Supplemental Biological Assessment

U.S. Fish and Wildlife Service

PSEG Site
Early Site Permit Application and Department of the Army Permit Application

U.S. Nuclear Regulatory Commission Early Site Permit Application and Department of the Army Permit Application
Docket Number 052-043

Salem County, New Jersey

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U.S. Nuclear Regulatory Commission
Rockville, Maryland

U.S. Army Corps of Engineers
Philadelphia District

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Abbreviations/Acronyms

°F	degrees Fahrenheit
ac	acre(s)
BA	biological assessment
BMPs	best management practice
Btu	British thermal units(s)
CDF	confined disposal facility
CFR	*Code of Federal Regulations*
COL	combined construction permit and operating license
CP	construction permit
CWS	circulating water system
dBA	decibel(s) on the A-weighted scale
EIS	environmental impact statement
EMF	electromagnetic field
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act of 1973, as amended
ESP	early site permit
FR	*Federal Register*
ft	foot or feet
FWS	U. S. Fish and Wildlife Service
GCRP	U.S. Global Change Research Program
GEIS	*Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (NUREG–1437)
gpm	gallon(s) per minute
ha	hectare
HCGS	Hope Creek Generating Station
hr	hour(s)
kg	kilogram(s)
km	kilometer(s)
kV	kilovolt(s)
lb	pound(s)
Leq	equivalent continuous sound level
LMDCT	linear mechanical draft cooling tower
LULC	land use and land cover
MDCT	mechanical draft cooling tower
mi	mile(s)
mo	month(s)
NDCT	natural draft cooling tower
NEPA	National Environmental Policy Act of 1969, as amended
NJDEP	New Jersey Department of Environmental Protection

NJLWD	New Jersey Department of Labor and Workforce Development
NRC	U.S. Nuclear Regulatory Commission
OL	operating license
PPE	plant parameter envelope
PSE&G	Public Service Electric and Gas Company
PSEG	PSEG Power, LLC, and PSEG Nuclear, LLC
ROW	right-of-way
SGS	Salem Generating Station, Units 1 and 2
SWS	service water system
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey
WMA	wildlife management area

Supplemental Biological Assessment of the Potential Effects on Federally Listed Endangered or Threatened Species from the Proposed Early Site Permit and Department of the Army Permit for the PSEG Site

1.0 INTRODUCTION

The U.S. Nuclear Regulatory Commission (NRC) review team is reviewing an application submitted by PSEG Power, LLC, and PSEG Nuclear, LLC (PSEG), for an early site permit (ESP) for a site located adjacent to the existing Hope Creek Generating Station (HCGS) and Salem Generating Station, Units 1 and 2 (SGS), on the eastern shore of the Delaware River Estuary in Lower Alloways Creek Township, Salem County, New Jersey. As part of its review of this ESP application, the NRC is preparing an environmental impact statement (EIS) as required by Title 10 of the *Code of Federal Regulations* (10 CFR) Part 51, the NRC regulations that implement the National Environmental Policy Act of 1969, as amended (NEPA) (42 USC 4321-TN661). The EIS will include an analysis of pertinent environmental issues, including endangered and threatened species and impacts to fish and wildlife. The U.S. Army Corps of Engineers (USACE), Philadelphia District, is a cooperating agency on the EIS.

An ESP is a commission approval of a site for one or more nuclear power facilities. Issuance of an ESP is a process that is separate from the issuance of a construction permit (CP), an operating license (OL), or a combined license (COL) for such a facility. The ESP application and review process makes it possible to evaluate and resolve safety and environmental issues related to siting before the applicant makes a large commitment of resources. If the ESP is approved, the applicant can "bank" the site for up to 20 years for future reactor siting but may not conduct activities defined as "construction" in 10 CFR 50.10(a)(2) (10 CFR 50-TN249) without receiving further authorization. An ESP does not authorize construction activities or operation of a nuclear power plant. To construct and operate a nuclear power plant, an ESP holder must obtain a CP and an OL, or a COL, which are separate major Federal actions that require their own environmental reviews in accordance with 10 CFR Part 51 (10 CFR 51-TN250). For a COL or CP application that references an ESP, the NRC staff, pursuant to 10 CFR 51.75(c)(1), would prepare a supplement to the ESP EIS in accordance with 10 CFR 51.92(e) and would engage in new consultation in accordance with section 7(c) of the Endangered Species Act of 1973, as amended (ESA) (16 USC 1531-TN1010).

By letter dated October 26, 2010 (NRC 2010-TN2202), the NRC initiated ESA (16 USC 1531-TN1010) Section 7 consultation with the U. S. Fish and Wildlife Service (FWS) and requested a list of endangered, threatened, candidate, and proposed species as well as designated and proposed critical habitat that may be in the vicinity of the PSEG Site. The NRC received an email response (dated March 20, 2013) from Steve Mars, senior biologist at the FWS New Jersey Field Office, which stated, "The activities you [NRC] describe will not likely affect a federal listed species under the jurisdiction of the USFWS" (FWS 2013-TN3364). In a letter to FWS dated December 13, 2013, the NRC requested an update on Federally listed, proposed, and candidate species as well as designated and proposed critical habitat that may be in the vicinity of the PSEG Site and any updates to the initial information to assist with the preparation of the ESA biological assessment (BA) and EIS for the project (NRC 2013-TN3363). A

response was not received before the NRC submitted a request for comments on the draft environmental impact statement (DEIS) and BA to FWS on August 28, 2014 (NRC 2014a-TN4268). The U.S. Department of the Interior submitted a response to the DEIS and BA on November 5, 2014 indicating that no additional measures were required (DOI 2014-TN4269).

The August 2014 BA examined the potential impacts of construction and operation of a new nuclear power plant on Federally listed threatened or endangered species and species that were proposed Federal endangered species on the PSEG Site at that time. The August 2014 BA concluded that construction and operation of a new nuclear power plant, including activities that would be authorized under a Department of the Army permit, at the PSEG Site would not affect terrestrial species then listed under the ESA, including then proposed Federally endangered species.

Since publication of the BA and the draft EIS, the rufa red knot (*Calidris canutus rufa,* hereafter referred to as "rufa red knot") was listed as threatened on January 12, 2015, pursuant to ESA Section 7(c) (79 Federal Register [FR] 73705). Additionally, the northern long-eared bat (*Myotis septentrionalis*, hereafter reffered to as "northern long-eared bat) was updated to Federally listed as threatened on May 4, 2015 (80 FR 17974-TN4216). The NRC, in cooperation with the USACE, has prepared this supplemental BA to support a joint consultation with FWS in accordance with the ESA. Because NRC and the USACE are cooperating on this BA, the analysis that follows does not distinguish between NRC-authorized construction activities and other building activities; they are analyzed together as "building" activities. This supplemental BA examines the potential impacts on the rufa red knot and northern long-eared bat from building and operating a new nuclear power plant at the PSEG Site, including activities that would be authorized under a Department of the Army permit, adjacent to HCGS and SGS.

2.0 DESCRIPTION OF PROPOSED ACTIONS

PSEG is seeking an ESP for site approval for a potential future new nuclear power plant at a site (the PSEG Site) located adjacent to the existing HCGS and SGS and a Department of the Army permit to perform certain site-preparation activities. Building activities that could affect onsite and offsite terrestrial and wetland ecosystems include site preparation for installation of the power block, cooling tower, concrete batch plant, intake structure, switchyard, offices and warehouses, heavy haul road, temporary laydown areas, parking areas, and a proposed causeway (PSEG 2014-TN3452).

2.1 Location and Description

2.1.1 Site

The PSEG Site is located on the southern part of Artificial Island in Lower Alloways Creek Township, Salem County, New Jersey. Artificial Island was formed from dredge spoils produced as a result of maintenance dredging of the Delaware River navigation channel by the USACE. The site is approximately 7 mi east of Middletown, Delaware; 7.5 mi southwest of Salem, New Jersey; and 9 mi south of Pennsville, New Jersey (PSEG 2014-TN3452). Figure 1 shows the location of the PSEG Site and the areas within a 6-mi (10-km) radius and a 50-mi (80-km) radius of the facility.

The PSEG Site is located adjacent to HCGS and SGS on the northwestern portion of the existing PSEG property. Figure 2 depicts the proposed PSEG Site in relation to the existing units and nearby water bodies. PSEG owns 734 ac of the PSEG Site and is developing an agreement with the USACE to acquire 85 ac immediately north of the site. Thus, the total proposed PSEG Site would encompass 819 ac (PSEG 2014-TN3452). Figure 3 provides an aerial view of the proposed site layout for a new nuclear power plant at the PSEG Site.

The area within the 6-mi vicinity of the site contains mainly water (Delaware River and Bay), agricultural lands, wetlands, and some forestland. The area also includes numerous parks, wildlife refuges, and preserves such as Mad Horse Creek Wildlife Management Area (WMA) to the east and Abbotts Meadows WMA to the north in New Jersey, and Cedar Swamp WMA to the south and Augustine WMA to the west in Delaware (PSEG 2014-TN3452).

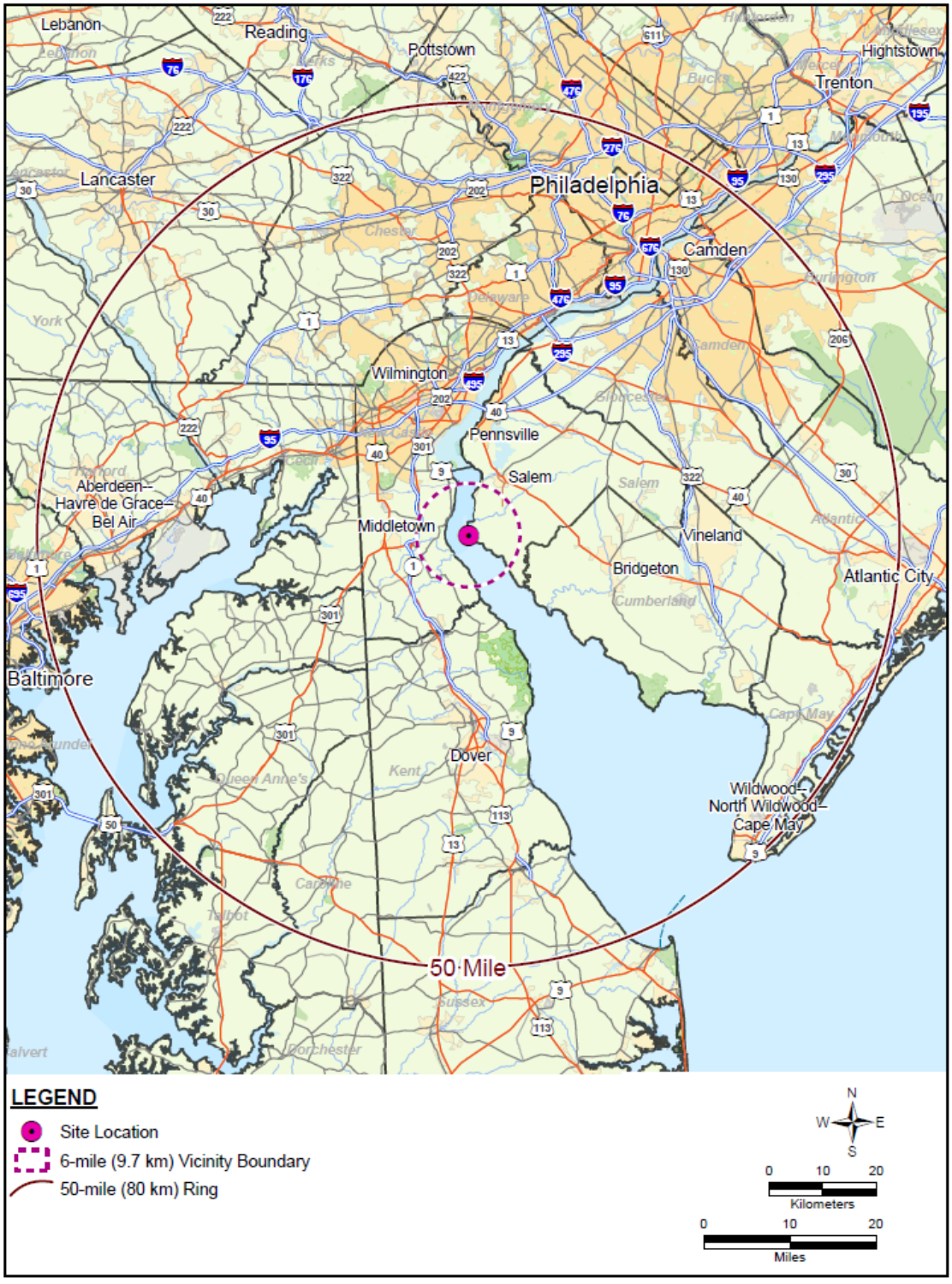

Figure 1. Location of the PSEG Site Within 6-Mile and 50-Mile Radius (Source: Modified from PSEG 2014-TN3452)

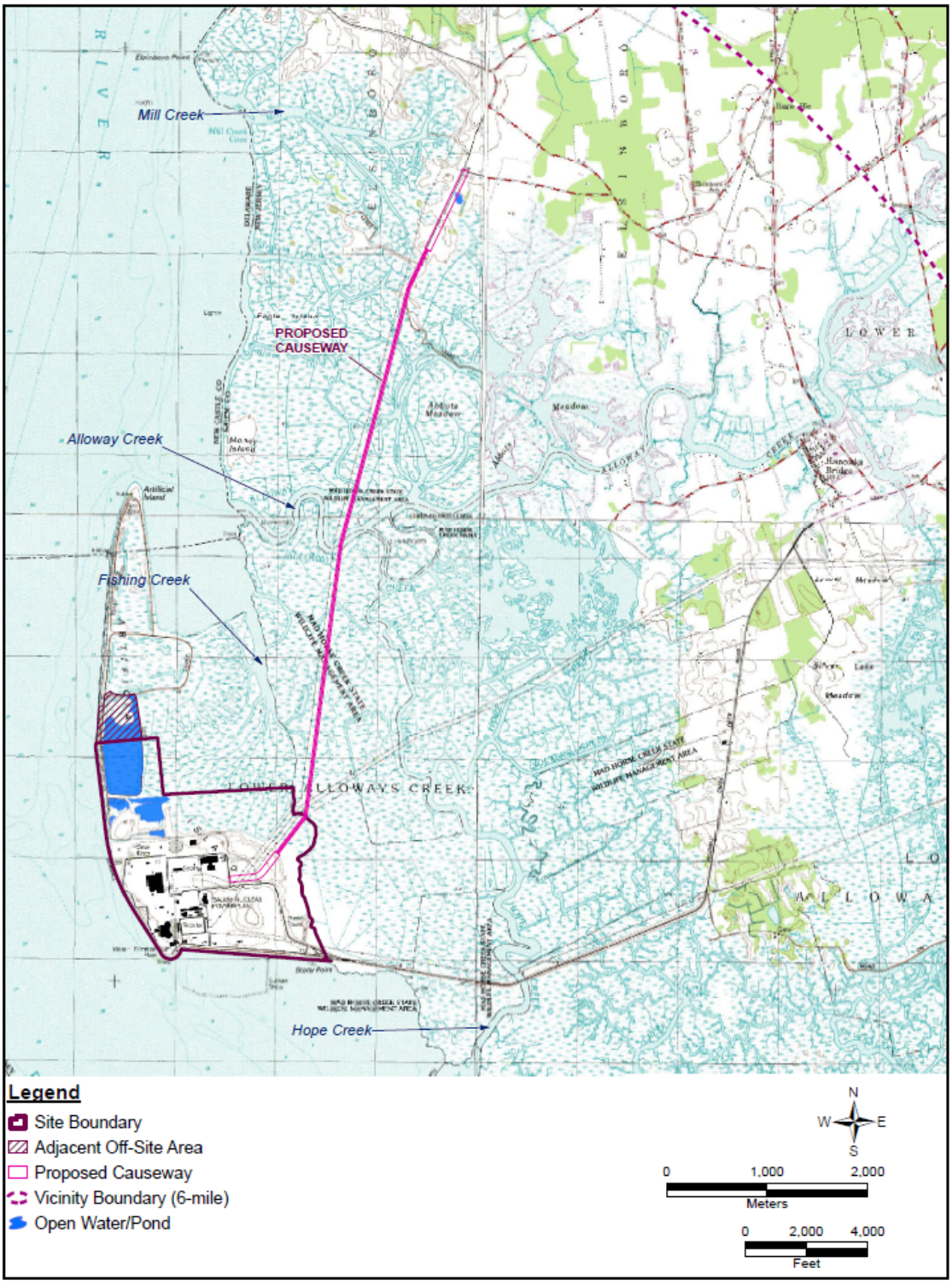

Figure 2. PSEG Site with Nearby Water Bodies and Proposed Causeway (Source: Modified from PSEG 2014-TN3452).

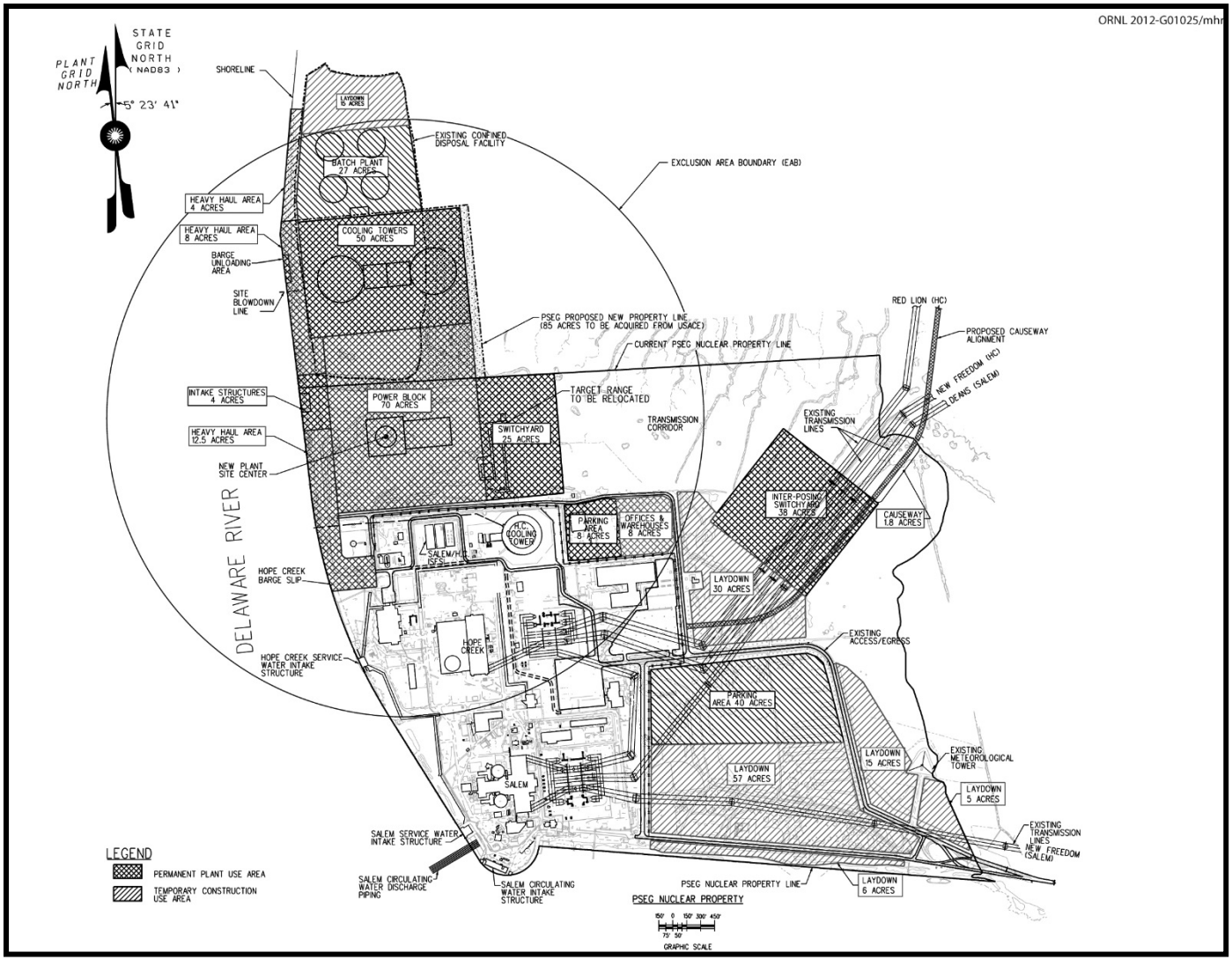

Figure 3. PSEG Site Utilization Plan (Source: PSEG 2012-TN1489)

Vegetation communities were identified from New Jersey Department of Environmental Protection (NJDEP) land use and land cover (LULC) data for the PSEG Site and offsite areas that potentially would be affected by the proposed causeway. Six vegetative cover types were identified and include: urban or built-up land, forestland, water, wetlands, barren land, and managed wetlands. The listed coverage types are common within the Outer Coastal Plain (PSEG 2014-TN3452). Table 1 lists NJDEP 2002 LULC within the proposed PSEG Site.

2.1.2 Urban or Built-up Lands (Developed Land)

Land use in the urban or built-up land category is characterized as having been altered by human activities (NJDEP 2010-TN2887). The majority of these lands on the site are related to power generation of HCGS and SGS and associated structures. The urban or built-up coverage type accounts for 358 ac, or 44 percent, of the PSEG Site. Upland rights-of-way (ROWs) (undeveloped) support shrubby vegetation but are considered under the urban or built-up land category as a result of vegetation maintenance practices (PSEG 2014-TN3452). Also included in this category are two wetland subcategories, wetland ROWs and *Phragmites*-dominated urban area. Wetland ROWs are included in this category because they exhibit hydric soils but, as a result of alterations, may not support vegetation typical of natural wetlands (NJDEP 2010-TN2887). Wetland ROWs account for 23.8 ac, or 3 percent, of the site, and *Phragmites*-dominated urban areas account for 0.5 ac, or less than 1 percent, of the site (PSEG 2014-TN3452). This type of land use provides limited habitat for wildlife use.

2.1.3 Wetlands

The wetlands category includes those areas that are inundated or saturated by surface or ground waters at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. This category does not include wetlands that have been modified for recreation, agriculture, or industry; these are described under specific use categories (NJDEP 2010-TN2887). The wetland category accounts for 284.9 ac, or approximately 35 percent, of the site's total available habitat (PSEG 2014-TN3452). Wetlands influenced by the tidal portions of the Delaware River system and the tidal portions of the watercourses draining into the Atlantic Ocean are categorized as coastal wetlands (NJDEP 2010-TN2887). Coastal wetlands found on the site include saline marshes and *Phragmites*-dominated coastal wetlands. Saltmarsh cordgrass (*Spartina alterniflora*) dominates these wetlands in areas of high salinity. Brackish marshes are co-dominated by big cordgrass (*Spartina cynosuroides*), saltmarsh cordgrass, common reed (*Phragmites australis*), narrowleaf cattail (*Typha angustifolia*), and common threesquare (*Schoenoplectus pungens*). Salt marshes account for 0.2 ac, or less than 1 percent, of the site (PSEG 2014-TN3452). *Phragmites*-dominated coastal wetlands are marsh areas that are dominated by the nonnative invasive *Phragmites australis* (NJDEP 2010-TN2887). *Phragmites*-dominated coastal wetlands are the most common wetland type found on the site and account for 155.6 ac, or 19 percent, of the site's vegetation cover (PSEG 2014-TN3452).

Table 1. NJDEP 2002 LULC Cover within the Proposed PSEG Site

New Jersey LULC Categories	Existing PSEG Property		85-Ac Parcel to be Acquired		PSEG Site Total	
	Area (ac)	Percent	Area (ac)	Percent	Area (ac)	Percent
Urban or Built Up						
Industrial	234.5	31.9	0.0	0.0	234.5	28.6
Transportation/Communication/Utilities	8.5	1.2	0.0	0.0	8.5	1.0
Wetlands Rights-of-Way	23.8	3.2	0.0	0.0	23.8	2.9
Upland Rights-of-Way (developed)	0.5	0.1	0.0	0.0	0.5	0.1
Upland Rights-of-Way (undeveloped)	29.5	4.0	0.0	0.0	29.5	3.6
Other Urban or Built-up Land	51.1	7.0	4.7	5.5	55.8	6.8
Phragmites-Dominated Urban Area	0.5	0.1	0.0	0.0	0.5	0.1
Recreational Land	4.9	0.7	0.0	0.0	4.9	0.6
Subtotal:	**353.3**	**48.1**	**4.7**	**5.5**	**358.0**	**43.7**
Forested Land						
Old Field (<25% Brush Covered)	69.4	9.5	0.0	0.0	69.4	8.5
Phragmites-Dominated Old Field	31.9	4.3	0.0	0.0	31.9	3.9
Deciduous Brush/Shrubland	6.0	0.8	0.0	0.0	6.0	0.7
Subtotal:	**107.3**	**14.6**	**0.0**	**0.0**	**107.3**	**13.1**
Water						
Artificial Lakes[1]	14.2	1.9	26.2	30.8	40.4	4.9
Tidal Rivers, Inland Bays, and Other Tidal Waters	3.9	0.5	1.7	2.0	5.6	0.7
Subtotal:	**18.1**	**2.5**	**27.9**	**32.8**	**46.0**	**5.6**
Wetlands						
Saline Marsh	0.0	0.0	0.2	0.2	0.2	0.0
Phragmites-Dominated Coastal Wetlands	127.3	17.3	28.3	33.3	155.6	19.0
Deciduous Scrub/Shrub Wetlands	4.6	0.6	0.0	0.0	4.6	0.6
Herbaceous Wetlands	5.8	0.8	0.0	0.0	5.8	0.7
Phragmites-Dominated Interior Wetlands	95.0	12.9	23.7	27.8	118.7	14.5
Subtotal:	**232.7**	**31.7**	**52.2**	**61.3**	**284.9**	**34.8**
Barren Land						
Altered Lands	14.6	2.0	0.2	0.2	14.8	1.8
Disturbed Wetlands (Modified)	4.2	0.6	0.1	0.1	4.3	0.5
Subtotal:	**18.8**	**2.6**	**0.3**	**0.4**	**19.1**	**2.3**
Managed Wetlands						
Managed Wetland in Maintained Lawn Greenspace	3.8	0.5	0.0	0.0	3.8	0.5
Subtotal:	**3.8**	**0.5**	**0.0**	**0.0**	**3.8**	**0.5**
Total:	**734.0**	**100.0**	**85.1**	**100.0**	**819.1**	**100.0**

Source: Staff, based on PSEG 2014-TN3281.

[1] Desilt basins are included under artificial lakes.

Isolated wetlands and wetlands generally found in non-tidal lowlands influenced by primary, secondary, and tertiary courses and are categorized as interior wetlands (NJDEP 2010-TN2887). Interior wetlands found on the site include deciduous scrub/shrub wetlands, herbaceous wetlands, and *Phragmites*-dominated interior wetlands. There are 4.6 ac of deciduous scrub/shrub wetlands representing less than 1 percent of the total acreage available (PSEG 2014-TN3452). Herbaceous wetlands are characterized as being dominated by herbaceous species associated with lake edges, open flood plains, and abandoned wetlands agricultural fields (NJDEP 2010-TN2887). Herbaceous wetlands account for 5.8 ac, or less than 1 percent, of the total acreage at the PSEG Site (PSEG 2014-TN3452). *Phragmites*-dominated interior wetlands are dominated by the *Phragmites australis* and account for 118.7 ac, or 14.5 percent, of the site's acreage.

2.1.4 Forestland

Old field (less than 25 percent brush covered), *Phragmites*-dominated old field and deciduous brush/shrubland identified by NJDEP as occurring on the site are categorized under forested land, brushland/shrubland. Vegetation cover could include early successional species to climax species and are between 0 and 20 ft in height. Old field is also covered in this category and can contain shrubs and grasses (NJDEP 2010-TN2887). Forested land covers over 107.3 ac, or approximately 13 percent, of the site (PSEG 2014-TN3452).

Old field (less than 25 percent brushed covered) is predominantly covered by grasses, herbaceous species, tree seedlings, and/or saplings. *Phragmites*-dominated old field contains open fields predominantly covered by *Phragmites australis*. Natural forested areas covered predominantly with deciduous species less than 20 ft in height are classified under deciduous brush/shrubland. This category also can include agricultural lands that have been overgrown with brush (NJDEP 2010-TN2887).

Walking surveys conducted by PSEG in 2009–10 on brushland/scrubland areas indicated that the most common vegetation species were groundsel tree/sea myrtle (*Baccharis halimifolia*), autumn olive (*Elaeagnus umbellata*), multiflora rose (*Rosa multiflora*), Japanese honeysuckle (*Lonicera japonica*), poison ivy (*Toxicodendron radicans*), annual ragweed (*Ambrosia artemisiifolia*), broomsedge (*Andropogon virginicus*), thyme-leaf sandwort (*Arenaria serpyllifolia*), mugwort (*Artemisia vulgaris*), Queen Anne's lace (*Daucus carota*), common spike rush (*Eleocharis palustris*), late boneset (*Eupatorium serotinum*), fescue (*Festuca* sp.), Chinese lespedeza (*Lespedeza cuneata*), yellow sweet clover (*Melilotus officinalis*), blue scorpion grass (*Myosotis stricta*), common reed, plantain (*Plantago virginica*), Canada bluegrass (*Poa compressa*), green foxtail (*Setaria viridis*), Canada goldenrod (*Solidaga altissima*), goldenrod (*Solidago* sp.), and purpletop (*Tridens flavus*) (PSEG 2014-TN3452).

2.1.5 Water

The NJDEP LULC category of water includes all areas within the landmass of New Jersey periodically covered by water (NJDEP 2010-TN2887). This includes the artificial lakes and tidal rivers, inland bays, and other tidal waters found on the proposed PSEG Site. Artificial lakes include water bodies that are 1 ac and larger. Water control structures would be present on these sites. Tidal rivers, inland bays, and other tidal waters include tidal portions of

watercourses, enclosed tidal bays, and other tidal water bodies. Land cover categorized as water accounts for approximately 46 ac or 5.6, percent of the site (PSEG 2014-TN3452).

2.1.6 Barren Lands

Barren lands are in non-urban settings and are characterized by thin soil, sand, or rocks (NJDEP 2010-TN2887). These land cover types are often lacking vegetative cover, or the vegetation is sparse. The NJDEP LULC data indicates that two subcategories of barren lands, altered lands and disturbed wetlands, are present at the site. Altered lands are non-urban areas that have been changed by human activities. Disturbed wetlands are formal natural wetlands that have been altered by clearing, grading, leveling, filling, and/or excavating. The soils are hydric but lack vegetation or wetland species. Barren lands represent 19.1 ac, or 2.3 percent, of the site's total acreage (PSEG 2014-TN3452).

2.1.7 Managed Wetlands

Managed wetlands are characterized by hydric soils but do not support typical wetland vegetation (NJDEP 2010-TN2887). Some examples are stormwater swales, golf fairways and recreational fields, and open lawn areas. Managed wetlands account for 3.8 ac, or less than 1 percent, of the site (PSEG 2014-TN3452).

2.1.8 Vicinity

The existing access road and the proposed causeway are included as part of the vicinity. The existing access road extends 3.6 mi east-northeast from the PSEG Site to Alloway Creek Neck Road (PSEG 2014-TN3452). The ROW is 350 ft wide except where it travels through state owned lands, where it is 450 ft wide. Vegetation cover types in the existing access road include 134 ac of agricultural land, 146 ac of wetlands, 50 ac of urban/built-up land, 39 ac of barren land, 6 ac of forestland, and 4 ac of open water (PSEG 2014-TN3452). The total area covered by the existing access road ROW is 379 ac. Dominant species noted along the access road include common reed and cordgrass (PSEG 1982-TN2889). In additional to part of the State of New Jersey, portions of the State of Delaware and the Delaware River also lie within the 6-mi vicinity of the PSEG Site. The NJDEP LULC database would not provide vegetation cover for areas outside of the State of New Jersey. As a result, the U.S. Geological Survey (USGS) LULC database was used to determine the vegetation communities for areas within the 6-mi vicinity of the PSEG Site. The USGS database is composed of nine LULC categories (Anderson et al. 1976-TN2888). Six of these categories are applicable to the PSEG vicinity: urban or built-up land (developed land), agricultural land, forestland, water, wetlands, and barren land (PSEG 2014-TN3452). Urban or built-up land accounts for 939 ac, or 1.2 percent, of the available land use in the vicinity. Agricultural land includes cultivated crops and pasture. Approximately 17,097 ac (23 percent) of the available vegetation cover in the vicinity is agricultural.

Forestland in the vicinity includes deciduous, evergreen, and mixed forests and accounts for approximately 2,653 ac, or less than 4 percent, of the available vegetation cover in the vicinity. As a result of the site's proximity to the Delaware River and Bay, water is the largest available LULC in the vicinity, accounting for approximately 26,837 ac, or nearly 37 percent, of the

vicinity. There are approximately 16,555 ac of emergent herbaceous wetlands and 8,979 ac of woody wetlands in the PSEG Site vicinity. Together the wetlands LULC accounts for nearly 35 percent, making it the second largest vegetation cover type in the vicinity. Barren land makes up nearly 651 ac, or less than 1 percent, of the LULC (PSEG 2014-TN3452).

2.2 Impacts to Habitats

Proposed ground-disturbing activities at the PSEG Site and offsite areas are based on the Site Utilization Plan (Figure 3). Permanent land impacts are depicted as cross hatched, and temporary land impacts are diagonal hatched. Potential areas affected include the power block, cooling tower, concrete batch plant, intake structure, switchyard, offices and warehouses, heavy haul road, temporary laydown areas, parking areas, and the proposed causeway. Preconstruction and construction activities include clearing, grubbing, and grading of the site; installing erosion control measures; building access and haul roads; installing construction security infrastructure; installing temporary utilities and facilities (e.g., storage warehouses, concrete batch plant); preparing the laydown, fabrication, and shop areas; relocating existing facilities within the PSEG Site; staging equipment; and preparation activities associated with power plant construction support. The applicant has not determined the type of reactor to be built on site and is using a plant parameter envelope (PPE) to bound associated building impacts. The terrestrial ecology impacts represented in this section are based on the PPE, and the actual limits of disturbance (particularly wetlands and jurisdictional streams) may be minimized further during the design phase after a specific reactor technology is selected. PSEG anticipates that once a design is selected, and if the NRC approves a CP or COL, building activities could take 68 months to complete (PSEG 2014-TN3452).

Preconstruction and construction activities would result in the permanent or temporary disturbance of approximately 385 ac of the PSEG Site and 45 ac of adjacent offsite areas (see Table 2), as well as 69 ac of the habitat in the area of the proposed causeway. The 45 ac offsite area is currently owned by the USACE and is used as a combined disposal facility (CDF) for disposal of dredge materials. In addition, the permitted disposal facility on the PSEG Site is used for disposal of materials dredged from the intake structures of HCGS and SGS. Preconstruction and construction activities that would affect terrestrial habitats include clearing and grubbing, site grading of upland areas, excavation, and filling of various site areas to achieve design grades (PSEG 2014-TN3452). A total of 228.6 ac of the affected area is considered temporary. This includes 159.9 ac on the site, 45.2 ac on adjacent offsite areas, and land disturbances on 23.5 ac during building of the proposed causeway (PSEG 2014-TN3452).

2.2.1 Urban or Built-up Land (Developed Land)

Approximately 91 ac, or approximately 26 percent, of urban or built-up land on the proposed PSEG Site would be used during building activities. Temporary uses would account for almost 45 ac. Permanent use would equal to approximately 47 ac, or approximately 13 percent, of the urban or built-up land use on the site (PSEG 2014-TN3452).

Table 2. LULC Changes from Building Activities on the PSEG Site

New Jersey Land Use Category	PSEG Site			Adjacent Offsite Areas[(a)]
	Total Onsite Area (ac)	Permanent Use (ac)	Temporary Use (ac)	Temporary Use (ac)
Urban or Built-Up Land				
Industrial	234.5	26.4	5.1	0.0
Transportation/communication/utilities	8.5	0.0	0.0	0.0
Wetlands right-of-way	23.8	11.7	5.9	0.0
Upland right-of-way developed	0.5	0.0	0.2	0.0
Upland right-of-way undeveloped	29.5	0.0	19.6	0.0
Other Urban or Built-Up Land	55.8	8.1	9.5	2.4
Phragmites-dominated urban area	0.5	0.5	0.0	0.0
Recreation land	4.9	0.0	4.4	0.0
Subtotal:	**358.0**	**46.7**	**44.7**	**2.4**
Forestland				
Old field (<25 % brush covered)	69.4	2.6	54.3	0.0
Phragmites-dominated old field	31.9	0.1	26.0	0.0
Deciduous brush/shrubland	6.0	6.0	0.0	0.0
Subtotal:	**107.3**	**8.7**	**80.3**	**0.0**
Water				
Artificial lakes	40.4	40.3	0.0	0.0
Tidal rivers, inland bays, and other tidal waters	5.6	2.9	0.3	0.1
Subtotal:	**46.0**	**43.2**	**0.3**	**0.1**
Wetlands				
Saline marsh	0.2	0.1	0.0	0.8
Phragmites-dominated coastal wetlands	155.6	58.3	5.1	2.1
Herbaceous wetlands	5.8	0.9	2.5	0.0
Deciduous scrub/shrub wetlands	4.6	4.6	0.0	0.0
Phragmites-dominated interior wetlands	118.7	44.1	24.2	27.3
Subtotal:	**284.9**	**108.0**	**31.8**	**30.2**
Barren Land				
Altered lands	14.8	14.8	0.0	0.7
Disturbed wetlands (modified)	4.3	4.0	0.1	11.8
Subtotal:	**19.1**	**18.8**	**0.1**	**12.5**
Managed Wetlands				
Managed wetland in maintained lawn green space	3.8	0.0	2.7	0.0
Subtotal:	**3.8**	**0.0**	**2.7**	**0.0**
Total:	**819.1**	**225.4**	**159.9**	**45.2**

(a) Located in the USACE Artificial Island Combined Disposal Facility and includes batch plant, heavy haul road, and construction laydown area.

Source: Modified from PSEG 2014-TN3452.

Offsite effects on urban or built-up land also occur in the adjacent offsite areas and the proposed causeway. Building activities in the adjacent offsite areas would temporarily make use of 2.4 ac of urban or built-up lands. The proposed causeway would permanently use 4.2 ac and temporarily use 1.4 ac of developed lands (PSEG 2014-TN3452).

A total of 271 ac of the affected terrestrial habitat on the PSEG Site and vicinity would be permanently converted to developed land uses containing structures, pavement, or other intensively maintained exterior grounds. There are approximately 939 ac of developed land in the vicinity and 630,983 ac in the region. The proposed action would add an additional 22 percent of developed land uses to the vicinity and make use of approximately 5 percent of developed lands available. These land areas have limited value for wildlife on the site or in the vicinity (PSEG 2014-TN3452).

2.2.2 Forestland

The forestland cover type is mainly present in the southeast portion of the PSEG Site. Scattered old field communities consisting of one or more land cover types also occur sporadically in the north and west portions of the PSEG Site. Building activities would disturb approximately 89 ac of the available forestland on the site. Permanent use would result in the loss of 8.7 ac of forestland, and 80.3 ac would be temporarily disturbed. The permanent change of land use would result in the loss of approximately 8 percent of the available forestland on the site. The majority of the forestland on the site to be permanently lost is designated as deciduous brush/shrubland habitat (6 ac) and old field less than 25 percent brush covered) (2.6 ac) under the NJ LULC system (PSEG 2014-TN3452).

Less than 1 ac of forestland would be disturbed temporarily and 3.5 ac would change permanently with building the proposed causeway. No forestland would be disturbed in adjacent offsite areas during building activities (PSEG 2014-TN3452).

There is approximately 2,653 ac of forestland available in the 6-mi vicinity of the PSEG Site, and the proposed building activities would permanently remove less than 1 percent of that available habitat. The effects on forestland from building activities at the PSEG Site would not result in a noticeable impact to forestland in the vicinity (PSEG 2014-TN3452).

2.2.3 Water

The proposed building activities would disturb approximately 44 ac of water habitats on the site. Approximately 40 ac of artificial lakes and nearly 3 ac of tidal rivers, inland bays, and other tidal waters would be permanently disturbed. The permanent loss represents approximately 94 percent of the available onsite water habitats. Less than 1 ac would be temporarily disturbed on the site (PSEG 2014-TN3452).

Building activities on offsite adjacent areas and the proposed causeway would disturb approximately 5 ac of available water habitat in these areas. Temporary disturbances include less than 1 ac in adjacent offsite areas and approximately 2 ac in the causeway. Permanent losses offsite occur only in the proposed causeway area, and losses would be approximately 2 ac (PSEG 2014-TN3452).

There are approximately 26,837 ac of water habitat in the vicinity. The permanent loss of this habitat on the site and in the vicinity represents less than 1 percent of the total available habitat (PSEG 2014-TN3452). The loss of these areas would not have a noticeable effect on the available habitat in the area.

2.2.4 Wetlands

Wetlands and other aquatic habitats are mainly located in the extreme eastern and northern portions of the PSEG Site and represent one of the largest available habitats on the site. A potential future new nuclear power plant would permanently disturb 108 ac of wetlands, including 0.1 ac of saline marsh, 58.3 ac of *Phragmites*-dominated coastal wetlands, 0.9 ac of herbaceous wetlands, 4.6 ac of deciduous scrub/shrub wetlands, and 44.1 ac of *Phragmites*-dominated interior wetlands. There would be 31.8 ac of temporary effects on the site, including 5.1 ac of *Phragmites*-dominated coastal wetlands, 2.5 ac of herbaceous wetlands, and 24.2 ac of *Phragmites*-dominated interior wetlands (PSEG 2014-TN3452).

Offsite effects on wetlands from the building activities in the offsite adjacent areas and the proposed causeway would total 72.8 ac. A permanent loss of 23 ac would occur in the wetlands associated with the proposed causeway, including losses of 6.1 ac of freshwater tidal marsh, 11.2 ac of *Phragmites*-dominated coastal wetlands, 1.2 ac of herbaceous wetlands, 0.1 ac of mixed scrub/shrub wetlands (coniferous dominated), and 4.4 ac of *Phragmites*-dominated interior wetlands. A total of 49.8 ac would be disturbed temporarily, including 6.6 ac of freshwater tidal marshes, 13.2 ac of *Phragmites*-dominated coastal wetlands, and 29.2 ac of *Phragmites*-dominated interior wetlands (PSEG 2014-TN3452).

Potential effects on wetland plant communities may consist of actual direct damage to plants, compaction of wetland soils, and short-term reductions in productivity. The proposed causeway would be designed as an elevated structure to minimize potential effects on plant communities. Permanent effects on wetland plant communities along the causeway would be limited to placement of piers and direct shading. Shading potentially could result in some alteration of plant community makeup under the causeway and a reduction in primary productivity. The building method for the proposed causeway has not yet been determined, but construction work mats are expected to be used within a 50-ft wide easement. Reductions in primary productivity due to causeway development should be minimal overall, considering the large area of adjacent coastal wetlands within the project vicinity (PSEG 2014-TN3452).

A total of 131 ac of wetlands would be lost as a result of building activities on the PSEG Site and vicinity. This represents less than 1 percent of the 25,534 ac of wetlands available in the vicinity (PSEG 2014-TN3452). Most of these wetlands are dominated by near monocultures of the common reed, a nonnative aggressive invasive plant species that significantly affects Wetland diversity and habitat structure with resultant significant impacts to wildlife habitat quality. However, wetlands are an important habitat, and the alteration of these wetlands would be noticeable.

2.2.5 Barren Land

Approximately 19 ac of onsite barren land would be disturbed from building activities. This includes permanent impacts of nearly all of the 15 ac of altered lands and 4 ac of disturbed wetlands (modified). Temporary effects on barren land on the site include less than 1 ac of the available disturbed wetlands (modified) (PSEG 2014-TN3452).

Offsite barren land disturbances in the vicinity include approximately 13 ac of temporary effects in the offsite adjacent areas. There are no barren land disturbances expected for the building activities associated with the proposed causeway (PSEG 2014-TN3452).

Disturbances to barren lands represent approximately 3 percent of the available 651 ac of barren land in the vicinity and less than 1 percent of the 54,164 barren lands available in the region (PSEG 2014-TN3452). Building effects to barren land would not noticeably affect barren land habitats in the vicinity.

2.2.6 Managed Wetlands

The applicant proposes to temporarily disturb 2.7 ac, or 71 percent, of the available managed wetlands on the proposed PSEG Site. There will be no permanent impacts to managed wetlands, and there are no managed wetlands available in offsite areas or proposed causeway (PSEG 2014-TN3452). This disturbance would not noticeably affect managed wetlands in the vicinity.

2.2.7 Agricultural Lands

Agricultural lands that potentially would be affected by preconstruction and construction include near offsite areas along the proposed causeway route. These agricultural land cover types are located at the north end of the proposed causeway in Elsinboro Township. These plant communities consist of cultivated crops and adventitious weedy species. The proposed causeway would disturb 12.6 ac of agricultural land in the vicinity. The causeway would permanently disturb 12.4 ac and temporarily disturb 0.2 ac. No permanent or temporary impacts to agricultural lands would result from onsite building activities at the ESP site. The affected agricultural lands represent less than 1 percent of agricultural lands available in the vicinity (PSEG 2014-TN3452). These impacts would not noticeably affect the available agricultural habitats in the vicinity.

2.3 Noise and Fugitive Dust Impacts

Preconstruction and construction activities on the PSEG Site and vicinity that produce noise and fugitive dust likely would displace wildlife into habitat surrounding work areas. Peak noise level associated with preconstruction and construction activities would be 102 A-weighted decibels (dBA) 50 feet away from work areas and would attenuate to 58 dBA 1,500 ft away. Behavioral effects attributed to noise could decrease chances for wildlife survival and successful reproduction. Effects on wildlife can range from nonexistent to serious, depending on the species and the situation (Larkin 1996-TN772). During frequent noise events that exceeded 80 dBA, waterfowl activities demonstrated only minimal responses to individual events with no noticeable disruptions of typical behavior patterns, indicating that avian species quickly

accommodated to the noise events (Fleming et al. 2001-TN2419). It is anticipated that general noise levels from preconstruction and construction would dissipate within a short distance to ambient levels well below that which would normally cause a response in wildlife (NRC 2013-TN2654).

Principal noise sources at an operating nuclear power plant include natural draft and mechanical draft cooling towers, transformers, and loudspeakers (NRC 2013-TN2654). The bounding noise level from the proposed new nuclear power plant at the PSEG Site for operational noise emissions is associated with fan-assisted natural draft cooling towers (NDCTs), as presented in the Site Safety Analysis Report in the PSEG ESP application (PSEG 2014-TN3453). The estimated dBA noise emission for this type of cooling tower is 60 dBA at 1,000 feet. Noise measurements recorded on the site demonstrate that existing noise levels attenuate to a maximum of 51.6 dBA (a value typical of ambient low noise environments) near the site boundary (PSEG 2014-TN3452).

Noise from onsite sources associated with the proposed site attenuates with distance. For example, a source with a noise level of 50 dBA at 1,000 ft has a noise level of 44 dBA at 2,000 ft from the source, and a source with a noise level of 60 dBA at 1,000 ft has a dBA of 54 at 2,000 ft. A 2009 baseline ambient noise survey indicates noise from sources at the existing HCGS and SGS facilities attenuates to levels that generally represent background noise values in natural environments (Table 3). This noise level is similar to that measured near the PSEG Site boundary. Noise sources within the adjacent marsh environment include wind, rustling of reeds and grasses (Phragmites), and animal noises (frog calls, bird songs, etc.) (PSEG 2014-TN3452). There are no known Federally listed threatened or endangered terrestrial species within the vicinity of the PSEG Site that potentially could be affected by plant operation noise. In addition, the expected noise level is well below threshold levels that would generally exhibit a response in wildlife populations. Thus, effects of noise from operation of the proposed site are expected to be minimal.

Table 3. Ambient Noise Levels at HCGS and SGS in February 2009

Monitoring Location	Location Specific Attributes	Noise Levels (dBA)	
		Day Leq[(a)]	Night Leq[(a)]
1	Open area 500 ft south of SGS switchyard near Delaware River shoreline	58.9	57.4
2	Open area near meteorological tower	51.6	51.6
3	Open area adjacent to high-use onsite road	54.3	65.6
4	Open area under 500 kV transmission line	53.2	53.6
5	Open area near HCGS cooling tower, small arms firing range, and low-use onsite road	60.9	61.5
6	Open area near Delaware River shoreline	43.4	51.6
7	Open area near material services building, HCGS intake pump house, and Delaware River shoreline	52.0	51.6

(a) Leq is the true equivalent sound level measured over the run time.

Source: PSEG 2014-TN3452.

PSEG proposes to suppress fugitive dust on the PSEG Site and offsite preconstruction and construction areas by using water from local stormwater retention ponds (PSEG 2014-TN3452). The impact of fugitive dust to wildlife species would be negligible.

2.4 Potential for Wildlife Collisions with Human-made Structures

Avian and bat collisions with human-made structures can be attributed to numerous factors related to species characteristics such as flight behavior, age, habitat use, seasonal and diurnal habitats, and environmental characteristics such as weather, topography, land use, and orientation of the structures. This is a particular concern in the area of the PSEG Site because it is in the Atlantic Flyway, a major bird migration route. Additionally, bat hibernacula are known to occur in northern and central portions of Salem County, New Jersey. Bird and bat collisions with construction equipment, such as cranes or new structures, have the potential to occur at the PSEG Site. Studies of avian and bat collisions with elevated construction equipment are lacking. However, surveys conducted in the vicinity of other human-made structures, such as NDCTs and wind turbines, indicate that avian and bat mortalities as a result of collisions could occur. The findings of NUREG–1437, *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), demonstrated that mortalities as a result of avian collisions with existing structures at nuclear power plants are minor and typically occur with structures greater than 300 feet tall (NRC 2013-TN2654). In addition, a study on bat collisions with wind turbine towers indicated that only a small fraction of bats collide with towers, and the collisions weren't sufficient to alter populations (Erickson et al. 2002-TN771). The tallest structure on the PSEG Site is the 512-ft NDCT associated with HCGS (PSEG 2014-TN3452). During a yearlong study from 1985 to 1986, PSEG counted 30 avian mortalities with no Federally or State-listed endangered or threatened species noted (PSEG 1987-TN2893). Therefore, the effects of such collisions during preconstruction and construction at the PSEG Site are expected to be negligible.

2.5 Cooling System Impacts on Vegetation

Operation of cooling systems for a proposed new nuclear power plant at the PSEG Site poses the most significant risk to vegetation. The proposed cooling systems will use a recirculating (closed cycle) cooling water system that includes NDCTs, mechanical draft cooling towers (MDCTs), or fan-assisted cooling towers during normal operations. The circulating water system (CWS) cooling towers would be the tallest structure on the site at a potential height of 600 ft and would dissipate heat at a rate of 1.508×10^{10} Btu/hour with evaporation losses as high as 25,264 gpm and a drift loss as high as 12 gpm. The service water system (SWS) would provide cooling functions for systems not serviced by the CWS during operation and during cooldown, refueling, and plant startup modes. The shorter SWS cooling towers dissipate heat at a maximum rate of 2,284 gpm and a maximum drift loss of 4 gpm (PSEG 2014-TN3452). Because the effects from the SWS cooling towers would be less significant than the CWS cooling towers, discussion of potential impacts as a result of cooling system operation will be limited to the CWS cooling towers.

Heat from operation of the proposed new nuclear power plant would be transferred to the atmosphere in the form of water vapor and drift from cooling towers. Vapor plumes and drift can affect crops, ornamental vegetation, and native plants, while water losses can affect shoreline

habitat. Total dissolved solids found in the vapor and drift have the potential to be deposited onto foliage or soil and cause visible damage (e.g., necrotic tissue and other deformities) and/or chronic effects (e.g., reduced growth and increased susceptibility to disease). NUREG–1555, Section 5.3.3.2, indicates that plants are generally not damaged by salt deposition rates of 1 to 2 kg/ha per month. Salt deposition rates greater than 10 kg/ha per month during the growing season have the potential to cause leaf damage in some vegetation species (NRC 2013-TN2654).

The linear mechanical draft cooling tower (LMDCT) has greater potential for salt drift than other proposed cooling tower structures. Therefore, discussion of salt deposition as a result of cooling tower drift will be limited to the deposition rate of the LMDCT. The results of Seasonal and Annual Cooling Tower Impacts prediction code modeling conducted by PSEG for the proposed site shows that the maximum salt deposition rate during any season is 1.31 kg/ha per month (1.17 lb/ac per month) during the winter. The maximum expected salt deposition rate in any direction is 0.89 kg/ha per month (0.80 lb/ac per month). These salt deposition rates fall within the rate described by NUREG–1555 as generally not damaging to plants (NRC 1996-TN288; NRC 1999-TN289).

Analyses performed by PSEG have shown the cooling tower drift over terrestrial habitats is primarily to the east (within coastal wetlands) (Figure 4) and southeast on the PSEG Site. Most of the plant communities within the salt drift zone that would be exposed to drift from the PSEG cooling towers are salt marsh or brackish marsh ecosystems dominated by species (*Phragmites australis* and *Spartina alterniflora*) with medium to high salinity tolerance. Surveys conducted previously at the PSEG Site did not record any impacts from salt deposition due to drift from the existing HCGS NDCT for any specific plant species. Damage to native vegetation has not occurred at HCGS, which uses brackish water for cooling and represents a comparatively high probability of impact from operation of natural draft towers (NRC 1996-TN288; NRC 1999-TN289; PSEG 2014-TN3452).

Drift deposition also has the potential to damage vegetation through soil salinization. However, soil salinization usually does not occur in areas where rainfall is sufficient to leach salts from the soil profile. In humid environments, effects of drift deposition on soils appear to be transitory, if they can be detected at all (NRC 1996-TN288; NRC 1999-TN289).

Previous evaluations of increased fogging, icing, humidity, and/or precipitation due to cooling tower drift have been conducted for nuclear power plants with cooling towers (natural draft and mechanical draft). No significant impacts were reported as a result of these evaluations (NRC 1996-TN288; NRC 1999-TN289). In addition, based on an analysis conducted for the proposed site, the duration of any fogging and other cooling tower induced precipitation events would be expected to be low (PSEG 2014-TN3452).

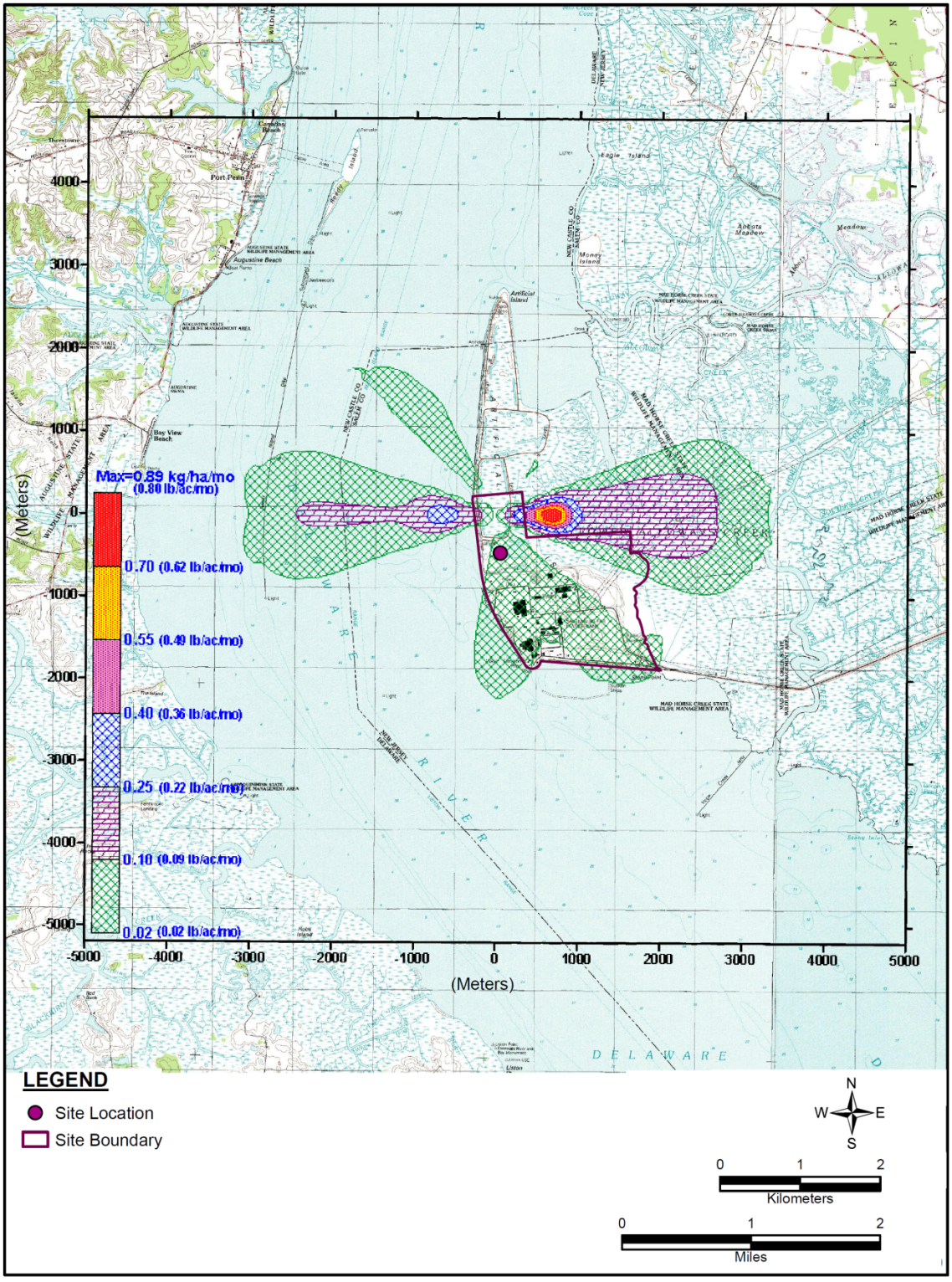

Figure 4. LMDCT Salt Deposition Rates (Source: Modified from PSEG 2014-TN3452)

Based on these results, combined with the nature of the local plant communities, the potential effects of proposed site cooling tower operation on surrounding plant communities on the PSEG Site and in the vicinity would be expected to be minimal (NRC 1996-TN288; NRC 1999-TN289).

2.6 Impacts of Artificial Light

Artificial light can affect wildlife by both disorientation and attraction. Night migrating bird species can be impacted when meteorological conditions, such as inclement weather, bring them into close proximity with artificial lighting. Birds may become disoriented and collide with each other or structures, become exhausted, or be taken by predators (Longcore 2004-TN3189). Artificial lighting may affect terrestrial mammal nocturnal predator–prey relationships (Beier 2006-TN2380). Light pollution also may have significant negative impacts on the selection of flight routes by bats (Stone et al. 2009-TN3190). When exposed to artificial light, green frogs were found to exhibit fewer advertisement calls and moved more frequently than they did under ambient light conditions; this could result in potential impacts on recruitment rates, leading to effects on population dynamics (Baker and Richardson 2006-TN2379).

Down shielding of lights to prevent light from being directed into the night sky can help reduce the effect on migratory birds. This means lights can be shielded so that the pattern of illumination is below the horizontal plane of the light fixture. However, this will not prevent potential impacts to other species, such as frogs (Longcore 2004-TN3189).

Additional lighting effects could be lessened by using low sodium lighting. Down shielding, as described above, could be employed to further mitigate certain impacts. Operating experience with HCGS has shown that bird collisions with units have not been a noticeable issue (PSEG 1987-TN2893). It is not expected that the incremental effect of lighting added for the proposed site would increase impacts to noticeable levels, particularly if down shielding and other best management practices (BMPs) were to be employed. With the use of appropriate BMPs, impacts to terrestrial wildlife from the additional lighting at the new PSEG Site are expected to be minimal.

2.7 Impacts of Increased Vehicle Traffic

Increased traffic as a result of operating a new nuclear power plant at the PSEG Site has the potential to increase wildlife mortality caused by vehicle collisions. PSEG estimates that the onsite workforce could increase by 600 employees during normal day-to-day operations and by 1,000 employees during refueling operations (PSEG 2014-TN3452). The increase in workforce population would increase the amount of vehicle traffic on the site and in the vicinity. Local wildlife populations could decline if roadkill rates exceed the rates of reproduction and immigration. However, roadkills occur frequently, and wildlife populations are not significantly affected (Forman and Alexander 1998-TN2250). No individual Federally or State-listed threatened or endangered species were identified that would be adversely affected by vehicle traffic. Therefore, the effect of increased traffic on terrestrial wildlife populations on the site and in the vicinity would be minimal.

The proposed causeway will be constructed on piers to preserve wildlife travel corridors. By allowing wildlife travel below the causeway, this elevated design also will help to minimize the

possibility for wildlife–vehicle collisions and wildlife mortality over conventional roadways built on embankments. The elevated design of this structure will also minimize potential impacts to plant communities. Permanent impacts to wetland plant communities along the causeway will be limited to placement of piers and direct shading. Shading could potentially result in some alteration of plant community makeup under the bridge and a reduction in primary productivity (PSEG 2014-TN3452). However, because the effect will be to a small area relative to the overall plant community, impacts are expected to be minimal.

2.8 Impacts to Shoreline Habitat

Based on the proposed Site Utilization Plan (as shown in Figure 3), the western shoreline of PSEG will be modified with the development of shoreline plant features that include the water intake structure, heavy haul road, and barge facility. In total, 9.5 ac of nearshore water and riparian shoreline will be impacted below the coastal wetland boundary, also known as the New Jersey upper wetland boundary. Based on the Site Utilization Plan, the shoreline will be constructed as a stabilized shoreline (using riprap or other appropriate treatment) (PSEG 2014-TN3452). This will be the condition of the shoreline during the operational phase of the PSEG project.

The already disturbed nature of the shoreline before the proposed stabilization likely provided marginal habitat for most terrestrial species. The main use of these areas would have been some riparian zone/edge birds, as well as waterfowl and other birds on the open water. Open water habitat will remain during the operational stage of the PSEG project (PSEG 2014-TN3452). The riparian zone, on the other hand, will provide little habitat with the establishment of the riprap bank. However, there are large areas of similar shoreline habitat of higher quality in the vicinity of the site. Therefore, it is expected that the shoreline modifications in place during the operational stage of the PSEG project will have a negligible impact on terrestrial wildlife populations.

2.9 Impacts of Transmission Lines

This section addresses potential operational effects of transmission systems on terrestrial resources. This includes the transmission system itself and any ROW associated with the proposed site. The transmission needs for the proposed site include two to three new onsite lines crossing between two proposed switchyards on the PSEG Site. Two potential offsite transmission line routes are being considered by the regional transmission line provider to support grid stability and are discussed as part of cumulative impacts.

2.9.1 Vegetation

The Public Service Electric and Gas Company (PSE&G) is responsible for maintaining the transmission lines and ROWs associated with HCGS and SGS in New Jersey and to ensure that important terrestrial habitats and species are protected in accordance with resource agency approved BMPs. Potential effects from operation and maintenance of the new transmission systems are based on established procedures PSE&G uses for existing lines (PSEG 2014-TN3452).

PSE&G transmission lines and ROWs are surveyed by air and ground approximately five times a year to ensure the physical and electrical integrity of transmission line supports, hardware, insulators, and conductors are acceptable for safe and reliable service. Climbing inspections of structures are performed approximately every three years, with the frequency dependent on the age of the line (PSEG 2014-TN3452).

PSE&G employs maintenance measures to keep woody vegetation at least 30 ft from conductors wherever transmission lines cross wooded areas. The primary method used for maintenance of the transmission line ROW is mechanical clearing. For areas that contain wetlands, ROW maintenance is typically performed manually in accordance with resource agency approved BMPs. In accordance with an integrated pest management program, herbicides are used to prevent sprouting from fast growing woody vegetation. For any herbicide applications that may be required in or near waterways or wetlands, only herbicides specifically labeled for use in waterways are used, consistent with U.S. Environmental Protection Agency (EPA) label requirements and NJDEP regulations. Periodic inspections are conducted to ensure that appropriate clearances between tall vegetation and conductors are maintained (PSEG 2014-TN3452).

Important habitats on the PSEG Site are wetlands. It is not anticipated that transmission line ROW maintenance normally required to control woody vegetation will be necessary on the site because the onsite transmission lines run through herbaceous coastal wetlands. These onsite coastal wetlands are disturbed habitats dominated by common reed that does not grow tall enough to interfere with overhead transmission lines. Consequently, onsite transmission line maintenance activities most likely will be restricted to minimal mechanical clearing and/or herbicide application. Therefore, impacts to important terrestrial habitats resulting from the operation and maintenance of onsite transmission line systems are expected to be minimal (PSEG 2014-TN3452).

Saltmarsh cordgrass is the only identified important plant group on the PSEG Site. Saltmarsh cordgrass is essential to the function of the coastal marsh and is an important component of coastal wetlands in marsh restoration sites. Cordgrass has not been observed in onsite areas near the planned transmission lines. Furthermore, the transmission lines are elevated and would not interfere with any future establishment of these plants on the site. Also, as stated above, the need for routine use of herbicides or mechanical clearing as part of any onsite transmission line maintenance activities would be minimal, if required at all. Therefore, impacts to saltmarsh cordgrass associated with the maintenance and operation of the onsite transmission lines are not anticipated (PSEG 2014-TN3452).

2.9.2 Wildlife

Section 4.5.6.2 of the GEIS provides a thorough discussion of bird collisions associated with operating transmission lines. Avian collisions with transmission systems are dependent on site-specific variables such as nesting, foraging, and roosting. Additionally, factors such as line orientation to flight patterns and movements, species composition, and line design are factors in avian collisions. The GEIS determined that bird collisions with transmission lines were more likely to occur with large-bodied species such as raptors, and smaller species such as song birds were more likely to collide with towers (NRC 2013-TN2654).

Threatened and endangered species of large-bodied and small-bodied birds have the potential to be affected where transmission lines pass through areas where these species are concentrated. Several State-listed species have the potential to occur on the PSEG Site or in the vicinity. However, field surveys conducted from 2009 to 2010 did not identify significant concentrations of these species (PSEG 2014-TN3452). Additionally, PSEG's wildlife management practices would be required to comply with the Migratory Bird Treaty Act regarding nest removals and maintenance activities. PSEG includes appropriate measures in the design of transmission lines to reduce the potential for avian collisions. In addition, current design standards for phase-to-phase and phase-to-ground clearances for high transmission voltages are generally considerably greater than wing-to-wing or wing-to-foot spans for even the larger birds. Electrocution is rarely a problem for 500 kV transmission lines (PSEG 2012-TN2389). Therefore, bird mortality resulting from the collisions with transmission line systems on the PSEG Site or in the vicinity is expected to be a small fraction of the total mortality and would not pose as a significant threat to overall populations.

Transmission line ROW management practices have the potential to affect wildlife on the PSEG Site and vicinity. ROW development represents a barrier to larger, more mobile species that require continuous tracts of forested habitat and to smaller, less mobile species that have difficulty crossing disturbed habitat (NRC 2013-TN2654). Much of the proposed transmission line ROWs on the site have been developed previously or are dominated by common reed (PSEG 2014-TN3452). Because of the vegetation types in the proposed onsite transmission line corridor, PSEG does not expect a need to conduct maintenance activities of the transmission line ROWs. Transmission line ROWs on the PSEG Site are not expected to adversely impact terrestrial wildlife species.

2.9.3 Electromagnetic Fields

Studies have indicated that electromagnetic fields (EMFs) associated with transmission lines could affect flora and fauna (NRC 2013-TN2654). Plant foliage in the vicinity of strong electromagnetic fields (greater than 1,100 kV) has been shown to incur damage to tips of leaves and buds, similar to the stresses that may occur as a result of drought. However, the damage is limited to those plants located close to transmission lines and generally does not interfere with overall growth. Additionally, transmission lines energized at levels less than 765 kV are not expected to affect most terrestrial fauna. The transmission lines that would be constructed for PSEG would operate only at 500 kV (PSEG 2014-TN3452), which is much lower than the 1,100 kV threshold for EMF effects on flora and 765 kV threshold for terrestrial fauna. Therefore, the increased EMF posed by the operation of the proposed transmission lines is expected to have only a minimal impact on terrestrial flora and fauna.

3.0 FEDERALLY LISTED SPECIES CONSIDERED

Based on NRC review of sources from FWS and the states of Delaware and New Jersey, one Federally threatened bat species and one Federally threatened bird species were identified with the potential to be present in the site vicinity that was not previously discussed in the August 2014 BA (NRC 2014a, TN4268). These species are northern long-eared bat (*Myotis septentrionalis*) and rufa red knot (*Calidris canutus rufa*). Accordingly, this BA focuses on

evaluating the potential effects from building and operating a new nuclear plant at the PSEG Site on the northern long-eared bat and rufa red knot.

3.1 Northern Long-eared Bat

3.1.1 Species Description

The northern long-eared bat is a medium size bat species with adults averaging 0.2 to 0.3 ounces. Female bats are slightly larger than their male counterparts. Their average body length is from 3.0 to 3.7 inches long. They are medium to dark brown on their back, ears, and wing membranes and tawny to pale brown on their ventral side. The most distinguishing characteristic of the bat is its long ears, which can extend up to 0.2 inches beyond its muzzle. The ears are pointed and symmetrical with a long tragus (0.4 inches) (80 FR 17974-TN4216).

3.1.2 Distribution and Habitat

The northern long-eared bat's eastern range extends from Maine to the Florida panhandle. However, populations are found in patches and are more common in the northern part of its range than the southern portions. Over 780 hibernacula have been discovered in its range in the United States with only a few individuals in each hibernaculum (80 FR 17974-TN4216).

Hibernacula used by northern long-eared bats are typically large, with large passages, constant cool temperatures, high humidity, and no air currents. Additionally, northern long-eared bats have been seen overwintering in railroad tunnels, storm sewers, and other unexpected retreats. In the summer, northern long-eared bats roost underneath bark or in crevices or cavities of live trees and snags of various tree species. Tree species include black oak (*Quercus velutina*), northern red oak (*Quercus rubra*), silver maple (*Acer saccharinum*), black locust (*Robinia pseudoacacia*), American beech (*Fagus grandifolia*), sugar maple (*Acer saccharum*), sourwood (*Oxydendrum arboreum*), and shortleaf pine (*Pinus echinata*). They also have been observed roosting in or under the eaves of human-made structures such as barns, buildings, sheds, and cabins. Northern long-eared bats are not a long distance migratory species, and movements between summer and winter hibernacula are between 35 mi and 55 mi. Breeding occurs between late July and early October. Home ranges are approximately 46 to 425 ac for females and 161 ac for males. Northern long-eared bats emerge at dusk and fly along hillsides through forest understory, gleaning insects from vegetation. They have a diverse diet of insects, most commonly beetles, moths, and arachnids. Mature forests are an important habitat for the northern long-eared bat's foraging technique (80 FR 17974-TN4216).

Maternity roosts and hibernacula for the northern long-eared bat are known to occur in the following New Jersey counties: Atlantic, Bergen, Burlington, Camden, Hunterdon, Mercer, Morris, Ocean, Passaic, Salem, Somerset, Sussex, and Warren (FWS 2014-TN3208). No surveys were conducted on the PSEG Site for bats species. However, suitable habitat for hibernacula and maternity roosts are limited in the 6-mi vicinity. Important foraging habitat does not exist on the PSEG Site. Northern long-eared bat are known to occur in the northern and central portions of Salem County, New Jersey (80 FR 17974-TN4216).

3.1.3 Population Trends and ESA Status

The northern long-eared bat was proposed for listing under the ESA on December 2, 2013, and was listed as threatened on May 4, 2015. The northern long-eared bat was most abundant in the eastern portion of its range. It has experienced a severe and rapid decline, estimated at approximately 99 percent, since the introduction of white nose disease (first discovered in 2007) in its northeast range. The primary threat to the northern long-eared bat is attributed to white nose disease caused by the fungus *Geomyces destructans.* The threat of white nose disease is expected to increase and continue to extirpate northern long-eared bat populations as it spreads throughout its range (80 FR 17974-TN4216).

3.2 Rufa Red Knot

3.2.1 Species Description

The rufa red knot is 9-11 (in) in length and considered a medium size shorebird. In the spring adults are finely mottled with colors that include grays, black, and ochre running into stripes on the crown. The throat, breast and sides of the head are a cinnamon-brown colorand there is a dark gray line through the eye. The abdomen and undertail coverts are white, and the uppertail coverts are white and barred with black. Adult rufa red knots in winter are pale ashy gray above from the rump to the crown and feathers on the back are narrowly edged with white. The underparts are white and the breast is lightly streaked and speckled, with flanks narrowly barred with gray. In the fall the underparts of some individuals have traces of “red” from the spring (79 FR 73705-TN4267).

3.2.2 Distribution and Habitat

Red knots migrate annually between their breeding grounds in the Canadian Arctic and wintering locations in the Southeast United States, Northeast Gulf of Mexico, northern Brazil, and Tierra del Fuego located on the southern tip of Argentina. It uses the Delaware Bay as a final stopover for migrations to breeding grounds in the spring.

Red knots are found primarily on beaches of sand or peat at the mouths of tidal creeks, along the edge of tidal marshes dominated by salt marsh cordgrass (*Spartina alternaflora*) and saltmeadow cordgrass (*S. patens*), and in salt pannes (shallow, high salinity, mud-bottomed depressions on the marsh surface) and shallow coastal ponds or embayments. Radio tracking showed that most of the time rufa red knots roosted along the shoreline or in sandy washovers above the high tide line, but rufa red knots also roosted in bare, shallow-water openings 0.5 to 1.3 mi (850 to 2,050 m) inland in adjacent salt marsh. The preference for inland roost sites was greater at night and during spring tides, and Delaware Bay is the only area in which rufa red knots have been observed roosting inland.

Rufa red knots must take advantage of seasonally abundant food sources at migration stopovers to build up fat reserves for the next leg of migration. Delaware Bay serves as a seasonal migration stopover for rufa red knots due to the abundance of horseshoe crab eggs available.

3.2.3 Population Trends and ESA Status

The rufa red knot was added to the Federal list of candidate species in 2006. On December 11, 2014, the final rule was published to list the rufa subspecies as threatened under the ESA. The effective date of listing was January 12, 2015. A decline in the rufa red knot population in the 2000s was caused mainly by a reduction in the availability of food resulting from increased horseshoe crab harvests, which was compounded by small changes in the timing that the red knot arrived at Delaware Bay. It is also thought that the red knot may be particularly susceptible to impacts of global climate change, which is likely to effect their breeding grounds in in the arctic tundra. Other likely factors in the bird's decline include impacts on quality and quantity of coastal habitats due to rising sea levels, rangewide quantity and timing of invertebrate food resources, and storm and weather pattern severity, timing and location (79 FR 73705-TN4267).

4.0 PROPOSED ACTION EFFECTS ANALYSIS

This section provides descriptions of potential building and operations impacts on the Federally threatened northern long-eared bat and rufa red knot. Building and operational impacts that potentially could affect these species were evaluated based on habitat presence and life history considerations as well as the type and spatial and temporal nature of the impacts. The primary threats to the Federally threatened northern long-eared bat and Federally threatened rufa red knot from building and operating a new nuclear power plant on the PSEG Site include habitat reduction, fragmentation, degradation, and the potential for mortality as a result of increased vehicle traffic and collisions with site structures.

4.1 Habitat Loss

Habitat suitable for supporting hibernacula and maternity roost for the northern long-eared bat does not exist on the PSEG Site. Additionally, the PSEG Site does not provide suitable habitat for foraging northern long-eared bats. Therefore, the review team concludes that there will be no effect on the northern long-eared bat as a result of building and operating a new nuclear power plant on the PSEG Site.

The PSEG Site does not contain suitable habitat or forage to support the rufa red knot. Therefore, the review team concludes that there will be no effect on the rufa red knot as a result of building and operating a new nuclear power plant on the PSEG Site.

4.2 Cooling System Impacts on Vegetation

The main concern would be salt drift and deposition that could affect vegetation in the surrounding area. However, calculated salt deposition rates fall within rates that are generally not damaging to plants. Furthermore, most plants within the salt drift zone for the PSEG Site have medium to high salinity tolerance. The review team has determined that there would be no effect to northern long-eared bat or rufa red knot habitat from PSEG Site cooling system operations.

4.3 Wildlife Collisions with Plant Structures

There has been documentation of bat and bird mortality as a result of collisions with human-made structures. However, these collisions do not significantly affect bat and bird populations. Additionally, the PSEG Site does not contain habitat suitable for northern long-eared bat hibernacula, maternity roosts, or foraging. Nor does the PSEG Site contain suitable habitat or forage to support the rufa red knot. Therefore, bat and bird mortality as a result of collisions with human-made structures is not expected to occur on the PSEG Site.

4.4 Impacts of Increased Vehicle Traffic

Vehicle traffic is expected to increase as a result of building and operating a new nuclear power plant at the PSEG Site. Increased traffic associated with the operations of the new nuclear power plant has the potential to increase wildlife roadkills due to collisions with vehicles, and this is known to be a mortality factor for bog turtles. The proposed causeway would be built on piers to limit impacts to wildlife corridors. However, increased traffic would not be expected to be a significant cause of mortalities in northern long-eared bat or rufa red knot populations.

4.5 Transmission Lines

The operation and maintenance of onsite transmission lines are not expected to affect the northern-long eared bat or rufa red knot. Transmission lines on the PSEG site would disturb some of the coastal wetland areas. Maintenance of transmission lines in this area would not require disturbing the natural vegetation that would grow under the lines. There is a potential for transmission lines to cause bat or bird mortality as a result of collisions with the lines. However, habitat for the northern long-eared bat and rufa red knot does not exist on the site, and collisions in the vicinity would not be expected to occur in rates that would result in the decline of migrating bats or birds. Therefore, transmission lines on the PSEG Site would not be expected to affect northern long-eared bats or rufa red knots.

5.0 CUMULATIVE EFFECTS ANALYSIS

In addition to impacts from building activities, the following cumulative analysis also considers other past, present, and reasonably foreseeable future projects that could affect the terrestrial and wetland ecological resources also affected by building and operating a new nuclear power plant at the PSEG Site. Cumulative effects, as defined in 50 CFR 402.02, are those effects of future State or private activities, not involving Federal activities, which are reasonably certain to occur within the action area. Future Federal actions are not considered in the definition of cumulative effects. Direct and indirect impacts to terrestrial and wetland resources resulting from the building and operation of a new nuclear power plant on the PSEG Site and the proposed causeway would be limited to Salem County, New Jersey. However, the cumulative effects on terrestrial and wetland resources when combined with other actions would extend to areas within the Middle Atlantic Coastal Plains, Northern Piedmont, and Atlantic Coastal Pine Barrens ecoregions. For purposes of this cumulative analysis, the geographic area of interest for terrestrial and wetland resources is defined as the Middle Atlantic Coastal Plains, Northern Piedmont, and Atlantic Coastal Pine Barrens Level III ecoregions within 50 mi of the PSEG Site.

This geographic region of interest includes Salem County, New Jersey, and other counties, or portions of counties, in New Jersey, Delaware, Pennsylvania, and Maryland.

5.1 Habitat Loss

The Atlantic Coastal Plains in the geographic region of interest consist of the Middle Atlantic Coastal Plain, Northern Piedmont, and Atlantic Coastal Pine Barrens. The Middle Atlantic Coastal Plain is characterized as nearly flat topography and consists of swampy, marshy, and frequently flooded areas. Upland areas are dominated by loblolly-shortleaf pine forests and lowland, and tidally influenced areas support tidal marshes, swamps, floodplain forests, and pocosins. Marshes are dominated by cord grass and salt-meadow grass. The Northern Piedmont is characterized by irregular plains and low hills. It is dominated by mixed oak, chestnut oak, hemlock-mixed hardwood, and sugar maple-mixed hardwood forests. The Atlantic Coastal Pine Barrens are low undulating part of the Atlantic Coastal Plain. Native habitat in this area consists of pine-oak woodlands, mixed oak and beech-oak forests, salt marshes, swamps, freshwater marshes, and floodplains (Woods et al. 2007-TN3227).
The Atlantic Coastal Plains ecoregion has been altered significantly since the beginning of European settlement in the 1600s as a result of agriculture, silviculture, and urban development. The geographic region of interest includes the same habitat types as those found in the 6-mi vicinity of the site. Habitats within the 6-mi vicinity of the PSEG Site include barren land, developed land, cultivated cropland, pasture hay, deciduous forest, evergreen forest, mixed forest, emergent herbaceous wetland, woody wetland, and open water. However, the overall percentages of each habitat differ when expanding from the 6-mi vicinity to encompass the geographic region of interest. Open water associated with the Delaware River, Delaware Bay, and other open water areas occupies 791,821 ac (15.7 percent) of the area. Emergent herbaceous wetland occupies 199,603 ac (4.0 percent), and woody wetland occupies 279,248 ac (5.5 percent). Agricultural land consisting of cultivated cropland (1,075,101 ac) and pasture hay (774,432 ac) account for 36.8 percent of the land cover. Deciduous forest occupies 1,028,552 ac (20.5 percent) of the habitat in the geographic region of interest.

Developed lands, which include high, medium, low, and open space developed land, occupy 630,983 ac (12.6 percent). Barren lands account for 54,142 ac (1.1 percent) of the land cover. Evergreen and mixed forest habitat accounts for 190,352 ac (3.8 percent) of land cover in the geographic region of interest (PSEG 2014-TN3452).

The USACE created Artificial Island in the early 1900s with the authorization of the Rivers and Harbor Act of 1896. The act authorized the creation of a 30 ft channel from Philadelphia to Delaware Bay and covered 56 miles of proposed channel. The amount of material to be removed was estimated at 34,953,000 yd^3 of dredge material and 24,000 yd^3 of rock. Six locations, including Baker Shoal and Stony Point Shoal, were evaluated as potential disposal sites. Baker Shoal and Stony Point Shoal were enclosed in 1900 by bulkheads to form a deposit basin now known as Artificial Island (Snyder and Guss 1974-TN2280). Since the development of Artificial Island, several dredging projects have been conducted that have altered the terrestrial and wetland ecology of the region.

Most of the other operational projects in the geographic region of interest have resulted in the reduction, fragmentation, and degradation of terrestrial and wetland habitat in the geographical region of interest. These projects include several fossil fuel energy facilities such as Delaware City Refinery, Deepwater Energy Center, Carneys Point Generating Plant, Pedricktown Combined Cycle Cogeneration Plant, Cumberland County Landfill Gas-to-Energy Plant, Vineland Municipal Electric Utility, Sherman Ave. Energy Center, Carl's Corner Energy Center, and Cumberland Generating Station. Additionally, there are four operating nuclear power plants located in the geographic region of interest that have contributed to adverse cumulative effects to terrestrial and wetland resources: HGS, SGS, Peach Bottom Atomic Power Station, and Limerick Generating Station. The Salem County Solid Waste Landfill also operates in this region. These facilities are expected to have continuing effects on terrestrial and wetland resources in the region of interest during the operational period of a new nuclear power plant at the PSEG Site.

Future residential development and further urbanization of the area would result in the continued increase in fragmentation and loss of habitat. The New Jersey Department of Labor and Workforce Development projected that the population of Salem County would increase by approximately 5 percent between 2010 and 2030. The overall growth of the geographic region of interest is expected to increase as well from 2010 and 2030 (NJLWD 2014-TN3332). Future urbanization in the geographic region of interest could result in further losses of agricultural lands, wetlands, and forested areas. Urbanization would reduce area in natural vegetation and open space and would decrease connectivity among wetlands, forests, and other wildlife habitat. The loss of habitats as a result of urbanization would result in added pressures to the remaining habitat available for wildlife populations. However, it is not expected that these activities would substantially affect the overall availability of wildlife habitat or travel corridors near the geographic region of interest.

Some of the projects in the geographic region of interest include site redevelopment, including redevelopment resulting from a base realignment and closure for Camp Pedricktown, Shieldalloy site decommissioning, Gateway Business Park, and the Millville Municipal Airport. The Camp Pedricktown redevelopment and Shieldalloy facility are currently developed/disturbed sites. In addition, the Gateway Business Park in Oldmans Township, Salem County, is a light industrial complex consisting of 284 ac. The business park is planning to develop three sites with approximately 25 ac. The site is mostly developed with little terrestrial and wetland habitat available (Matrix Development Group 2008-TN3273). The proposed Millville Municipal Airport improvements would refurbish the apron terminal at the airport. These projects are not expected to further degrade or fragment terrestrial and wetland ecology resources within the geographic region of interest.

The transmission service provider has determined that a new transmission line and ROW are needed to support grid stability in the geographic region of interest. The new transmission line and ROW are not dependent on whether PSEG builds and operates a new nuclear power plant on the PSEG Site. In its environmental report, PSEG conducted a study of a hypothetical 5-mi wide macro-corridor known as the West Macro-Corridor and transmission line ROW that extends 55 mi from the PSEG Site to Peach Bottom Substation in Pennsylvania. The transmission line ROW within the corridor is expected to be 200 ft wide. The development of the transmission line corridor would cause disturbances to over 1,500 ac of land. Habitats that

could be affected include barren land, deciduous forests, evergreen forests, mixed forest, agricultural land, woody wetlands, and emergent wetlands (PSEG 2014-TN3452). The corridor would be expected to follow existing ROWs to the extent practicable. However, the exact amounts of terrestrial and wetland habitat that would be affected are not known, and it is expected that the project would cause fragmentation and degradation of these resources. The amount of terrestrial and wetland resources affected by the grid stability line would not be a significant amount of the available terrestrial and wetland resources in the region, but mitigation may be required.

Parks and wildlife management areas located in the region of interest include Supawna Meadows National Wildlife Refuge, Fort Mott State Park, Parvin State Park, and Mad Horse Creek WMA. These areas would not be expected to add cumulative impacts to terrestrial and wetland resources and may be affected by regional development. Habitats available in this region potentially could become overburdened with species fleeing areas being developed. The Supawna Meadows National Wildlife Refuge 35 miles south of Philadelphia, Pennsylvania, in Salem County, New Jersey, is recognized as a wetlands of international importance (FWS 2013-TN2530). The refuge covers approximately 3,000 ac and is an important refuge for migratory birds. Fort Mott State Park in Salem County, New Jersey, is a 124-ac facility and was part of the coastal defense system for the Delaware River (NJDEP 2013-TN2532). It provides open field and shoreline habitats as well as recreational activities such as fishing. Parvin State Park is a 2,092-ac facility on the edge of the Pine Barrens and contains coniferous and deciduous forest, open water, and wetland habitats (NJDEP 2013-TN2531). Parvin State Park allows fishing, hunting, and other recreational activities. The proposed Mad Horse Creek project will restore nearly 200 ac of the WMA to address injuries to the shoreline and bird resources resulting from the 2004 Athos I oil spill. NJDEP and the National Oceanic and Atmospheric Administration are proposing a tidal wetlands restoration project that allows for the restoration of *Spartina alterniflora* habitat (NOAA 2008-TN2721). Any unavoidable impacts to wetlands resulting from the construction of the new plant on the PSEG Site and vicinity could be further mitigated by this restoration project. Sensitive wildlife species that use marsh habitats (e.g., bald eagle [*Haliaeetus leucocephalus*] for foraging, northern harrier [*Circus cyaneus*], osprey [Pandion haliaetus]) will be positively affected by this restoration effort. These activities also potentially could improve habitat for the bog turtle.

5.2 Salt Drift, Icing, Fogging, and Increased Precipitation

Limerick Generating Station, Peach Bottom Atomic Power Station, and HCGS use cooling towers as part of their cooling system. These cooling systems have the potential to affect terrestrial or wetland resources in the region as a result of salt drift, icing, fogging, and increased precipitation (NRC 2013-TN2654). Peach Bottom Atomic Power Station uses MDCT, and both the Limerick Generating Station and HCGS use NDCT. Salt drift deposition rates are highest with MDCT but are dispersed further with NDCT. However, most of the effects of salt deposition on vegetation would be localized to the towers. No adverse impacts to terrestrial or wetland resources from fogging, icing, and increased precipitation would be expected as a result of operating cooling systems. The effects of salt drift, icing, fogging, and increased precipitation from the proposed new nuclear power plant at the PSEG Site were evaluated and found to have a negligible effect on terrestrial and wetland resources.

5.3 Climate Change

The “Global Climate Change Impacts in the United States” report, provided by the U.S. Global Change Research Program (GCRP), summarizes the projected impacts of future climate changes in the United States. The report divides the United States into nine regions, with the PSEG Site located in the Northeast region. The GCRP climate models for this region project temperatures to rise 2.5 to 4°F in the winter and 1.5 to 3.5°F in the summer over the next several decades. Winters are projected to be much shorter with fewer cold days and more precipitation. Cities that currently experience few days above 100°F each summer would average 20 or more days. Hot summer conditions would come three weeks earlier and last three additional weeks into the fall. Sea level is projected to rise more than the global average, with more frequent severe flooding and heavy downpours. These projected changes potentially could alter wildlife habitat and the composition of wildlife populations. Large-scale shifts in the ranges of wildlife species and the timing of seasons and animal migration that are already occurring are very likely to continue (GCRP 2014-TN3472).

5.4 Summary of Cumulative Effects

The potential cumulative effects to terrestrial and wetland resources from the construction and operation of a new nuclear plant on the PSEG Site, in combination with the other activities described above, would noticeably alter terrestrial and wetland resources. These activities will result in the loss or modification of terrestrial habitats and wetlands, which potentially could affect important species that live or migrate through the area. Therefore, the incremental contribution of the building and operation of the new nuclear plant on the PSEG Site to cumulative effects would be noticeable in the vicinity of the PSEG ESP site.

Although the PSEG Site does not contain suitable habitat for the Federally threatened northern long-eared bat or the Federally threatened (State-listed) rufa red knot, potential offsite transmission lines along with other actions taken in the geographical area of interest could result in potential effects to these species.

The extent of potential cumulative effects on the northern long-eared bat and rufa red knot would be dependent upon the extent of BMPs taken with the implementation of the various projects in the geographical area of interest. Mitigation or avoidance of sensitive habitat would be an important factor in determining the extent of potential effects.

The proposed new transmission lines to support grid stability have the potential to cross approximately 560 ac of freshwater woody and emergent wetlands (PSEG 2014-TN3452). The addition of the new transmission corridor potentially could cross over 14 miles of streams. Additionally, future urbanization could result in some limited losses of wetlands and streams. State and/or Federal regulations would require mitigation to protect wetlands and streams from future ROW development and urbanization. However, the cumulative effects to terrestrial and wetland resources from these activities and a future new nuclear power plant at the PSEG Site would be noticeable in the vicinity of the PSEG ESP site.

Potential cumulative effects on terrestrial and wetland resources for the site vicinity would result from loss of vegetation as well as loss and fragmentation of wildlife habitat. Such effects will

increase with the continued development of the geographical area of interest, with potential impacts to northern long-eared bat and rufa red knot habitat. Overall, when combined with other past, present, and reasonably foreseeable future actions, the cumulative effects to terrestrial and wetland resources resulting from the building and operation of the new plant on the PSEG Site and the proposed causeway would be noticeable but would not be expected to cause significant overall wildlife species population or ecosystem impacts within the 6-mi vicinity. Because of the presence of extensive similar habitat in the geographic region of interest, potential cumulative effects on terrestrial and wetland resources within this region would be expected to be minimal.

6.0 CONCLUSIONS AND DETERMINATION OF EFFECTS

Building activities would affect terrestrial habitats on the PSEG Site. However, hibernacula, maternity roost, and foraging habitat for the northern long-eared bat do not exist on the PSEG Site, and building activities associated with a new nuclear power plant would have no effect on this species. The PSEG Site does not contain suitable habitat or forage for the rufa red knot, and building activities associated with a new nuclear power plant would have no effect on this species. In addition, PSEG is developing a wetland mitigation plan to compensate for the loss of wetlands and other aquatic resources resulting from the proposed project. This plan would require approval through the Department of the Army permit application submitted to the USACE, Philadelphia District.

Potential impacts to the northern long-eared bat and rufa red knot from operation of the new nuclear power plant would be associated mainly with mortality as a result of collisions with human-made structures on the site. However, bat and bird mortality as a result of collisions is not known to affect overall bat or bird populations. Additionally, northern-long-eared bats and rufa red knots are not known to occur on the PSEG Site and suitable habitat does not exist on the site for either species.

The PSEG Site does not appear to provide suitable habitat requirements to sustain the northern long-eared bat or the rufa red knot. Therefore, habitat disturbed or lost because of the construction of a new nuclear power plant on the PSEG Site should not affect these species. Therefore, the review team has determined that building and operation activities associated with a potential new nuclear power plant on the PSEG Site would have no adverse effects on the Federally threatened northern long-eared bat or Federally threatened rufa red knot.

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