers. APPA staff includes 9 full-time employees, which includes 2 park rangers, 1 natural resource specialist, 1 project manager, 1 GIS specialist, 1 management assistant, 1 deputy superintendent, 1 superintendent; and 1 environmental protection specialist; DEWA staffing is discussed in the following sections. Daily, the park staff provides the services necessary to support park activities, upkeep and maintenance, and safety within the parks, including trash and litter pickup, upkeep and general maintenance of public use facilities (comfort stations, picnic areas, campgrounds, swimming areas, bridges, other structures, and parking areas), law enforcement, routine patrols by NPS rangers, visitor information, interpretative programs, and research activities.

FUNDING SOURCES

The largest source of park funding is congressionally appropriated funds (includes base and nonbase funding). Appropriated base funds are a significant portion of the total funding, which cover most of the parks' operations. Appropriated nonbase funding is requested by the parks to satisfy specific needs and nonrecurring projects and varies each year. In the past, significant nonbase funding was provided for projects including storm damage repair, dam repair, and land acquisition. Park revenue is small due to factors such as multiple park entrances and challenges in achieving true cost recovery. The NPS would require that the applicant be responsible for costs associated with the NPS managing the permit under 16 USC 3a, "Recovery of Costs Associated with Special Use Permits."

RESOURCE MANAGEMENT AND SCIENCE

The division of resource management and science includes cultural and natural resource staff responsible for identifying, protecting, and/or restoring the natural, cultural, and scenic resources of the parks. Currently, the natural resource staff includes four full-time employees and one seasonal employee. Cultural resource staff includes two full-time and two part-time employees. The total annual budget for the division is \$1.17 million.

In general, resource management and science staff tasks include research, restoration efforts, species-specific management programs, archives/collection management, historic site protection, and information integration activities. The resource management and science staff spends most of its time safeguarding sensitive habitats and protecting historically significant sites in compliance with state and federal resource conservation laws. With the increases in visitation and resident population, the natural and cultural resource protection programs at the parks are facing greater demands, from monitoring endangered species to patrolling historic structures and archeological sites.

The cultural resource management staff is responsible for the management, preservation, and protection of the 458 archeological sites, four visitor exhibits, and 1.2 million collected artifacts in DEWA (NPS 2003a, 16). This includes activities in the program areas of American Indian affairs, anthropology, cultural landscapes, ethnography, historic structures, history, and museum management. Cultural resource staff members provide support to other divisions within the parks, coordinate with regional cultural resource programs, and create and maintain cultural resource databases. Currently, this program is

understaffed and lacks essential full-time personnel, including a museum curator and technicians; however, in 2010 staff members rehoused 90 boxes of archeological objects and over 2,000 historical objects. Staff members also cleaned over 2,000 historical objects to remove agents of deterioration and photographed over 600 museum objects to improve access to collections (NPS 2010ac, 25).

The natural resources program covers three primary work functions, which include resource stewardship, inventory and monitoring, and planning and compliance. Work elements range from water resource and endangered species management to monitoring vegetation and integrated pest management. Listed species in the parks include approximately 49 plant species, 9 fish species, 13 mammal species, 7 reptile species, and 10 amphibian species. The parks also contain about 150 natural and artificial lakes, 600 wetland areas, and several waterfalls that are managed by natural resource staff. Natural resource staff members are responsible for monitoring vegetation management related to the existing transmission line. It takes approximately three staff members 40 hours (1 week) each to review vegetation maintenance plans. In addition, it takes one natural resource staff member approximately 80 hours (2 weeks) to monitor the resultant actions. The natural resource staff continues to implement a long-term ecological monitoring plan where field crews have been monitoring vegetation, streamside birds, water quality, and aquatic macroinvertebrates in watersheds throughout the parks.

The GIS section of this division coordinates the GIS programs at DEWA and MDSR. The GIS unit is responsible for supporting and enhancing natural and cultural resource management, providing support to other divisions within the parks, coordinating with regional GIS programs and technical support units, and creating and maintaining spatial datasets, as well as purchasing and maintaining GIS-related software and hardware. In 2010, the GIS team completed over 200 maps and other products in support of the parks' missions, including a hazardous structures database, regional planning projects, river campsite and planning efforts, and land/property issues (NPS 2010ac, 20).

INTERPRETATION, EDUCATION, AND PARTNERSHIP

The division of interpretation, education, and partnership includes all park activities directly related to providing visitors with a safe and educational experience while at the parks. The staff manages partnership, volunteer, interpretive, educational, and visitor center programs for DEWA. This division is responsible for staffing the visitor centers, producing written products, presenting programs to a wide variety of audiences, and meeting with current and potential partners and volunteers to collaborate on various projects. Interpretive rangers typically split their time between operation of the visitor centers, formal interpretive programs, and informal roving interpretation. Currently, the total number of interpretation, education, and volunteer coordination staff members is 26. This includes 6 full-time employees, 1 part-time employee, and 19 seasonal employees. Staff numbers in this division have decreased and park rangers now spend approximately 80% of their time on the operation of the visitor centers. In the last fiscal year, the total annual budget was \$535,170.

VISITOR MANAGEMENT AND RESOURCE PROTECTION

The visitor management and resource protection division includes law enforcement. Currently there are 17 full-time rangers and 2 seasonal rangers during the summer months. Law enforcement also includes 5 full-time dispatchers with 2 permanent intermittent employees. During the summer months, the staff would include 2 additional student hires. Law enforcement functions include highway, river, and trail patrol; search and rescue; emergency medical response; enforcement of boating, fishing, and hunting regulations; investigations; wildland firefighting; and general law enforcement. During the weekdays, an average of 4 law enforcement rangers patrol the parks. During the weekend, an average of 7 law enforcement rangers patrol the parks. Enforcement activities are conducted out of three primary ranger stations on the Pennsylvania side of DEWA, including the South Zone Office (Jackson House), North

Zone Office (Dingman's Schoolhouse), and the River District Office. DEWA law enforcement staff members are also responsible for covering APPA within DEWA and responding outside the park for emergencies and assisting with investigations when requested. In 2010, law enforcement managed seven park fires.

MAINTENANCE

Maintenance division staff members are responsible for all activities required to manage and operate the park's infrastructure on a daily basis. The DEWA infrastructure includes 575 buildings, 157 miles of roads, 176 miles of trails, 112 dams, 69 parking areas, 20 road bridges, and 14 boat and canoe launches. Currently there are 25 full-time employees and 17 seasonal employees. The total budget in 2010 was \$3.04 million. The responsibilities and daily tasks associated with this division include maintenance, repair, and operation of park infrastructure, including buildings, utilities, roads, trails, campgrounds, and dams. The parks' infrastructure requires a range of operational activities from basic sanitation to snowblowing to water testing. Some other maintenance responsibilities include hazardous-tree removal, snow and ice control, vegetation clearing, maintenance of ground structures, trash collection, and dam inspection and maintenance. Maintenance staff members are critical for ensuring open, safe, sanitary facilities for park visitors and employees, as well as to protect the cultural and natural resources of the parks. Staff members are responsible for year-round cleaning and sanitation care of the 15 park administrative buildings and 5 comfort stations. From mid-April to mid-October, the seasonal operation is responsible for cleaning 11 park visitor use areas and 5 remote composting-toilet facilities. Staff members are also responsible for the daily pickup and removal of trash from grounds and trash receptacles throughout the parks. Staff members also manage the paved roads, unpaved roads, parking lots, boat launch ramps, and bridges within the parks. This division ensures that park roads are open and safe for travel. Trails at the parks receive little attention. Frontcountry trail operations include the inspection and assessment of boardwalks, sidewalks, treadway and other trail structures, sign installation, and the removal of trees that pose a safety hazard to visitors and employees. On average, maintenance staff members spend 25% of their time on maintaining or rehabilitating structures; 25% maintaining utilities and infrastructure (trails, roads, and parking lots); 10% on landscaping, repairing, and installing fences and gates; 20% on cleaning restrooms and collecting trash; and 20% on other tasks and responsibilities. Currently, the maintenance division has no responsibilities associated with the existing transmission line.

MANAGEMENT

Management and administration includes all parkwide management and administrative support activities. The total annual budget for the office of the superintendent (management division) is \$1.68 million. This division includes the office of management and budget and the office of planning and design. Some of the positions include the management assistant, budget officer, budget technician, project managers, compliance managers, and the chief. Responsibilities include safety, lands, compliance, review and input for resource management, and oversight by the superintendent and the deputy. Responsibilities may also include all park communications and external affairs activities, park-level planning, human resource management, information technology, park leadership, and financial management.

VOLUNTEERS

In 2010, over 1,100 volunteers contributed 189,434 hours of service, at a value of nearly \$4 million, to DEWA. APPA's volunteer service hours are the highest in the northeast region (6,128 volunteers contributed 213,913 hours of service), while DEWA's are the second highest. Every year, volunteers contribute immensely to the preservation of the parks' natural and cultural resources.

The range of volunteer opportunities at the parks is very broad. For interpretation and education, volunteers participate in living history programs at park sites, provide educational programs for visitors, serve as docents at park sites, give visitor information at the visitor centers, and provide park advocacy. Volunteers also spend many hours aiding the maintenance division. Volunteer maintenance tasks include trail maintenance, trail assessment, river cleanup, building and landscape maintenance, lawn mowing, painting, janitorial services, tree trimming, chainsawing, hazardous fuel reduction around park structures and fire roads, graffiti removal, and trash cleanup. For the visitor management and resource protection division, volunteers perform boundary inspections and marking, provide volunteer bicycle patrols, identify and remove unauthorized geocaches, provide hiking patrols, participate in high-angle rescue teams, monitor resources, and provide river safety patrols. Some volunteers help the resource management and science division by cataloging and preserving artifacts, assisting archeology staff, performing water testing, assisting in the removal of invasive plants, performing GIS-related functions, planting native plants at approved sites, restoring habitat, managing open space, and monitoring resources through bird counts and other resource surveys. Volunteers also help the management division with filing papers and other administrative/clerical work.

HEALTH AND HUMAN SAFETY

The health and safety of visitors, park staff, and volunteers are of paramount concern to the NPS. NPS *Management Policies 2006* summarizes the commitment of the NPS to providing appropriate, high-quality opportunities for visitors while striving to protect human life and providing for injury-free visits (NPS 2006a, 105). Director's Order 83, *Public Health*, outlines what the NPS will do to ensure compliance with prescribed public health policies, practices, and procedures. This order establishes NPS policy with respect to all public health activities within areas of NPS jurisdiction, regardless of whether those activities are carried out by NPS or other federal employees, or by other organizations, including the U.S. Public Health Service. Public health includes illnesses associated with drinking water, wastewater, food safety, animal vectors, animal reservoirs, hazardous wastes, indoor air pollution, institutional sanitation, radiation safety, medical wastes, solid wastes, air pollution, and other related areas of environmental health. The *Strategic Plan* for DEWA sets the following goal for public safety: visitors safely enjoy and are satisfied with the availability, accessibility, diversity, and quality of park facilities, services, and appropriate recreational opportunities (NPS n.d.a).

In 2010, the overall number of reported injuries was reduced; however, the parks did not meet their Government Performance and Results Act goal for employee injuries. Recordable incidents were attributed primarily to sprains/strains of the knee, ankle, back, and shoulder. The visitor management and resource protection staff includes 9 first responders, 15 emergency medical technicians, and 1 park medic. The park has met the visitor injury goal for the last 5 years. The majority of visitor injuries in 2010 (approximately 65%) were the result of motor vehicle accidents (NPS 2010ac, 12). In 2010, approximately 35% of other injuries to park visitors were attributed to recreational activities related to hiking, climbing, boating, hunting, and bicycling. Park efforts to minimize risks to both employee and visitor safety have been ongoing, with measures such as traffic studies; CPR [cardiopulmonary resuscitation], automated external defibrillator, and defensive driver training; and safety inspections of fuel tanks, fire extinguishers, and park housing. The parks also provide their staff with safety tips on various topics, including Lyme disease prevention; heat, stress, and cold injury prevention; driving and fatigue; electrical safety; and fire prevention (NPS 2010ac, 13).

There have been no documented safety incidents concerning the B-K Line that runs through the parks.

ELECTROMAGNETIC FIELDS

EMF exposure related to transmission lines was identified during the public scoping process as a topic of concern; therefore, it is included in this EIS. EMFs occur both naturally and as a result of human activities. Natural EMFs are produced within the atmosphere in association with thunderstorms. Human-influenced EMFs occur as a result of household appliances, mobile phones, and transmission lines. EMFs are made of two components: electric fields and magnetic fields. Electric fields are created when a positive or negative electrical charge is present. These are present in homes where appliances are plugged in, even if they are switched off. Generally, electric fields are not of concern in the home or near transmission lines because these fields are weakened by trees, buildings, and human skin. Magnetic fields are those produced by current. Magnetic fields are typically of concern because they are not easily weakened by most material and pass through most materials. Both types of fields decrease in strength rapidly with increased distance from the source (WHO 2010, 1–2).

Research in this area has been ongoing for over two decades and the results are still inconclusive. Numerous panels of national and international expert scientists have convened to review data relevant to the question of whether exposure of power-frequency EMF is associated with adverse health effects. Many of the scientific panels have found that the scientific evidence suggesting health risks is weak. Despite more than two decades of research to determine whether elevated EMF exposure, principally to magnetic fields, is related to an increased risk of childhood leukemia, there is still no definitive answer. According to the USEPA (2006, 1), the general scientific consensus is that, thus far, the evidence available is “not sufficient to establish a definitive cause-effect relationship.” For these reasons, EMF is not considered in this EIS as a NEPA issue.

A number of counties, states, and local governments have adopted or considered regulations or policies related to EMF exposure. In New Jersey, exposure limits for electric fields at the edge of a ROW have been established at 3 kV/m (UEI 2006, 49). New Jersey has no formal exposure limit for magnetic fields. No formal regulations or policies for EMF exposure have been adopted in Pennsylvania. The International Radiation Protection Association, in cooperation with the World Health Organization, has recommended guidelines for EMF exposure. The recommended limit of electric field exposure is 4.2 kV/m and 833 mG for magnetic fields (International Commission on Non-ionizing Radiation Protection 1998). Although these organizations have no governmental authority, most utilities and regulators consider these guidelines because they were developed by a broad range of scientists. Although the USEPA has conducted investigations into EMF related to power lines and health risks, no national standards have been established.

